

Flood risk assessment

Property:

8 Olney Avenue, Manchester, M22 8AB

Nation Grid Reference:

382771 388587



Date Issued: 07/09/2021

Description of the development:

Application number: 130552/FH/2021

Erection of a single storey side extension to form additional living accommodation.

Minor extension (household extension less than 250 square meters).



Property location

The site is located at 8 Olney Avenue, Benchill, Manchester, M22 8AB (382771, 388587). Access to the site is gained via Olney Avenue. LiDAR shows the site level to be 44mAOD.



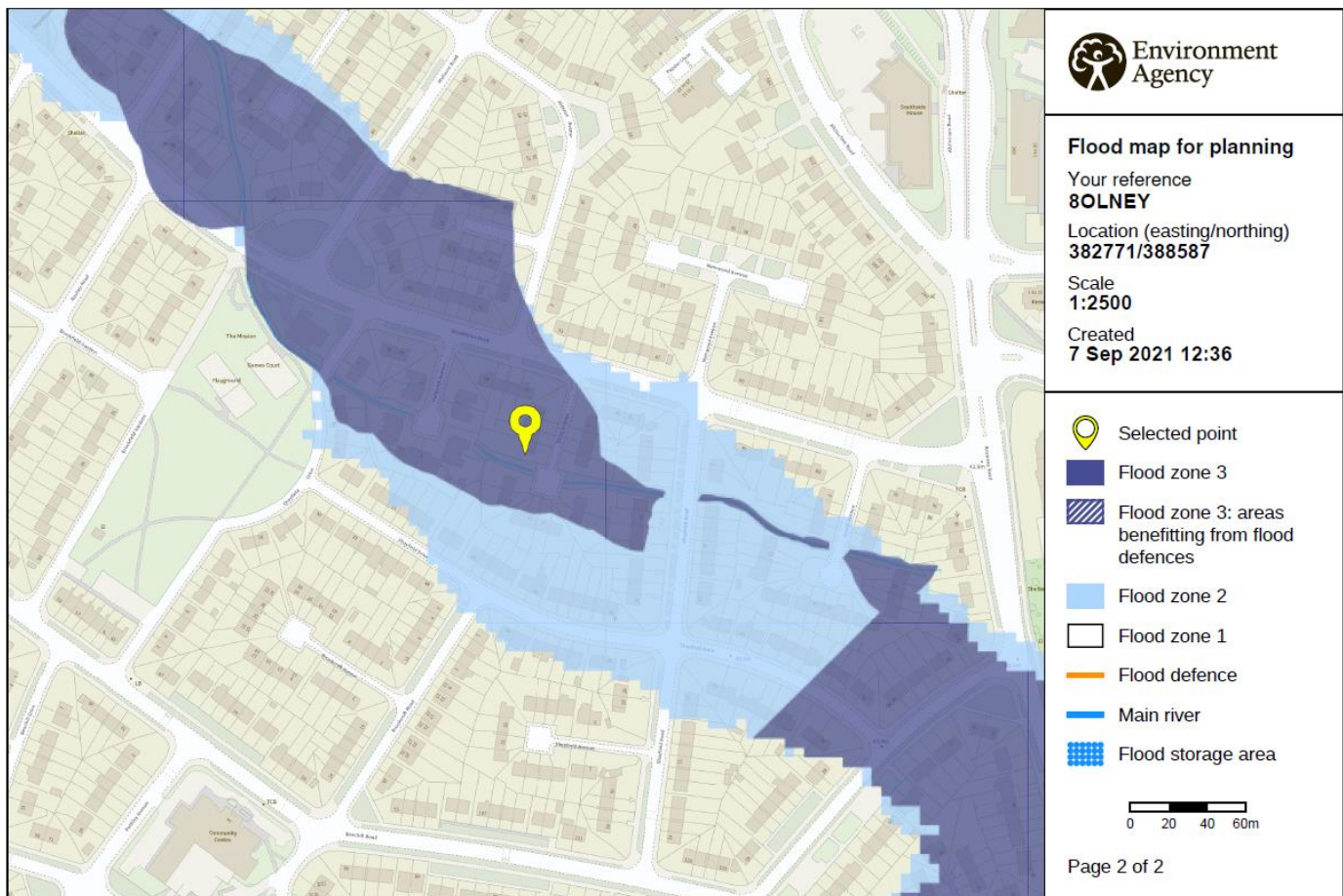
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Assessment of the flood risk

Flood Zone Classification:

The site is within Flood Zone 3.



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Site Flood Risk:

Flood data from the Environment Agent as well as a 'Landmark' flood report have been acquired for advising this assessment. The full report can be found in Appendix B. The main findings are summarised below:

Flood Zone definitions are set out in the National Planning Policy Guidance.

This area has been classified as: **Flood Zone 3**

Note: These flood zones refer to the probability of river and sea flooding, ignoring the presence of defences.

An assessment of the flood risk from all sources.

Type of risk	Level of risk
Rivers (fluvial)	Medium
Sea (coastal)	Low
Surface water	Medium to High
Groundwater	Low
Sewer	Low
Reservoir and canal	Low
Other sources	No other sources of flood risk known

Flood risk from rivers (fluvial)

The site is classified as having a medium risk of flooding from tidal or river sources by the EA mapping and Landmark flood report.

The estimated flood level for the development:

Land assessed as having a 1 in 100 (1%) annual probability of river flooding in any year.

The Environment Agency provided hydraulic model outputs (Appendix C: Hydraulic Modelling Output) on the 8th July 2021. The models rearrest node is "BROW01_0869u" directly northwest of the subject site. The node shows a maximum flood level of 41.15mAoD for the present day 1% fluvial event + 70% CC. It would be reasonable to suggest that the subject site will experience the same maximum flood level. The subject site has a ground level of 44mAOD.

Flood risk from the sea (coastal)

The site is at Low risk from coastal flooding.

The estimated flood level for the development:

Land assessed as having a 1 in 200 (>0.5%) or greater annual probability of flooding from the sea (coastal flooding) in any year.

The Environment Agency is responsible for managing the flood risk from rivers and the sea.

Flood risk from surface water

The site is at medium risk from surface water flooding.

Surface water flooding, sometimes known as flash flooding:

- *Happens when heavy rain cannot drain away*

Lead local flood authorities (LLFA) are responsible for managing the flood risk from surface water and may hold more detailed information.

*Your LLFA is **Manchester council**.*

*In addition, surface water flooding is difficult to predict as it depends on rainfall volume and location
Local features can greatly affect the chance and severity of flooding.*

The approximate extent and depth of flooding

Extent of flooding: Low

Flood depth (millimetres): Below 300mm

Flood velocity (metres/second): Less than 0.25 m/s



Surface Water Flooding

- Surface Water greater than 1m on site (return period: 1/75)
- Surface Water 0.3m - 1m on site (return period: 1/75)
- Surface Water greater than 1m on site (return period: 1/200)

 [Click Here to view the Online Viewer](#)

