



**27 Ormskirk Road, Knowsley,
L34 8HE**

March 2021

Flood Risk Assessment & SUDS for Planning

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Abbreviations:

EA	Environment Agency
FZ	Flood Zone

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1.0 Scope

This report contains the details of a Flood Risk Assessment carried out by Enviro Solution Ltd for 27 Ormskirk Road, Knowsley, L34 8HE, henceforth referred to as “the site” in this report.

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The Executive Summary contains an overview of key findings and conclusions. However, no reliance should be placed on the Executive Summary until the whole of the report has been read. Other sections of the report may contain information which puts into context the findings noted within the Executive Summary.

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2.0 Executive Summary

This FRA&SUDS Strategy for Planning has been carried out in accordance with the National Planning Policy Framework (NPPF) and NPPG to assist the council and EA in their assessment of the planning application.

The proposed development comprises part demolitions, replacement footprint and extensions to an existing dwelling in the area of FZ1 on the site and associated landscaping: flood future proofing and new porous & permeable areas maximized.

- Property is in majority FZ1; adjacent to FZ2 / FZ3 to the south
- Area of works is to the north of the house and is in current EA FZ1
- No raising of ground or additional footprint in the floodplain
- Critical: Access & Egress are wholly in EA FZ1 and to unrestricted FZ1
- **SCHEME REDUCES FLOOD RISK OVERALL**
 - Oversized SUDS appropriate to the site, scheme and flood setting
 - No additional formal SUDS required given no increase in impermeable areas / nature of scheme and site setting
 - New Resilient and resistant measures
- **Results in better protected and flood future proofed dwelling than existing**

This is categorized as retaining a "More Vulnerable" use at the site: in accordance with the NPPF classifications the NPPF/PPG Exception Test does still need to be passed; it is considered passed by this assessment.

Given the residual risk flood setting, the level, extent and depth of flooding on the site can be managed in terms of resistant and resilient measures and precautionary mitigation measures.

Based on the likely flooding risk and small scale of the proposed development, it is considered that the proposed development can be constructed and continue to be operated safely in flood risk terms, without increasing flood risk elsewhere; it is therefore considered appropriate development in accordance with the NPPF / PPG.

3.0 Introduction

The FRA combined a desktop study, review of available information, consultations and an assessment of all sources of flooding posed to and from the site and proposed development, in accordance with NPPF & NPPG. Appropriate flood mitigation measures were then considered, either as already incorporated within the scheme or recommended for inclusion at detailed design stage. The suitability of the proposed development was also reviewed in the context of the NPPF/NPPG and any relevant technical guidance accompanying the NPPF.

4.0 Purpose of the Report

This FRA has been carried out in accordance with National Planning Policy Framework (NPPF) & PPG.

The report provides the following information in accordance with the NPPF:

- An assessment of the flood risk posed to the site based on flood information and mapping provided by the EA and Strategic Flood Risk Assessment (SFRA);
- An assessment of the proposed development in terms of surface water run-off; and
- Proposals for measures to mitigate the flood risks posed to and from the development where appropriate.

5.0 Report Information Sources

The information source used to undertake this FRA has been collected from the following sources:

- British Geological Survey Website & iGeology App
- EA Website & Data
- Knowsley Metropolitan Borough Council Strategic Flood Risk Assessment
- Knowsley Metropolitan Borough Council Surface Water Management Plan / Preliminary Flood Risk Assessment
- Knowsley Metropolitan Borough Council as the Lead Local Flood Authority (LLFA) SUDS Policies and Guidance
- Internet mapping and searches.

6.0 Consultation

Where appropriate, the EA and local council will have been contacted to request any available and relevant flooding data.

7.0 Overview of British Legislation

7.1 National Planning Policy

The National Planning Policy Framework (NPPF) and NPPG supercede all Planning Policy Statements (PPS's) and Planning Policy Guidance (PPG's). Flood risk is retained as a key development consideration.

The Sequential and Exception Tests are retained. The accompanying NPPF Technical Guidance / NPPG also include Tables 2 and 3 to assist with flood risk vulnerability classifications and development suitability.

NPPG, New Climate Change Allowances and Government & LLFA SUDS guidance compliant.

7.2 Local Policy

The Strategic Flood Risk Assessment (SFRA) is a key source of flood risk specific information for the area. The SFRA provides a more detailed review of flood risks and recommendations for ensuring developments can be constructed and operated safely in accordance with the NPPF. Greater detail of the SFRA is provided in the report where appropriate.