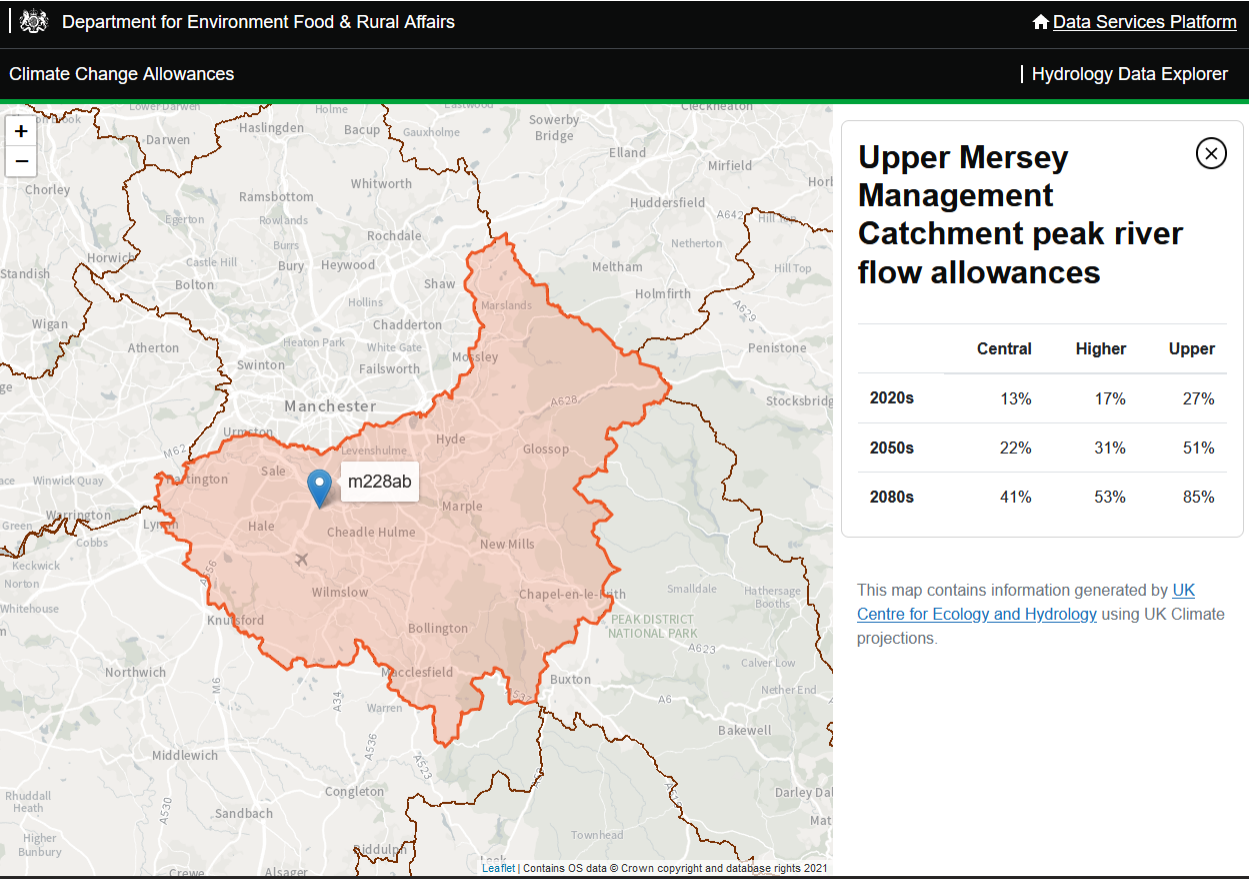
The environment agency provides a flood warning service for this location. The resident is registered for the flood warning service.

Climate Change Allowances:

Climate change allowances are predictions of anticipated change for peak river flow and sea level rise.

Peak river flow allowances:

For flood risk assessments and strategic flood risk assessments, the Environment Agency, as a statutory consultee, uses the management catchment climate change allowances from the peak river flow map as benchmarks.



Sea level allowances:

There are a range of allowances for each river basin district and epoch for sea level rise. They are set out in table 2 and are based on percentiles. A percentile describes the proportion of possible scenarios that fall below an allowance level. The upper end allowance is based on the 95th percentile. An allowance based on the 95th percentile is exceeded by 5% of the projections in the range.

Table 2: sea level allowances by river basin district for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
North west	Upper end	5.7 (200)	9.9 (297)	14.2 (426)	16.3 (489)	1.41

Calculating sea level:

Sea level calculated by adding together the climate change allowances from the UKCP18 user interface and the present day extreme sea levels from Coastal design sea levels - coastal flood boundary extreme sea levels (2018).

The UKCP18 provide projections of relative mean sea level rise around the whole UK coast and projects to 2100. The user interface provides a range of allowances based on percentiles.

UKCP18 Representative Concentration Pathway (RCP) 8.5 use the:

70th percentile (higher central) as the design allowance

95th percentile (upper end) allowance in planning for more severe climate impacts

An allowance based on the 70th percentile is exceeded by 30% of the projections in the range. At the 95th percentile it is exceeded by 5% of the projections in the range.

H++ allowances:

National H++ sea level rise estimates are provided for the UK. The Met Office has not produced new H++ allowances as part of UKCP18. They consider it is still appropriate to use the UKCP09 H++ allowances.
Where it is appropriate to apply H++ allowances you should use the allowance use a figure of 1.9 meters by 2100 (based on 1990 baseline).

The data in the table is from the UKCP18 user interface; it presents change using RCP8.5 at the 70th and 95th percentile, based on a 1981 to 2000 baseline.

Table: time-mean sea level rise in meters in 2099

Location	Mean sea level rise (meters) in 2099 (70th percentile)	Mean sea level rise (meters) in 2099 (95th percentile)
Liverpool	0.76	1.02



River and sea levels

River and sea levels are regularly checked by a network of monitoring stations. These levels can help you understand your flood risk.

River and sea levels for:

M22 8AB, Manchester, Greater Manchester, England

The nearest monitoring station is:

River level: Baguley Brook at Northern Moor

Station name: Northern Moor

Station ID: 5197

River name: Baguley Brook

Site datum: 28.85mAOD

Typical measured level: 0.17m

When the water level reaches 1.22m here, minor flooding is possible in this area.



Identification of any historic flood events

Response from the Environment Agency ref the flood history for the property.

Ref: GMMC126243BF Response 190507/JBa06

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

We have no records of flooding affecting the site.



Existing drainage features on site

Foul Water Drainage

Carries waste water away from a bathroom, kitchen or utility room connected to mains drainage / foul sewers.

Surface Water Drainage

Carries away rainwater from gutters that has run off roofs.

The rear of the property is also a large lawn area rather than a hard surface such as concrete or tarmac; this allows any rainwater to soak away in to the ground rather than flowing off in to drains helping to reduce the risk of surface water flooding.

In addition, gutters could be covered with gutter guards to prevent gutters becoming blocked with debris such as leaves and water butts installed to collect water.



Floor levels



The property is 44mAOD (above sea level).

The existing floor level is 250mm.

The new extension floor level will be the same finished floor level as the existing.



Advice for resilient design

To aid resilience of flood or surface water.

The property boundary is already fenced, using bases with impermeable material.

The new proposed floor will be a ground supported floor as these are the preferred option with a concrete slab of at least 150mm thickness.

A damp proof membrane (DPM) is included in the design to minimise the passage of water through the ground floor, the impermeable polythene membrane will be at least 1200 gauge any membrane joins required will overlap 300mm.

The floor insulation will be closed-cell type to minimise the impact of any flood water.

The floors will be finished in either ceramic or concrete-based floor tiles or a sand/cement screed. Any tiles will be grouted using water resistant grout.

If required flood resilient materials can be used, for example lime plaster and design, for example raised electrical sockets and making sure there's access to all spaces to enable drying and cleaning.

Homecheck Flood



Overall Flood Risk



FURTHER ACTION
CLICK TO VIEW ONLINE VIEWER

The property is at a significant risk of River and Surface Water flooding. Further assessment is recommended to understand the likely depth of flood waters. Please refer to the Professional Opinion and Recommendations section on page 1 of this report. To explore the risk further, please visit the online viewer.



Insurability

Despite the risk identified, flood insurance for most residential properties will remain available and affordable providing they are eligible for the Flood Re scheme. More information is provided at the back of this report. We recommend you obtain buildings and contents insurance terms before exchange of contracts.



Flood Defences

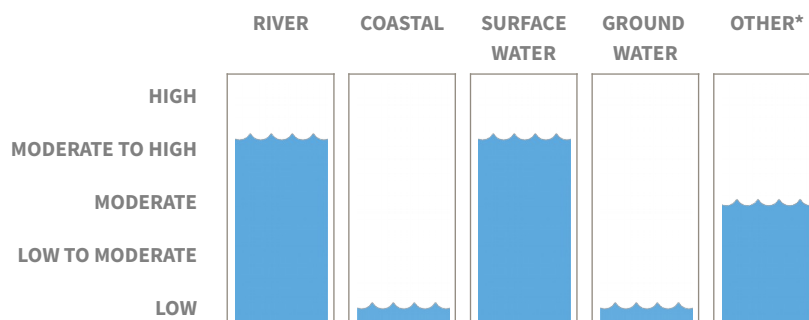
Are there existing river/coastal flood defences that have been identified and taken into account in our overall risk assessment?

No



Individual Flood Risks

The gauges below detail the level and type of individual flood risks at the property.



* Includes historic flood events, proximity to surface water features and elevation above sea level

This report is issued for the property described as:
8 OLNEY AVENUE, MANCHESTER, M22 8AB

Report Reference:
201032332

National Grid Reference:
382770 388590

Customer Reference:
STS/WOO0341

Report Date:
16 April 2019



Click here to view the **online viewer** or go to:

<http://landmark.ly/ZfK91e>



CONTACT DETAILS

If you require any assistance please contact our customer support team on:

0844 844 9966

or by email at:

helpdesk@landmark.co.uk

Professional Opinion and Recommendations

Please see below our recommendations and next steps with regards to the property.



Overall Flood Risk



FURTHER ACTION
CLICK TO VIEW ONLINE VIEWER

Professional Opinion

Having reviewed the risk of flooding to the property, Landmark's environmental consultants consider the risk of flooding to be significant. Please note the following findings and recommendations:

1. River Flooding
The property is within an area that is at a moderate to high risk of River flooding. This is because there is the potential for flooding to occur fairly frequently or with depths that could result in significant impact.
2. Surface Water Flooding
The property is within an area that is at a moderate to high risk of Surface Water flooding. This is because there is the potential for flooding to occur fairly frequently or with depths that could result in significant impact.
3. Other Flooding
A water feature has been identified at the property. This does not present an immediate risk, however it may require frequent upkeep and maintenance.

We have also found a moderate risk of Other flooding, you can investigate this further using the online viewer.

Recommendations

1. Landmark recommend carrying out a follow on report to understand the expected depth of flood waters at the property, as well as the protection level of any defences found to benefit the property. Understanding the likely depths of flooding is important as it will both help to reassess the risk and identify what the most practical approach is to protect the property. The required follow on report, a Flood Solutions Consult, will cost £99 + VAT.
2. If your property is a new build, flood risk will likely have been investigated in more detail as part of the planning process. In addition, if your property has recently flooded we may need to take a different approach to address the risk. Please call us for more details.
3. You should ask the seller and other nearby residents whether or not flooding has occurred in the area previously. If it has, what was the impact and where were the affected areas.
4. As a high risk of flooding has been identified, Landmark recommend the property purchaser/owner explores the online viewer to understand the risks further.

Insurance

Despite the risk identified, flood insurance for most residential properties will remain available and affordable providing they are eligible for the Flood Re scheme. Please see details of eligibility at <http://www.floodre.co.uk/homeowner/eligibility/>. We recommend you obtain buildings and contents insurance terms before exchange of contracts.

Flood Risk

Flood risk is based on probability; to understand more about flood and the information reviewed, including flood protection measures, please explore the flood section of this report or visit the 'Know Your Flood Risk' website at: www.knowyourfloodrisk.co.uk.

Professional Opinion and Recommendations

Useful Information:

No physical site inspection has been carried out or is proposed. This report highlights only the information which we have determined should be drawn to your attention however, other risks may be present. To review the complete information and for a full list of the data used for this report, please see the Useful Information section on the online viewer. Available at <http://landmark.ly/ZfK91e>.

Next Steps:

If you require any assistance, please contact our customer service team **0844 844 9966** or helpdesk@landmark.co.uk

Property Location



Location Plan

The map below shows the location of the property



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Property



Search Radii

Property Purchaser Guide



Understanding this report

The purpose of this report is to provide a professional opinion on the likelihood of flooding at the property. The front page provides an overall assessment, an indication of the availability of insurance, as well as a flood gauge which is broken down into River, Coastal, Surface, Groundwater and Other flood risks to help visualise the potential flood risks. Within the report, we provide recommendations and further detail of any risk requiring further attention.

Overall Flood Risk

The overall flood risk is an assessment of all the flood data which has been analysed. It may differ from the individual risks on the flood gauge as we consider the overall risk to the property.

Risk Rating

Landmark Information Group provide one of three possible responses for the Overall Flood Risk at the property. These are:

Passed: this means no risk of flooding has been identified.

Passed moderate: this means that while potential flood risks have been found, these are not considered significant or frequent enough for a Further Action to be issued. The property purchaser should refer to the online viewer to explore these potential issues further.

Further Action: this means a significant risk of flooding at the property has been identified. Further assessment will be required.

Insurability

Based on the data assessed within this report, an indication of whether buildings insurance is likely to be available and affordable is provided.

Flood Defences

If river/coastal flood defences are known to be present, these are assumed to be operational and are taken into consideration in our Overall Flood Risk analysis.

Individual Flood Risks

These enable you to easily identify your level of risk from the various causes of flooding. However, a residual risk of flooding may be present if flood defences fail. We therefore, provide on the Professional Opinion and Recommendation

page the level of risk should any defences identified fail. It is important to note that flood defences do not usually protect the site against groundwater or surface water.

Flooding Types

There are several types of flooding taken into account when making our overall opinion. These are explained below. Where a risk is found, this is shown on the front page and further details are provided within the body of the report.

River Flooding

River flooding occurs when rivers and streams are unable to carry away floodwaters within their usual drainage channels. River flooding can cause widespread and extensive damage because of the sheer volume of water.

Coastal Flooding

Coastal flooding results from a combination of high tides, low lying land and sometimes stormy conditions. Coastal flooding can cause widespread and extensive damage because of the sheer volume of water.

Surface Water Flooding

Surface water flooding is common during prolonged or exceptionally heavy downpours, when rainwater does not drain away into the normal drainage systems or soak away into the ground.

Ground Water Flooding

Groundwater flooding generally occurs during long and intense rainfall when underground water levels rise above surface level. Groundwater flooding may last for weeks or several months.

Other Flooding

We analyse any historic flood events records, the proximity of the property to surface water features and the elevation of the property above sea level to enhance our overall analysis of the property.

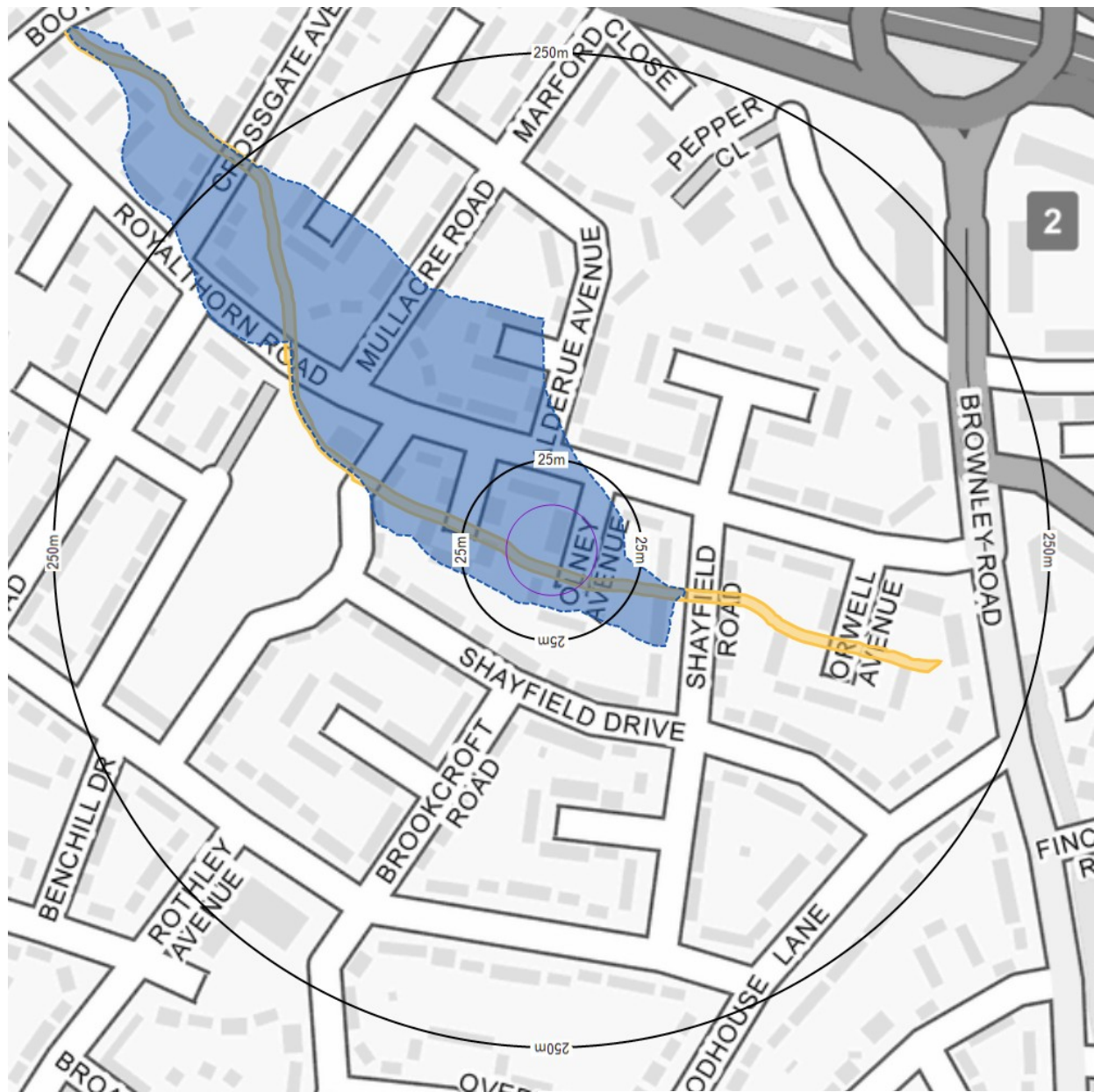
Next Steps:

If you require any assistance, please contact our customer service team **0844 844 9966** or **helpdesk@landmark.co.uk**.

River Flooding



The map below shows the location of potential river flood risks that may affect the property. We detail the information we believe requires your further attention in the table on the following page and also on the Professional Opinion and Recommendations page. If you wish to explore these features and the surrounding area further, please visit the online viewer.



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River Flooding



Risk Of Flooding From Rivers And Sea (RoFRS)



Flooding From Rivers or Sea Without Defences (Flood Zone 3)



[Click Here](#)
to view the **Online Viewer**

River Flooding



River Flooding

We have highlighted below potential flood risks at or around the property. Please see the Professional Opinion and Recommendations page for further information and next steps guidance.

Details	Distance	Contact
Risk of Flooding From Rivers and Sea (RoFRS)		
Data Provider: Environment Agency	On Site	1
Flooding From Rivers or Sea Without Defences (Flood Zone 3)		
Data Provider: Environment Agency	On Site	1

What does this mean?

- **RoFRS:** The Environment Agency (if in Wales National Resource Wales) have carried out a national flood likelihood analysis, using local expertise, to predict the chance of flooding taking into consideration flood defences present. A risk rating is then given to each area. Please see Landmark's Overall Flood Risk result to understand the expected impact on the property.
- **Flood Zone 3:** This area has been classified as Flood Zone 3. This means that the area is thought to have a high probability of flooding; an annual chance of (1 in 100) 1% or greater for river flooding, or (1 in 200) 0.5% or greater for coastal flooding). If the area benefits from a flood defence, this may reduce the likelihood or impact of flooding. Please see Landmark's Overall Flood Risk result to understand if this flood zone is expected to impact the property.



Further Information

Please visit the online viewer to understand more about river & coastal flood risks at and around the property and the data used in this analysis.

Surface Water Flooding



The map below shows the location of surface water flood risks that may affect the property. We detail the information we believe requires your further attention in the table on the following page and also on the Professional Opinion and Recommendations page. If you wish to explore these features and the surrounding area further, please visit the online viewer.



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Surface Water Flooding

- Surface Water greater than 1m on site (return period: 1/75)
- Surface Water 0.3m - 1m on site (return period: 1/75)
- Surface Water greater than 1m on site (return period: 1/200)



[Click Here](#)
to view the **Online Viewer**

Surface Water Flooding



Surface Water Flooding

We have highlighted below flood risks at or around the property. Please see the Professional Opinion and Recommendations page for further information and next steps guidance.

Details	Distance	Contact
Surface Water Flooding Return Period: 1 in 75		
Depth of flood water: Greater than 0.3m and Less than or equal to 1.0m	On Site	2
Data Provider: JBA Risk Management Limited		

Flood data provided by JBA Risk Management Limited. © Copyright JBA Risk Management Limited 2008-2019

What does this mean?

- **Surface Water Flooding Return Period: 1 in 75:** This area is at risk of flooding in a 1:75 year rainfall event (an event that has a 1 in 75 chance of happening in any given year). It is expected that in this event a large amount of rainfall would overwhelm the drainage systems or be unable to soak away into the ground immediately, and would therefore gather at the areas shown on the map. The depth information above will help you understand how severe any resulting flood might be. If your property/site is within this area we would recommend you consider further investigations to clarify the impact of any flooding.



Further Information

Please visit the online viewer to understand more about river & coastal flood risks at and around the property and the data used in this analysis.

Preparation for a Flood Event

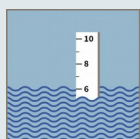
Understanding Flood Risk

It is important to understand that flooding can happen anywhere, even if you don't live near to a watercourse or the sea. This is because in periods of very heavy rainfall, water can collect in many places where there may be a dip in the ground or a barrier blocking the water's path. Severe rainfall events can also lead to water rising from under the ground as the ground becomes saturated and water is unable to drain away naturally.

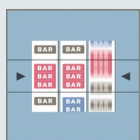
The impacts of flooding are not just financial as flooding can also devastate lives, causing both severe disruption at the time as well as continued disturbance through the drying out period in the months that follow. Therefore, it is important to consider any potential flood risk when purchasing a property.

Insurance may be expensive or difficult to obtain if your home is at risk, so it is vital to understand the risk of flooding of your home or before purchasing a property.

How is the Overall Flood Risk Calculated?



Impact: We consider the expected depths of flooding at your house. Low depths, for example, 10cm, are unlikely to put people at risk but water damage to buildings and contents may be significant without any flood protection. High water depths, for example 1m, may severely threaten the safety of people and may cause extensive damage to buildings. It may be dangerous to keep deep floods out of a building because of the large weight of water pressing against the wall.



Likelihood: Flood risk is based on probability and different approaches to flood protection may be needed depending upon how likely flooding is expected. A common way of expressing how likely a flood event is to occur is 'return period'. For example, a 1:100 year event has a 1% likelihood of occurring in any given year, whereas a 1:200 year event has a 0.5% likelihood of occurring in any given year. The 1:200 event would be expected to result in a greater extent of flooding than the 1:100 event, as it would be more severe, but the likelihood of it occurring is lower.