8.0 Site Status and Environmental Setting

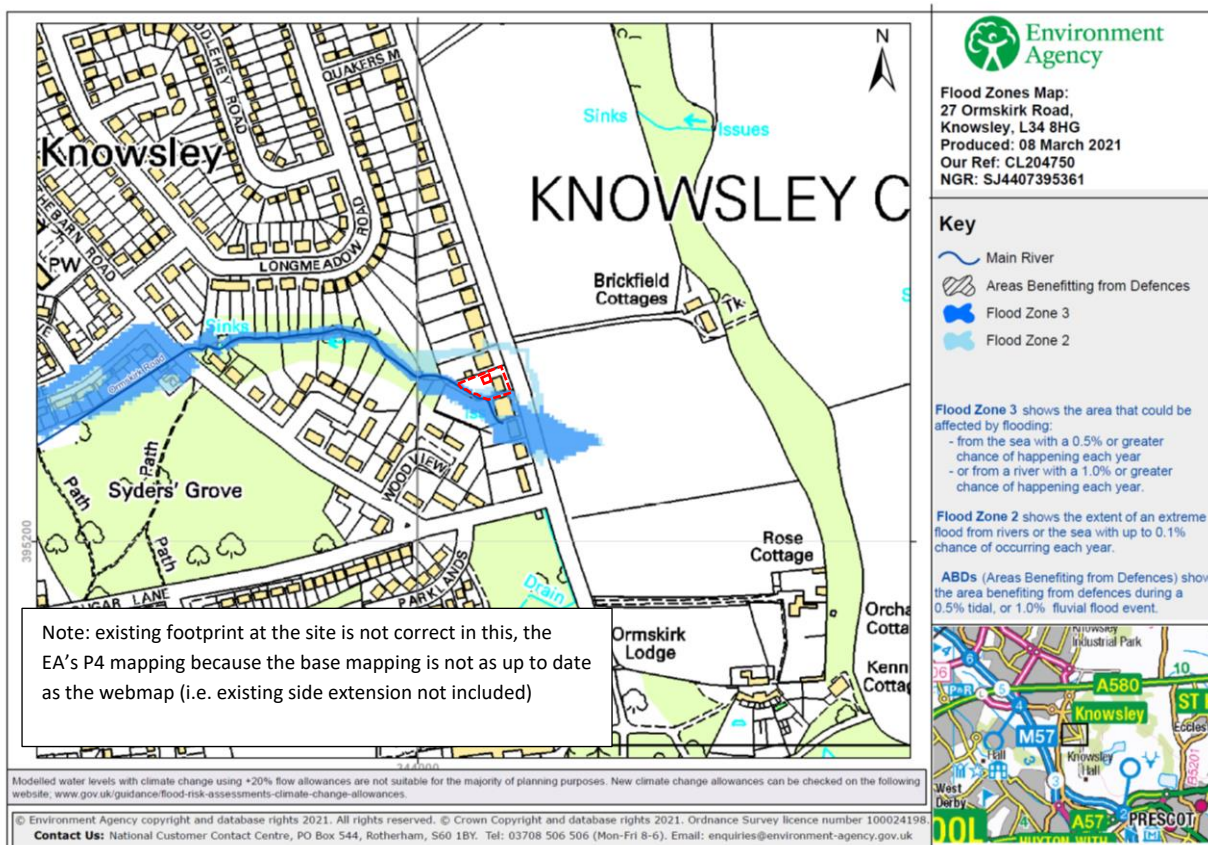
8.1 Site Location and Status

The site is located on the western side of Ormskirk Road. The site is currently occupied by an existing dwelling, soft and hard landscaping. The far west of the site is adjacent to an EA main watercourse an unnamed heavily culverted tributary / upper reach of the Croxteth Brook which is a tributary of the Knowsley Brook.

The location plan is included in Appendix A. The site is c. 0.092 ha (920.0m²).

8.2 Existing Flood Risk

Flood Sources	Site Status	Comment on flood risk posed to / from the development
Fluvial / Tidal	Property and area of works are in EA FZ1 Application boundary is on the far edge of fluvial FZ3/ FZ2 Critical: Access & Egress are wholly in EA FZ1 and to unrestricted FZ1 Site is in majority EA FZ1 EA do not have site specific flood heights for this site Low Risk	Extension to existing dwelling is appropriate in this flood setting Property is not within any SFRA extreme extents. New climate change allowances can be addressed in the fluvial extents: no modelling required given scheme and flood setting The scheme can incorporate suitable mitigation measures to address residual surface water risk Results in better protected and flood future proofed dwelling than existing.
Groundwater	SWMP indicates site not in potential elevated future groundwater risk	The proposed development will not increase the risk of groundwater flooding; New slabs can be engineered / waterproofed appropriately to industry standard Non return valves and sump Low Risk
Artificial Sources	No artificial sources within 250m	Low Risk
Surface Water / Sewer Flooding	Property and area of works are in NO – VERY LOW hazard area Evacuation route which is to the south always in NO – VERY LOW hazard Condition, depth and location of surrounding infrastructure uncertain	Scheme can REDUCE FLOOD RISK OVERALL : see main sections below Development will utilise existing connection to sewers, gravity drainage and non-return valves Development will not increase the peak flow or volume of discharge from the site: Low Risk No further drainage assessment required
Climate Change including new allowances	Assessed as is appropriate, for this site and scheme specifically, using EA flood extents from available modelling and site levels Area of works are not within climate change flood extent area	Development will not increase the peak flow and volume of discharge from the site Low risk posed to and from the development



8.3 Topography

There is a verified OS level on Ormskirk Road directly adjacent to the site.

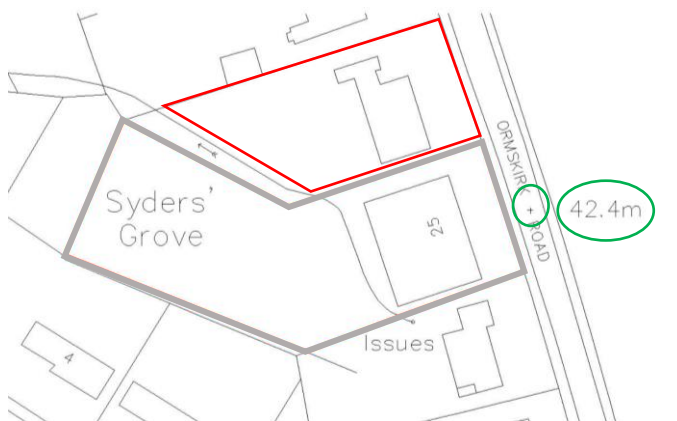
This indicates a level of 42.4mAOD.

The existing footprint ground level is itself more or less flush with the road / slightly raised based on the existing kerb height.

The ground truths do not suggest that the footprint and garden are at a lower level than the road.

It is known that the site is significantly raised above the level of the river and the top of banks are clearly defined on the site.

In order to provide a level of tolerance, it is considered appropriate therefore to use a Ground FFL and external garden level in the area of works as being at 42.2mAOD, using an allowance of a 200mm lower level than the road (even though the ground FFL is higher than the road).



8.4 Geology & Hydrogeology

Based on BGS mapping and surrounding borehole records, the site is underlain by:

- Bedrock: Chester Formation - Sandstone
- Superficial Deposits: Till, Devensian - Clay, Sandy, Gravelly, Cobbly

The Sandstone is a water bearing stratum, the Till is not.

There will be no groundwater body displaced as part of the scheme.

Infiltration is not required given the site is adjacent to a watercourse which is the preferred discharge point, hence BRE365 testing is not required at the planning stage.

8.5 Fluvial Mechanisms, Modelling & New Climate Change Allowances

The flood mechanism is extreme fluvial overtopping and potential for surcharge from any minor culverts upstream and downstream of the site.

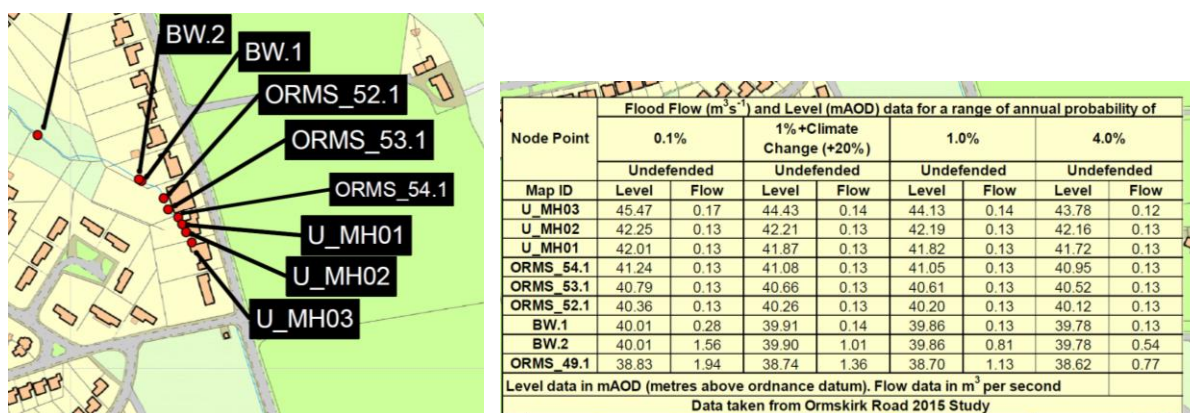
The EA do have site specific flood levels for this stretch of the Croxteth Brook.