Preparation for a Flood Event

Flood Protection Measures

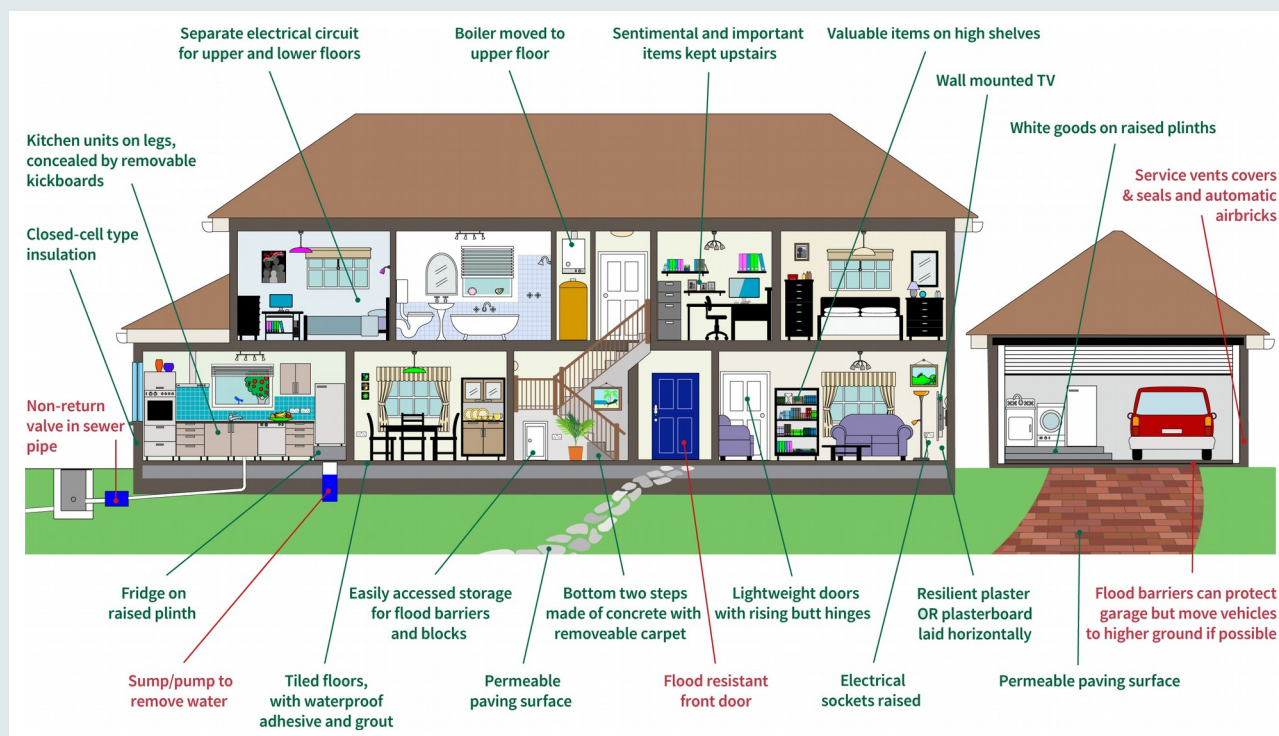
Flooding can usually be managed by the installation of flood protection measures, either on or within the building or across the property. Flood protection measures can be divided into two categories; flood resistance and flood resilience.

Flood resistance measures: physical barriers designed to keep water out of your house, such as flood doors, air brick covers and non-return valves. Temporary flood resistance products are those that need deploying (fitting or activating) prior to flooding arriving, whereas permanent flood resistance products do not need activating.

Flood Resilience measures: these reduce flood damage in situations where water is allowed to enter, such as raising electrical sockets, the use of resilient plaster.

The flood source, likely depths and property design and age will inform the best choice of permanent resistance, temporary resistance or resilience. Other factors will play a part in the decision making process, such as cost, visual impact, ease of deployment and product performance. The best answer for your home will most likely involve a combination of products.

Please refer to the Know Your Flood Risk website for further information and suppliers of protection and resilience measures: www.knowyourfloodrisk.co.uk/flood-advice-guidance.



Preparation for a Flood Event

Flood Action Plan

Preparing a Flood Action Plan will help ensure the safety of everyone, minimise the disruption that you may suffer and reduce damage to important items. The flood plan should comprise of a simple check list for you to follow should a flood event be expected. You can create your own personal Flood Action Plan by visiting the Environment Agency website at www.gov.uk/prepare-for-flooding/future-flooding. Alternatively, visit your Local Authority's website.

A Flood Action Plan should include:

- Contact numbers for utility providers (gas, electricity, water), insurance providers, local authority and other important contacts family, friends etc;
- A list of important items that you can move upstairs or to a safe place before an event (pets, cars, electrical equipment, heirlooms, furniture);
- Where the utility shut off points are and how to operate them;
- What Property Level Protection measures to install and where;
- Where the emergency flood kit is and what it should comprise of;
- Practical advice on appropriate actions to do during a flood (store as much drinkable water as possible, block sinks and toilets, tune into your local radio station for updates);
- Practical advice on appropriate actions after a flood has occurred (take photo's and videos of damage, contact insurance providers, contact utilities to check that central heating, water and electrics are working fine).

Flood Action Groups

As well as protecting your property and preparing yourself for a flood, as a local community you can set up a flood action group. Flood action groups across England and Wales are proving to be very successful ways in raising awareness and engaging communities in responding to flood risk. This is done through engagement, increasing resource, applying for grant schemes and working in partnership with relevant Agencies and Authorities. The advice, support and assistance provided by Agencies and Authorities can be helped by local knowledge to better help reduce or mitigate flood risk. For guidance on how to create a flood action group in your community please visit the National Flood Forum's website at www.nationalfloodforum.org.uk/flood-risk-community-groups/how-to-form-a-flood-action-group.



Preparation for a Flood Event

FLOODRE

At the start of April 2016 the flood insurance market changed. Flood RE opened for business, allowing many flood risk prone residential properties access to affordable flood insurance. All other properties (including most leasehold homes and all commercial property) are exposed to a fully risk-based flood insurance market, perhaps for the first time.

It is therefore important to understand in advance of exchanging contracts whether that property has a flood risk, which is likely to make insurance more expensive, or even impossible to obtain.

Such insurance implications may make getting a mortgage more difficult, which may jeopardise the proposed transaction. Alternatively, the cost implications of dealing with the potential flooding may lead to the property price being discounted.

So what is Flood RE?

Flood RE is a scheme developed by the insurance industry with the approval of Government. It is an independent organisation and is neither run by nor funded by Government (though it does report to Parliament on the way the scheme is working). The Flood RE scheme is designed to ensure that affordable flood cover remains available to most residential homes for a 25 year period and to soften the transition to fully risk-reflective pricing.

Flood RE also hopes to encourage competition between insurers to offer better terms for flood insurance. Insurers who write flood risk business in the UK must be members of Flood RE. They can then choose whether or not to cede to Flood RE the flood part of home insurance policies (buildings or contents) bought by their customers. Each insurer is free to set the benchmarks at which it will offer flood insurance itself, or cede the business to Flood RE, or perhaps refuse to offer flood cover at all. So there will be variations in the level of flood risk to the property which will result in Flood RE's involvement. Flood RE offers the insurer who cedes the business both capped premiums (set by reference to the property Council Tax band) and capped excess for the cover. Both will rise over the lifetime of the scheme, with the capped premiums rising in line with CPI. Flood RE will deal only with the insurer, not with the insured.

See www.floodre.co.uk



Useful Information

The Purpose and Scope of the Report

The Homecheck Flood report is a desktop flood risk screening report, designed to satisfy the concerns raised by the Law Society Practice Note and to enable home buyers and property professionals to assess the risk of flooding at residential sites. It examines two key areas: (1) the overall risk of flooding at a site taking into account any flood defences present (where these are identified within the vicinity of the property and based on the presence of flood defences registered by The Environment Agency). It should be noted that a residual risk of flooding may remain if such defences were to fail owing to extreme weather conditions, over-topping or poor maintenance. In addition, it should be noted that flood defences do not generally offer protection against groundwater or surface water flooding (2) how flood risk affects the availability of insurance for a site. Where no flood defences are present in the vicinity of the property the overall risk rating provides a worst case scenario which may be alleviated by smaller scale local flood defences or recently constructed flood defences not currently registered by The Environment Agency.

Where several flood risks have been identified, the report highlights the most risky and details the information Landmark consider should be drawn to your attention as part of the conveyancing transaction. However, other flood risks may be present. A home buyer may wish to review the complete information at and around the property using the online viewer.

The Homecheck Flood report is a general purpose indicative screening tool, and is intended to provide a useful initial analysis for a residential conveyancing transaction. It does not provide an alternative to a property specific assessment, such as the Flood Solutions Consult Report, which should be used when this report suggests 'Further Action'.

The Individual Flood Risks

The individual flood risk gauges on the front page highlight the individual river, coastal, surface water, ground water and other types of flooding risk at the property, taking into consideration any flood defences found. These risks are used to determine the overall flood risk to the property. The individual flood risks are demonstrated in the gauges as follows:

High Moderate To High	Landmark consider the individual flood risk to be significant. This is because there is a potential flood risk that would be likely to occur fairly frequently or the predicted depth of any flood event would result in significant impact and/or there is a flood water storage area on property and/or there is information to suggest a flood has happened in the past. It is recommended that you refer to the Overall Flood Risk and take note of the Professional Opinion and Recommendations as further action will be required.
Moderate	Landmark consider the individual flood risk to be moderate. This is either because of a potential flood that is likely to occur with moderate frequency, or because the predicted depth of potential flooding at the property is likely to be shallow and insufficient to cause a significant issue. It is recommended that you check the Overall Flood Risk result and refer to the Professional Opinion and Recommendations for guidance and next steps.
Low To Moderate	This describes areas that Landmark Information Group consider are at low to moderate risk flooding. These are areas where we have found some indication of potential flood risk, however any resulting flooding would be expected to be infrequent, or have a low predicted depth. It is recommended that you check the Overall Flood Risk to the property as this may differ from the individual flood risks.
Low	This describes areas that Landmark Information Group consider are at minimal or no risk of flooding. These are areas where there may be some indications of potential flood risk, however any flooding would be expected to be very infrequent, or have a very low predicted depth. It is recommended that you check the Overall Flood Risk to the property as this may differ from the individual flood risks.