8.6 EA Product 4 Updated 2021 Data: see Appendix A

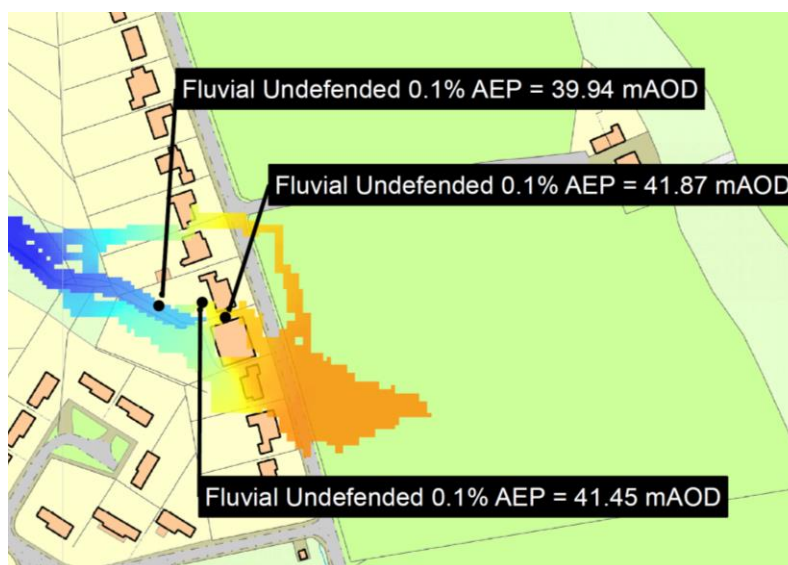
The nodes relevant to the site are BW.1 and BW.2

[See also below for the sensitivity test using Node ORMS_52.1 as a worse case for the new climate change allowances.]

- 1in100year: 39.86mAOD
- 1in100year+20%cc: 39.90mAOD
- 1in1000year: 40.01mAOD



Using the EA's on-site flood levels suggests there could also be a 1in1000year flood point south of the site of 41.45mAOD, but this is still lower than the area of works (42.2mAOD) which is further north of this area.



8.7 Sensitivity Test: how to address the new climate change allowances

Defra issued new basin level changes to climate change allowances in Feb 2016; the EA are in the process on an area basis of deciding on prescriptive methodologies to apply these new allowances. The new allowances are greater than the previous standard 20% added to the EA's modelled 1in100year (usually). The new allowances are between 40% and 70%.

One method previously agreed on other schemes is to, when these data are available: take the difference between the 1in100year and the 1in100year + cc (old 20%) and use that as a pro rata value to work out what 40% to 70% would be and then add that to the 1in100year.

Using BW.1 and BW.2

- 1in100year: 39.86mAOD
- 1in100year+20%cc: 39.90mAOD
- Different is the 20%
- This is 0.04m
- Multiply by 3.5 to have a proxy worse case 70%
- This is 0.14
- Add to the 1in100year
- **The 1in100year + 70% NEWcc = 40.04mAOD**
- This is higher than the 1in1000year

Using ORMS_52.1 as a relevant and appropriate worse case

- 1in100year: 40.20mAOD
- 1in100year+20%cc: 40.26mAOD
- Different is the 20%
- This is 0.06m
- Multiply by 3.5 to have a proxy worse case 70%
- This is 0.21
- Add to the 1in100year
- **The 1in100year + 70% NEWcc = 40.41mAOD**
- This is slightly lower than the 1in1000year in this area (40.45mAOD)

Given site for the area of works is at c. 42.2mAOD: this further explains the flood extents.

The site / area of works are topographically protected and even the 1in100year+70%cc flood levels remain likely in-channel at this site / stretch of watercourse or does not reach the area of works, as is shown by the mapping. No additional modelling data are required for this assessment based on the site and scheme specific assessment.

Critical:

- a) **There will be no footprint within the 1in100year + NEW70%cc or the 1in1000year**
- b) **There is to be no footprint within 18.0m of the top of bank of the watercourse.**
 - **No EA permit is required unless there is a need for there to be storage within 8.0m of the top of bank.**

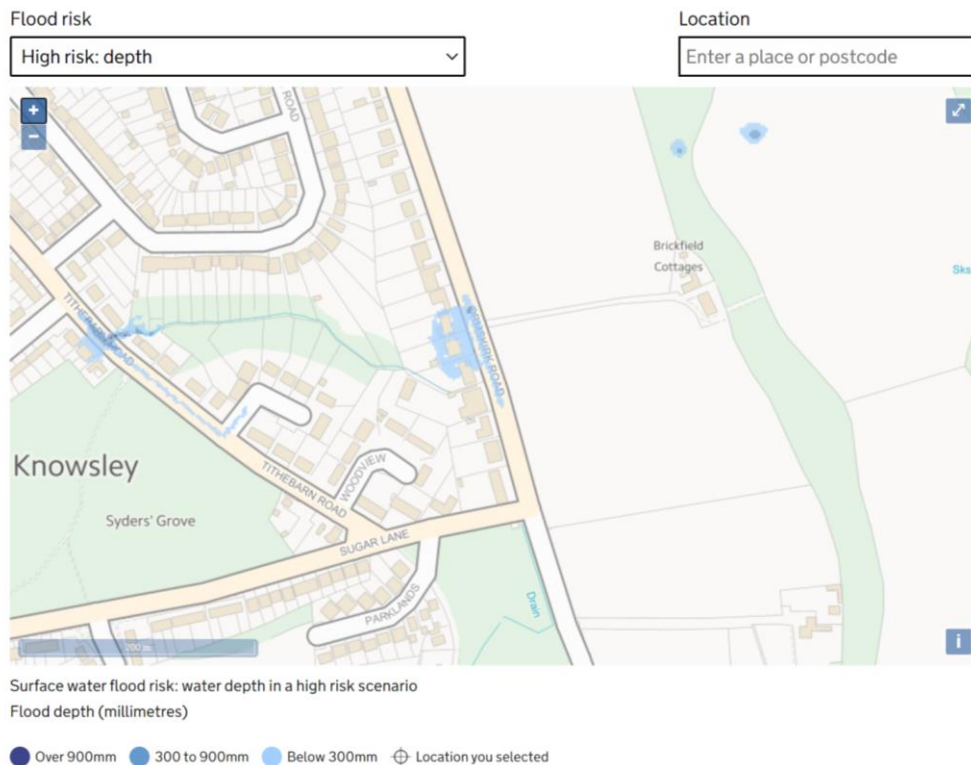
The site is not in a rapid inundation zone given the catchment type and surrounding large areas that would be flooded before the site and the fact that this is the far upper catchment area.