Useful Information

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Timperley and Sinderland Flood Mapping Study

Volume 2 – Final Report (May 2007)

**Environment Agency
North West Region**
Timperley and Sinderland
Final Modelling Report
May 2007



Timperley Brook

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Environment Agency North West Region

Timperley and Sinderland Final Modelling Report

Contents Amendment Record

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1 INTRODUCTION AND BACKGROUND

1.1.1 An extensive flood mapping exercise was carried out by Halcrow for the whole of the Upper Mersey catchment in 2001¹. The Environment Agency require an update and a refinement of the original study. The objectives are set out below:

- Update existing hydrology for the area
- Remove flood defences (where present) from the existing hydraulic models to run an 'undefended' case
- Run the following flood events; 1%, 1% plus climate change allowance and 0.1% Annual Exceedance Probability (AEP) and provide a comparison with the original study.
- Produce flood outlines for the 1%, 1% plus climate change AEP, and 0.1% AEP events
- Identify Areas Benefiting from defences (ABD) within the catchment.

1.2 DESCRIPTION OF CATCHMENT

1.2.1 Timperley and Sinderland Brook and their tributaries are situated in Altrincham in south west Manchester (Figure 1.1). The catchment is 50km² to its outfall at the Manchester Ship Canal. The area is of low lying topography with elevations ranging from 60mAOD to 5mAOD. Sinderland Brook is gauged at Partington, the remaining tributaries are ungauged. The area is heavily urbanised and the watercourse flows through extensive lengths of both open channels and culverted reaches. There are five hydraulic reaches in the catchment, details of which are provided in the following section.

1.3 STATEMENT OF RIVER REACHES

1.3.1 The study area includes the following reaches (Figure 1.1):

- Brownley Brook (from Concord Business Park to the confluence with Baguley Brook at Royalthorn Wood)
- Baguley Brook (from M56 crossing to the confluence with Timperley Brook)
- Fairywell Brook (from the M56 crossing to the confluence with Baguley Brook in Brooklands)
- Timperley Brook (from M56 crossing to the confluence with Baguley Brook)
- Sinderland Brook (from the confluence of Timperley and Baguley Brook to the Manchester Ship Canal)

2 DATA AVAILABILITY AND REVIEW OF PREVIOUS WORK

2.1 DATA AVAILABILITY

- 2.1.1 LiDAR data was supplied by the Environment Agency (EA) for the study area. This data was flown in two stages; the first in 2002 and the second in 2006. The 2006 data has been used and where this was not available the 2002 data set was used. The LiDAR was provided at a resolution of 2m and has a typical vertical accuracy of +/- 25mm. LiDAR coverage for the area is shown in Figure 2.1.
- 2.1.2 NFCDD data was provided by the EA and was used to identify where the formal flood defences are in the catchment. A site visit was also made to the area to verify defence locations and carry out a walkover inspection. Verified flood defences within the catchment are shown in Figure 2.2.
- 2.1.3 A series of cross section drawings were provided in the vicinity of Timperley/Baguley/Sinderland Brook confluence. A new housing development has been built since the previous study and river enhancement works have been carried out along a 1.8km reach of Sinderland Brook.
- 2.1.4 Hydraulic models constructed for the Section 105 flood mapping study were provided by the EA.

2.2 PREVIOUS STUDIES

- 2.2.1 The Timperley and Sinderland Brook catchment was modelled during the Upper Mersey Section 105 study. Hydraulic models for the study were constructed using iSIS software and calibrated against observed flood events. A range of return periods were run as part of this project but only the 1% AEP event was flood mapped.
- 2.2.2 An Areas Benefiting from Defences (ABD) study² was carried out for the EA by Royal Haskoning in April 2006. The report stated that there were few formal defences within the catchment. It concluded that the identification of ABD was not possible as the mapped Flood Zone 3 extent shows a 'with defences' case. It was recommended that a 'without defences' scenario should be produced to compare the two extents and highlight the ABD on the study reaches. Potential ABD's were put forward in the report and these are listed below;
- Baguley Brook at Brooklands (where defences are present on right and left banks)
 - Timperley and Sinderland Brooks downstream of the flood storage area at Balfour Road.

3 **HYDROLOGICAL ASSESSMENT**

3.1 **SUMMARY**

- 3.1.1 Hydrological analysis has been carried out to provide updated design flows for the hydraulic models. Details are provided in the hydrology report (Volume 1) and the 1% AEP inflows are shown in Table 3.1.

<i>Sinderland and Timperley</i>		1% AEP (current study)
Model	Node label	Peak Flows (m ³ s ⁻¹)
Brownley	mr56	0.776
Brownley	mr0037	0.324
Fairywell	FAIR01_m65	2.396
Fairywell	FAIR01_m61	0.485
Fairywell	FAIR_mr0034	0.252
Baguley	mr0019	0.175
Baguley	m59	1.744
Baguley	mr57	1.184
Baguley	m60	0.000
Baguley	m61	0.000
Baguley	m62	1.839
Baguley	m63	1.068
Baguley	m66	1.448
Baguley	mr0033	2.329
Baguley	mr0035u	1.100
Timperley	mr0032	0.572
Timperley	m69	2.454
Timperley	m70	1.303
Timperley	m71	6.020
Timperley	m72	5.258
Sinderland	SIND_mr0087	5.859
Sinderland	SIND_mr0030u	4.602
Sinderland	SIND_m67	2.957
Sinderland	SIND_m73	0.842
Sinderland	SIND_m74	4.864
Sinderland	SIND_m75	3.158
Sinderland	SIND_m77	1.136
Sinderland	SIND_mr0088	3.055
Sinderland	SIND_m78	1.728

Table 3.1 Design flows

4 RIVER MODELLING

4.1 INTRODUCTION

- 4.1.1 The hydraulic models used in the current study were the following; BROW100.dat, FAIR100.dat, BAGU100.dat, TIMP100.dat and SIND100.dat.

4.2 DESCRIPTION OF RIVER AND RIVER REACHES

Brownley Brook

- 4.2.1 Brownley Brook is the smallest tributary in the catchment. It is an ordinary watercourse which flows through the Wythenshawe housing estate. The modelled reach is 4 km and has heavily culverted reaches. Brownley Brook is shown in Figure 4.1.

Fairywell Brook

- 4.2.2 Fairywell Brook follows a north westerly course through a large housing estate to join Baguley Brook just upstream of the Bridgewater Canal. The modelled reach is 6.2 km and is shown in Figure 4.2

Timperley Brook

- 4.2.3 Timperley Brook rises near Manchester Airport and flows in a north easterly direction through open country leading to Altrincham golf course. Downstream of the golf course the brook flows through housing estates and joins Baguley Brook to form Sinderland Brook at NGR 376583, 390187. The reach is shown in Figure 4.3.

Baguley Brook

- 4.2.4 Baguley Brook drains the largely urban area of Wythenshawe but also flows through Wythenshawe Park before entering Baguley itself. It continues to flow west through Brooklands to its confluence with Timperley Brook. The reach is shown in Figure 4.4.

Sinderland Brook

- 4.2.5 Sinderland Brook is formed at the confluence of Timperley and Baguley Brook on the western edge of Altrincham. It flows as through open fields in a westerly direction to its outfall at the Manchester Ship Canal. The reach is shown in Figure 4.5.