No additional data assessment is required for the scheme and site specifically based on this assessment.

The appropriate approach is precautionary: full flood resilience so that the scheme results in the full property being better protected and flood future-proofed.

8.8 Surface Water Risk and Hazard Summary

- Site is in majority No hazard in the EA high risk scenario
 - Area of ponding to the north of the site
- Site is in medium hazard in the EA low risk scenario
- No displacement compensation required for surface water however if required, the area of garden adjacent to the extension could be lowered on a volume for volume basis
- Access & Egress is always in NO - LOW hazard
- Scheme will reduce this flood risk by reducing surface water discharge



8.9 Existing Drainage

The site drains impermeable surfaces to internal private drainage with manholes and connection to the watercourse.

The Greenfield runoff rates are provided in Appendix C; this indicates an output of Qbar of a nominal 0.22 l/s because of the fact that the site is very small and the nature of the geology.

8.10 Design Response

REDUCE FLOOD RISK OVERALL

- There will be no footprint within the 1in100year + NEW70%cc or the 1in1000year
 - Works to be ~18.0m distance from the top of bank and outside of the extreme 1in1000year
 - Maximise porous and permeable areas – significant betterment
 - Highest forms of informal SUDS to be used for a previously un-attenuated site
 - Permeable and Porous areas
 - Betterment as will attenuate for areas currently unattenuated
 - Mandatory and standard resilient measures
 - No detailed modelling is required to set the level of the flood resilience: the full height of the new ground floor can be resilient and where works are required to the existing ground floor footprint, the height of resilience will simply be as high as is feasible (i.e. usually minimum of 600mm height)
 - **Results in better protected and flood future proofed dwelling than existing**
-

9.0 Assessment of Proposed Development

9.1 Proposed Development

The proposed development comprises (See Appendix B).

- Part demolition of north end of house (garage area) and replacement footprint / extensions
- New side and rear extension: within FZ1
 - There will be no footprint within the 1in100year + NEW70%cc or the 1in1000year
 - No new footprint within 18.0m of top of bank
- No raising of land within the floodplain
 - No flood compensation required
- Critical: the new main access point is still within FZ1 and to unrestricted FZ1
- New landscaping: porous and permeable areas maximized
 - New permeable paving to be to EA specification to include additional lined subbase for storage
- Swimming pool specifications:
 - Swimming pool discharge is to foul sewer not the watercourse
 - Closed-system of pump(s) to be connected to existing (new if required) manhole in driveway which is pumped to the existing sewer connection to be a standard constant recycling / minimal top up to meet industry standards
 - Filter to be cleaned using reverse pump hence creating "backwash"
 - The backwash will be created c. 4 - 6 times a year; all backwash to discharge to existing manhole and hence to foul sewer

Critical for policy compliance:

- No change to site operations or sensitivity
- No habitable areas lower than existing habitable areas
- **Reduces flood risk overall**
 - New modern flood resilience – see below
 - New porous / permeable
- Given the site constraints and LOW hazard setting: further raised floor levels are not considered necessary

As an appropriate response, the site will operate as existing with an improvement based on the design:

- 1) robust resilient construction techniques in order to minimise the damage caused by water entry and also to reduce the time taken to return the property to use after a flood (see later sections)
- 2) Reduce flood risk overall with new lower water demand white goods: betterment of surface water management on the site as a result of the scheme where feasible

Drainage

The existing connections will be retained / additional secured with the water company; non-return valves can be utilized as standard.

If a new outfall to the watercourse needs to be formalized: this can be undertaken as part of an EA Permit which is post planning.

9.2 Drainage Connections

Foul

The existing connections will be retained / new connections installed subject to agreement with the water company.

Surface Water

The existing connections will be retained / new connections installed subject to agreement with the EA.

Discharge to the watercourse is the appropriate approach that would be required by the EA.

SUDS Commensurate with the scheme

The new areas of new permeable paving / planting can be used as surface storage using splayed ends to the rainwater downpipes: standard approach for minimal disruption scheme.

9.3 LLFA Drainage Requirements

No additional formal SUDS or drainage are considered required.

All drainage is at grade (no lower floors involved) and can be drained using gravity as the house is higher than the top of bank of the watercourse.

Given size of scheme, it is not considered necessary to provide a new formal connection and outfall to the watercourse if the existing is appropriate (subject to survey / investigation); using the existing system is the most sustainable approach.

To address the surface water risk and reduce the surface water risk to surrounding areas:

- Any new permeable areas to be constructed to the EA guidance for permeable paving SUDS

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7728/pavingfrontgardens.pdf

9.3 Pipe sizes /Manholes / Pipe runs

These will be confirmed as part of detailed designs; specifications of landscaping and drainage products need to be confirmed through Buildings Regs.

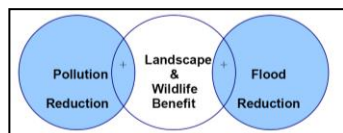
Not required at this stage to demonstrate scheme can accommodate the surface water flows or meet LLFA requirements.

9.4 SUDS Hierarchy Check

The scheme offers tangible benefit in that it maximises permeable / porous areas:

Concept SUDS Strategy

The following diagram indicates the philosophy behind the proposed SUDS strategy, and is taken from the EA's SUDS guidance:



(Source: Environment Agency, 2009)

Table 2 indicates the SUDS Hierarchy Appraisal for the site and proposed development:

Table 2: Site Specific SUDS Appraisal

SUDS Hierarchy	SUDS Technique	Potential Benefits			Site Specific	
		Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit	?	Scheme Specific SUDS Suitability Appraisal and Comment
Most Sustainable ↑ ↓ Least Sustainable	Living Roofs	•	•	•	*	Not likely feasible given nature of build / pitched roof areas
	Ponds / Basins	•	•	•	X	Site is a single dwelling plot; not necessary
	Swales	•	•	•	X	Site is a single dwelling plot; not necessary
	Infiltration Techniques	•	•		X	Not suitable given site is adjacent to a watercourse
	Permeable and Porous Surfaces with discharge to sewer	•	•		✓	To meet LLFA Scheme can incorporate additional porous / permeable surfaces with areas not covered by building
	Tanked Systems	•			*	Not required and not sustainable option

Key:

Potentially suitable at the site: *

Incorporated in the scheme: ✓

Not suitable / possible at the site: X

9.5 Flood Resilience

The proposed development will utilize the flood resilient techniques recommended in the NPPF Technical Guidance where appropriate and also the recommendations that have previously been issued by various local authorities.

No detailed modelling is required to set the level of the flood resilience: the full height of the new ground floor can be resilient and where works are required to the existing ground floor footprint, the height of resilience will simply be as high as is feasible (i.e. usually minimum of 600mm height).

As per previous correspondence with planning officers and as agreed, the FRA provides the recommended resilient measures that can be incorporated, it will depend on the construction team as to what construction will actually need to be undertaken and what materials are used exactly. This does not invalidate the point and recommendations of this FRA. The FRA cannot simply specify the exact specifications / products to be used; this information is not required of planning.

- Non-return valves as standard for ground level
- For the new extension at the elevated ground level: waterproofing to be tied in to existing and proposed ground floor slab as appropriate; details to be provided at detailed design to building regulations requirements: to reduce the turnaround time for returning the property to full operation after a flood event.
- Waterproofing to be installed above ground level as appropriate
- Plasterboards will be installed in horizontal sheets on ground levels rather than conventional vertical installation methods to minimise the amount of plasterboard that could be damaged in a flood event
- Wall sockets will be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property
- Any wood fixings on ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event
- Airbricks will be raised to as high as is feasible and practicable
- The Damp Proof Membrane / ground waterproofing will be installed above the main floor slab and tied in to the walls where appropriate, to reduce the turnaround time for returning the property to full operation after a flood event
- New electrics to be installed top down as far as is feasible to minimise damage

9.6 Refuge and Evacuation

Based on the likely flood risk and associated warning time, evacuation is usually preferred and feasible at this site, floodwaters are also not likely to enter the building; in emergency refuge is a preferred flood response but the site access / egress is not likely to be flooded and there is unrestricted access to unrestricted FZ1.

Range of Flood Events

The site is in part FZ3 fluvial undefended and not in a rapid inundation zone / breach flood extent. The evacuation and flood management does not need to consider this fastest type of flood inundation but surcharging is possible due to the sections of culvert downstream and upstream.

The preferred response is well advanced evacuation which is feasible given the flood setting.

Preferred evacuation route is always in FZ1:

- Ormskirk Road north: which is all in FZ1

All site users have access to the first floor which is an appropriate emergency refuge.

The property itself will be a modern protected and resilient dwelling as a result of the scheme and based on the available mapping is not likely to be inundated hence the site users can remain dry within the property for the duration of the likely flood event.

9.7 Annual Monitoring

It is recommended that tenants should contact the EA on an annual basis to confirm the flood status of the property.

If the flood status has changed, the evacuation and refuge plan should be reviewed and updated by suitable flood risk consultants as appropriate.

10.0 Flood Storage

It is considered that flood compensation is not required given the existing and new footprint and all raising of the land is not within the 1in1000year.

11.0 Conclusion

The proposed development is categorised as retaining “More Vulnerable” uses at the site in accordance with the NPPF with the area of works being wholly within FZ1 outside of the 1in1000year extreme event; part of the application boundary is in EA Flood Zone 3 thus it is an appropriate scheme but the Exception Test still needs to be passed; it is considered passed by this assessment.

The proposed scheme REDUCES FLOOD RISK OVERALL:

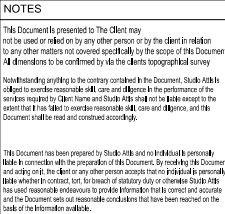
- SUDS strategy commensurate with the scale and sensitivity of the scheme
- Fully NPPF and LLFA compliant
- New modern resilient and resistant building construction techniques
- **Results in better protected and flood future proofed dwelling than existing**

Based on the likely flooding risk, it is considered that the proposed development could be constructed and operated safely in flood risk terms and is therefore appropriate development in accordance with the NPPF/NPPG.

12.0 Appendices

- A. Site Location & Existing Layout / Floor Plans
 - B. Proposed Development Plans
 - C. Greenfield Runoff Rates
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Appendix A