4.3 GEOREFERENCING

- 4.3.1 The Section 105 models provided by the EA were not georeferenced. Flood mapping requires georeferenced models to translate maximum water levels to locations on the digital terrain model.
- 4.3.2 Georeferencing was undertaken using iSIS-GIS (an in-house extension developed for Arcview). Grid references for the centre point of each model cross section are provided in the Section 105 study modelling reports. These were used as a basepoint to locate the remaining ordinates of the cross section and extracted. Grid referencing

information has been added to cross section data within the models. During the georeferencing exercise it became apparent that the cross section node labels in the Section 105 report did not always concur with the node labels within the model. In these circumstances approximate locations were sought by calculating distance to next and noting comments in the iSIS cross sections.

4.4 EXTENSION OF CROSS SECTIONS

- 4.4.1 The Section 105 models were built to accommodate the 1% AEP maximum water levels and flows. The current study models a 0.1% AEP flood event which required extension of some cross sections. On further investigation it became apparent that the 1% AEP water levels (used in the S105 study) exceeded the extent of the cross section in a number of locations. This was addressed in the current study by extending the sections into the floodplain using the LiDAR data provided. In some cases cross sections were extrapolated to the extent of the water level where the cross section geometry did not match the LiDAR ground levels. Details of the changes made to cross sections are given in Table A1-A3 (Appendix A).

4.5 ADDITION OF RESERVOIR AND SPILL UNITS

- 4.5.1 The above approach is not suitable when the out of bank area behaves as a flood storage pond. In these circumstances, the cross sections have been trimmed and spill units added to represent a flow route from the channel to the floodplain. The floodplain area is represented using iSIS reservoir units. Elevations from the LiDAR were used to provide reservoir geometry. Two additional reservoir units were added on Fairywell Brook in the vicinity of the recreation ground in Brooklands.
- 4.5.2 Changes made to the model using the above methods are summarised in Appendix A.

4.6 INCORPORATION OF NEW SURVEY

- 4.6.1 River restoration work has been carried out along Sinderland Brook as part of a new housing development. The original cannellised course has been restored to a meandering river, thus creating a wider floodplain and new and varied habitats. The new course is shown in Figure 4.6 below.

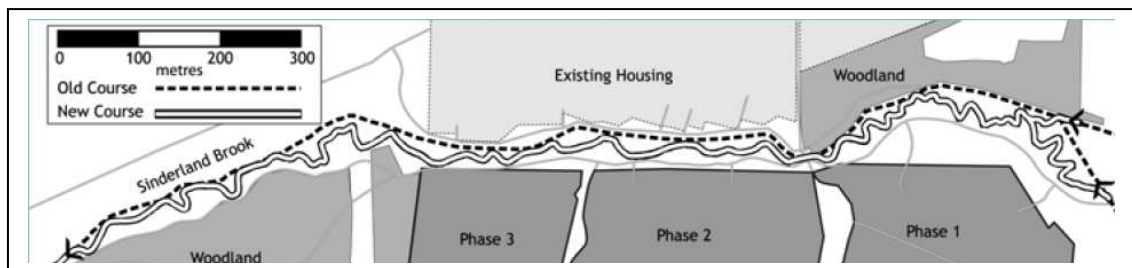


Figure 4.6 River Restoration Plan (source: <http://therrc.co.uk/newsletters/issue20.pdf>)

Photographs of the site are provided in Appendix B.

- 4.6.2 Cross section survey drawings were provided of the reach by the EA. Cross sections information was taken from the following drawings; 1002101/OB/007, 1002101/OB/008 and 1002101/OB/030. A total of 13 cross sections replaced a reach of 1.8km in length in the existing Sinderland Brook model. Interpolated sections were added to the model where necessary to improve stability.
- 4.6.3 No further changes were made to the existing Section 105 models. Run parameters were modified to increase stability but a complete review of the hydraulic models was beyond the scope of this study.

4.7 REMOVAL OF FLOOD DEFENCES

- 4.7.1 Flood defences, identified in the Royal Haskoning Report², were removed from the model to represent an ‘undefended’ case. Formal flood defences exist on Timperley and Baguley Brook only, so the existing models for Fairywell, Brownley and Sinderland are ‘undefended’ by default. The following defences were removed from the model;

- Timperley Brook – right and left banks at Navigation Road Recreation ground and Balfour Road storage basin. The control structure (orifice and sluice gate) at Balfour Road was removed from the model.
- Baguley Brook – right and left bank through the recreation ground at Brooklands.

- 4.7.2 The locations of the flood defences are shown on Figures 4.3 and 4.4. The LiDAR data has been used to provide ground elevations. The defences in the model have been lowered to these heights to represent the ‘undefended’ case.

- 4.7.3 In some areas the LiDAR data does not tie into the survey data within the model. Where this occurs, the flood defence has been lowered to a relative level which ties into the existing model. Details of the removal of flood defences are provided in Appendix A.

4.8 HYDRAULIC MODEL RUNS

- 4.8.1 A matrix of hydraulic model runs is provided in Table 4.1.

Reach	1% AEP		1% AEP + climate change allowance	0.1% AEP
	Undefended	Defended	Undefended	Undefended
Brownley	×	n/a	×	×
Fairywell	×	n/a	×	×
Baguley	×	×	×	×
Timperley	×	×	×	×
Sinderland	×	n/a	×	×

Table 4.1 Hydraulic model run matrix (NB. defended runs required for 1% AEP only)

5 MODEL RESULTS AND FLOOD MAPPING

5.1 MODEL RESULTS

- 5.1.1 Maximum water level results for each flood event are provided in Table C.1 in Appendix C. Results are provided for the existing and undefended case (where applicable). The results indicate a narrow range of water levels between the 1% AEP and 0.1% AEP event. The increase between the two events ranges between 0.3 mAOD for Fairywell Brook to 0.7 mAOD for Timperley Brook. The small increases are due to the low lying topography on the floodplain. Once the flood water is out of bank a large increase in flow may only produce a small increase in flood level.
- 5.1.2 Table C.2 compares results from the Section 105 study and the current study for the 1% AEP event. It is clearly seen that maximum water levels have decreased when compared to the original study. The decrease in water levels ranges from 0 to 4.5 % in the 1% AEP event. This is due to the reduction in design flows being used to run the models. Further detail on the design flows are provided in the hydrology report.

5.2 FLOOD MAPPING

- 5.2.1 The production of flood outlines consists of the creation of a water surface from the hydraulic model maximum water level results, and the computation of flood extents by spreading the floodwaters over the ground elevation model.
- 5.2.2 Flood outlines were generated for the following events
- 1% AEP (undefended and defended)
 - 1% AEP plus climate change allowance (undefended)
 - 0.1% AEP (undefended)
- 5.2.3 DeltaMapper software was used to create flood outlines for the Timperley and Sinderland Brook catchment. DeltaMapper is a tool for mapping and processing temporally and spatially varying data. The application title is from the **DE**Launey **Tri**Angulation algorithm used within the application to generate interpolated surfaces. DeltaMapper has been developed by Halcrow Group. Water levels, model nodes, and a Digital Terrain Model (DTM) are imported to this software. A water surface TIN is constructed from the nodes and cross section information, and water levels are interpolated to create a water surface polygon. A depth grid is produced by the subtraction of the water surface from the DTM. Flood outlines are created from this depth grid using ArcView.
- 5.2.4 Level 2A flood maps are included in Appendix D. These show the calculated flood extents from the hydraulic models results.

5.3 AREAS BENEFITING FROM DEFENCES (ABD)

- 5.3.1 ABD's are identified where there is a difference in the 0.1% flood extent for the defended and the undefended case. This indicates which properties are benefiting from the flood defence along the watercourse.

Baguley Brook

- 5.3.2 There is an ABD adjacent to Baguley Brook in Brooklands. The area covers Dalebrook Road and Newlyn Drive on the right bank and Ashstead Road, Cranleigh Drive and Clover Croft on the left bank. The removal of the defences in the area causes an increase in flow spilling into the floodplain and ponding on the left and right banks to occupy a greater extent in the undefended case.

Timperley Brook

- 5.3.3 There is an ABD adjacent to Claremont Avenue downstream of the dismantled railway line. The removal of the control structure at Balfour Road storage area leads to an increase (0.5m) in maximum water levels in this reach in the 1% AEP event. Consequently, a larger flood extent is seen in the undefended case in this area.