Version	Amendment	Drawn & Date
P01	Issued for Information	08.02.21

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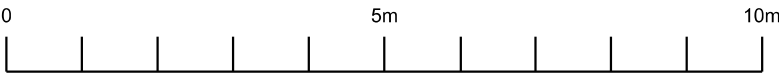
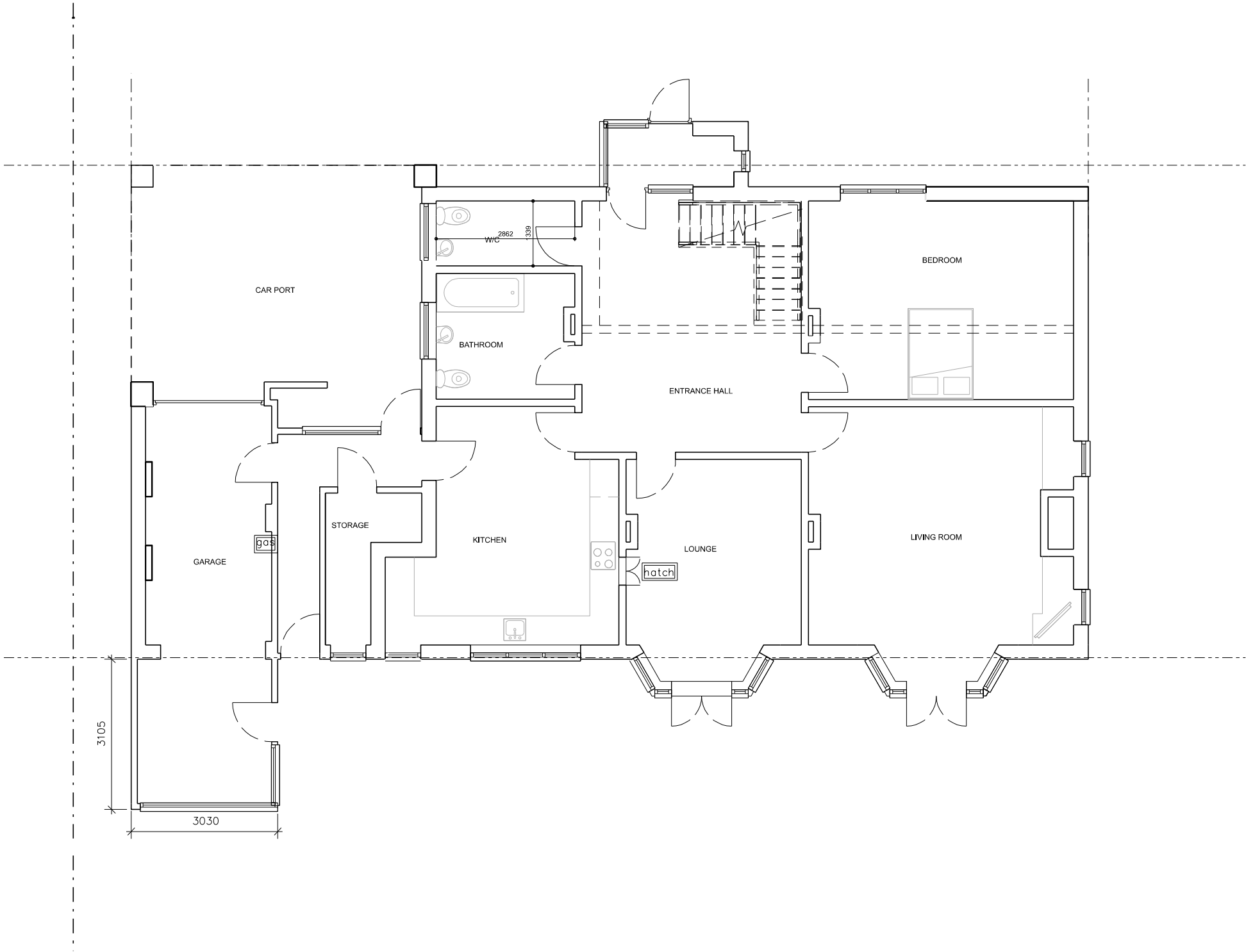
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Scale 1:500	Checked	Approved	

Drawing Number	Status
	S2

2050-SAT-ZZ-00-DR-A-1102

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Scale 1:100	Checked Approved
Drawing Number 2050-SAT-ZZ-00-DR-A-1100	Status S3 Revision P01

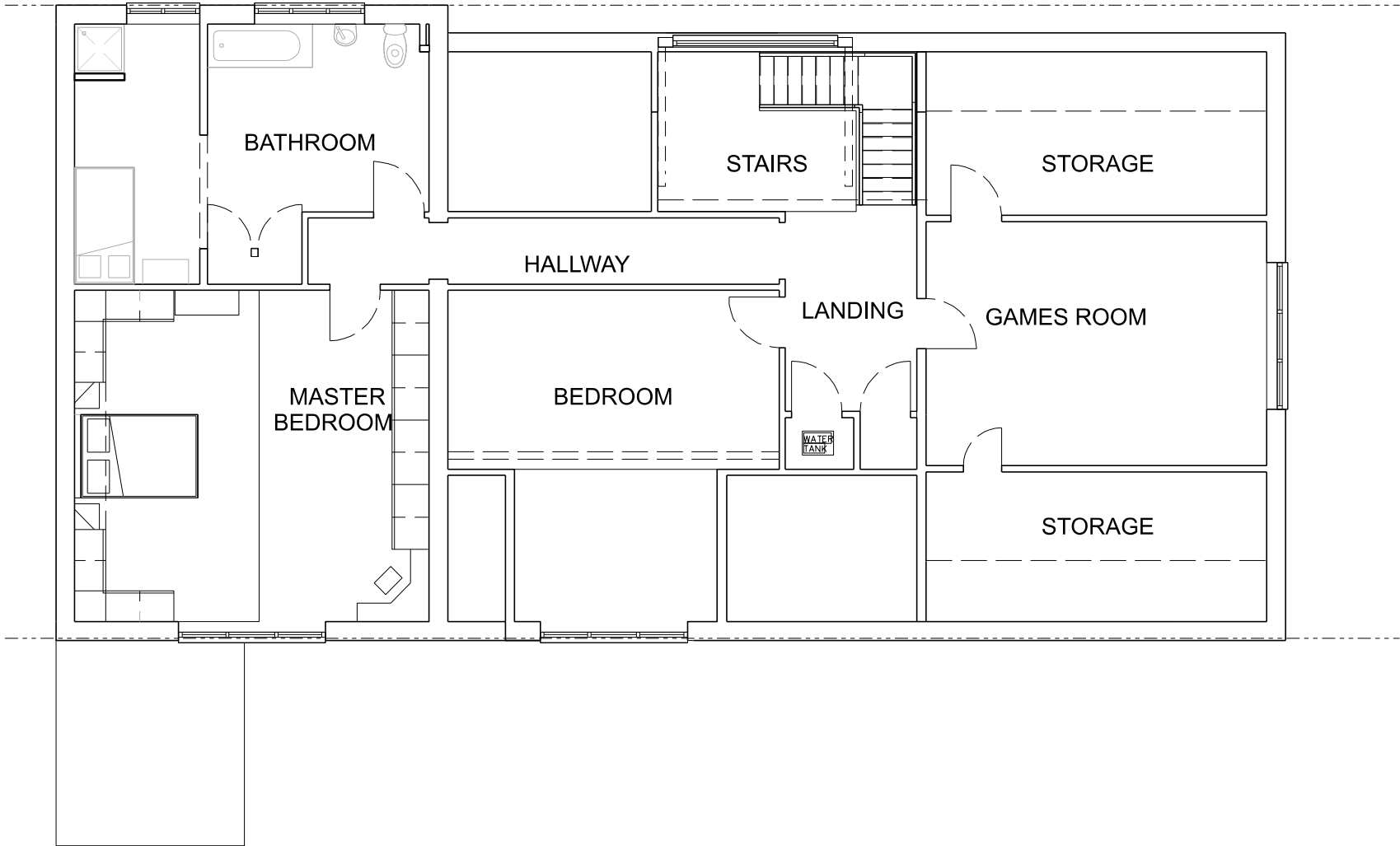
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Version	Amendment	Drawn & Date
P01	Issued for Information	08,02,21



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Internal Project Number	
20-50	
Client	
Mr Costello	
Project Name	
Ormskirk Rd Knowsley Village	
Drawing Title	
Existing First FL Plan	
Original Size A3	RIBA 2013 Stage 03
Scale 1:100	Checked Approved
Drawing Number 2050-SAT-ZZ-00-DR-A-1101	Status S3 Revision P01

Flood Zones Map:
27 Ormskirk Road,
Knowsley, L34 8HG
Produced: 08 March 2021
Our Ref: CL204750
NGR: SJ4407395361

Key

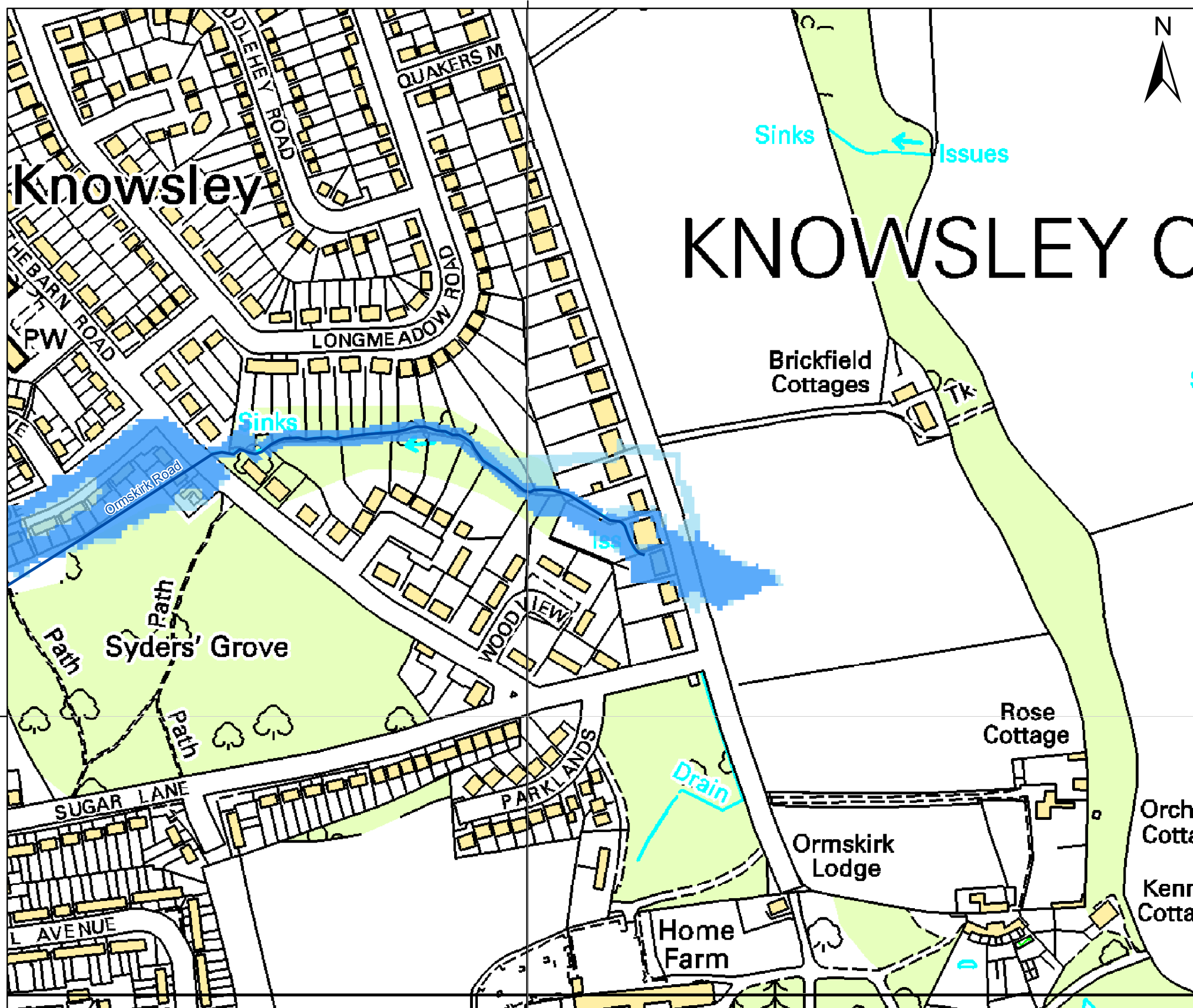
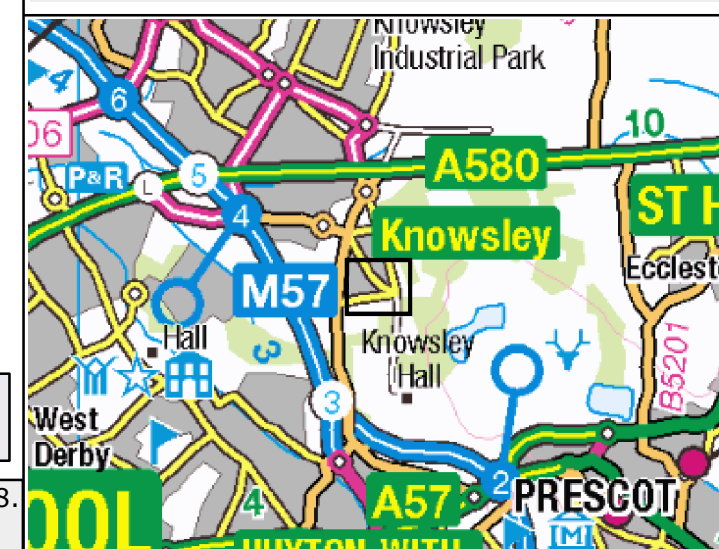
-  Main River
-  Areas Benefitting from Defences
-  Flood Zone 3
-  Flood Zone 2

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

ABDs (Areas Benefitting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.