6 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- 6.1.1 The Timperley and Sinderland catchment has been modelled using updated design flows following a review of the hydrological analysis.
- 6.1.2 Model results from the current study show a decrease in maximum water levels when compared with results from the Section 105 study. The decrease is within a range of 0 – 4.5 %.
- 6.1.3 Flood defences have been removed from the models to produce an ‘undefended’ case. This applies only to Timperley and Baguley Brooks where formal flood defences are present.
- 6.1.4 Flood maps have been produced for the following flood events; 1% (defended), 1% plus climate change allowance and 0.1% AEP (both undefended).
- 6.1.5 The flood outlines produced indicate that there are two areas benefiting from defences within the catchment. These are located adjacent to Baguley Brook in Brooklands and Timperley Brook downstream of the Balfour Road storage basin.

Recommendations

- 6.1.6 A detailed review of the hydraulic models should be undertaken to incorporate any updated survey and improve model stability.
- 6.1.7 The models should be re-calibrated due to the update in design flows and the river restoration works on Sinderland Brook.
- 6.1.8 Due to the low lying nature of the catchment, some areas may benefit from a 2d modelling approach to provide more detailed flood routes and extents.

7 REFERENCES

¹ Upper Mersey S105 Project, Final Hydraulic Modelling Report, Halcrow 2001.

² Areas Benefiting From Defences – Sinderland and Timperley Brook Catchment, Draft Report, Royal Haskoning, 2006.

APPENDIX A HYDRAULIC MODEL DETAILS

Table A.1 Details of Changes to Fairywell Model

Table A.2 Details of Changes to Baguley Model

Table A.3 Details of Changes to Timperley Model

APPENDIX B SITE PHOTOGRAPHS

Photo 1 - 3: Baguley Brook – Flood defences

Photo 4: Confluence of Baguley and Timperley Brook

Photo 5: Timperley Brook – Upstream of the confluence with Baguley Brook

Photo 6: Sinderland Brook river restoration

Photo 7: Gauging Station at Partington, Sinderland Brook

Photo 8: Timperley Brook downstream of the Bridgewater Canal crossing

Photo 9: Timperley Brook – Spillway at Balfour Road storage basin

Photo 10: Timperley Brook – Balfour Road storage basin control structure

APPENDIX C MODEL RESULTS

Table C.1.1 Brownley Brook - Maximum water level results

Table C.1.2 Fairywell Brook - Maximum water level results

Table C.1.3 Baguley Brook - Maximum water level results

Table C.1.4 Timperley Brook - Maximum water level results

Table C.1.5 Sinderland Brook - Maximum water level results

Table C.2.1 Brownley Brook - Comparison of results with Section 105 study

Table C.2.2 Fairywell Brook - Comparison of results with Section 105 study

Table C.2.3 Baguley Brook - Comparison of results with Section 105 study

Table C.2.4 Timperley Brook - Comparison of results with Section 105 study

Table C.2.5 Sinderland Brook - Comparison of results with Section 105 study

APPENDIX D FLOOD MAPS

D1 Brownley Brook

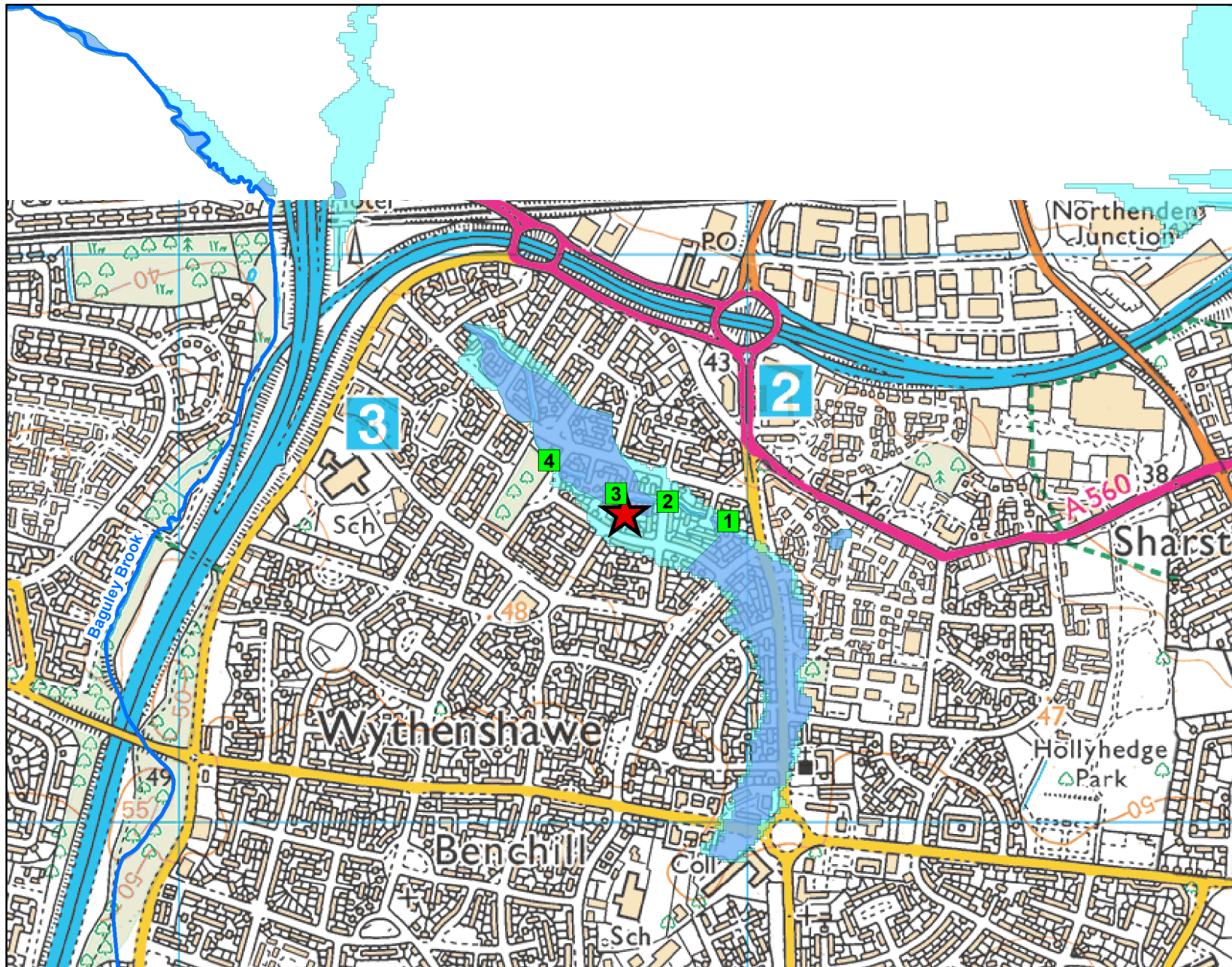
D2 Fairywell Brook

D3 Timperley

D4 Baguley Brook

D5 Sinderland Brook

Detailed Flood Map centred on Olney Avenue, Benchill, M22 8AB. Created on 06/07/2021 [GMMC222840SW]



1:10,001



Legend

- Site Location
- Model Measurements
- Main River
- Flood Zone 3
- Flood Zone 2

					Undefended			
Map Reference	Model Node Reference	Easting	Northing	Data	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 35% Increase flow	1 % AEP (1 in 100 year) + 70% Increase flow	0.1 % AEP (1 in 1000 year)
1	BROW01_1074u	382969	388530	Modelled Water Level (m aodN)	42.00	42.00	42.14	42.17
				Modelled Flow (cumecs)		1.34	1.49	
2	BROW01_0959u	382862	388565	Modelled Water Level (m aodN)	41.42	41.42	41.44	41.44
				Modelled Flow (cumecs)		0.50	0.48	
3	BROW01_0869u	382772	388578	Modelled Water Level (m aodN)	41.13	41.13	41.15	41.15
				Modelled Flow (cumecs)		1.05	1.09	
4	BROW01_0752u	382654	388637	Modelled Water Level (m aodN)	40.02	40.02	40.06	40.06
				Modelled Flow (cumecs)		0.71	0.71	

Model data taken from Brownley Brook 2007

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

Notes:

*Climate Change Scenario - 35% and 70% increases in flow calculated for the 2080's (2070 - 2115). Please see <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) of development determine the climate change allowances to consider in any flood risk assessment.