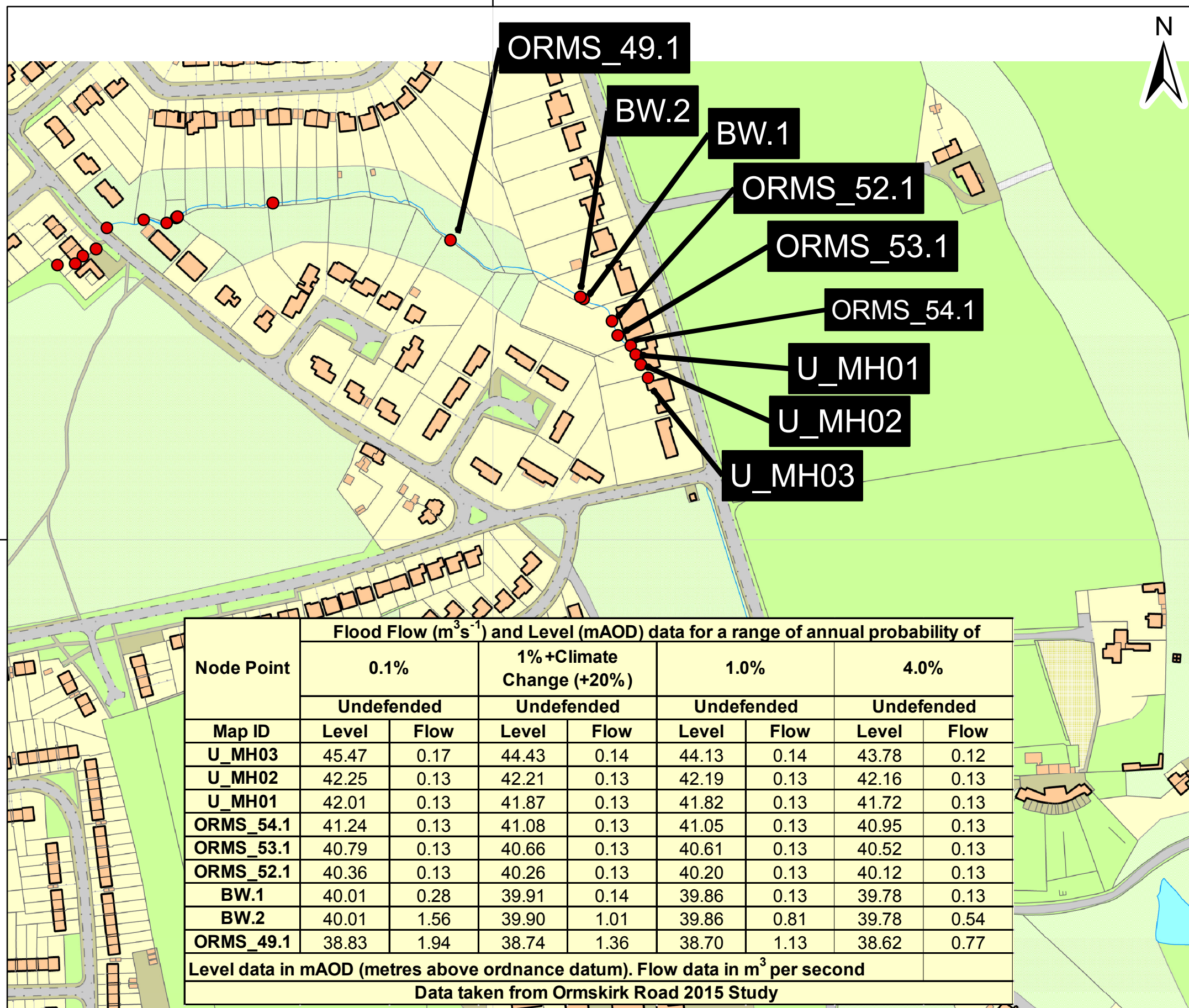


Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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Fluvial Levels Map:
 27 Ormskirk Road,
 Knowsley, L34 8HG
 Produced: 08 March 2021
 Our Ref: CL204750
 NGR: SJ4407395361

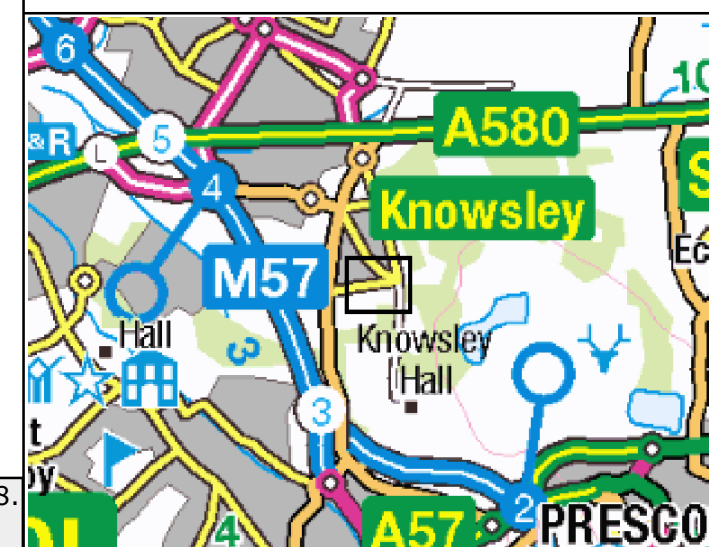


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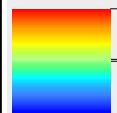


Fluvial Levels Map:
27 Ormskirk Road,
Knowsley, L34 8HG
Produced: 08 March 2021
Our Ref: CL204750
NGR: SJ4407395361

Key

 Main River

Fluvial undefended 1% annual probability
of flooding scenario

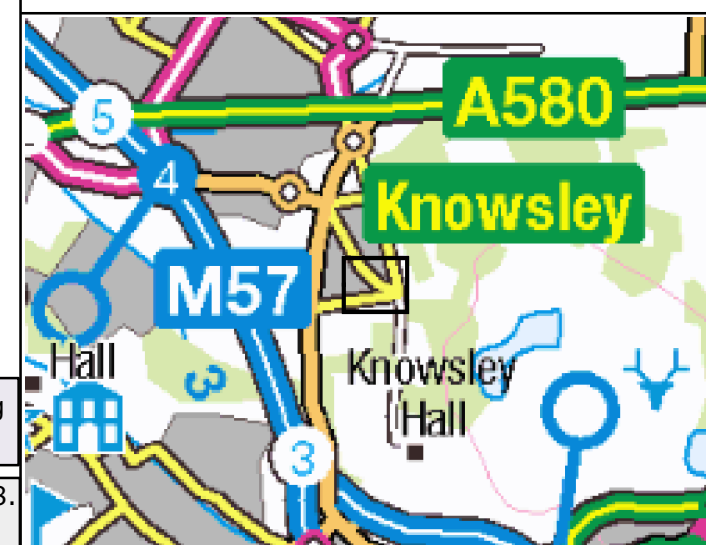
mAOD
 High : 43
 Low : 39

Flood Zone 3 shows the area that could be
affected by flooding:

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chance of happening each year
- or from a river with a 1.0% or greater
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chance of occurring each year.

ABDs (Areas Benefiting from Defences) show
the area benefiting from defences during a
0.5% tidal, or 1.0% fluvial flood event.



Level data given in mAOD (metres above ordnance datum)

AEP = Annual Exceedance Probability

Data taken from Ormskirk Road study 2015

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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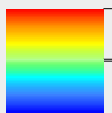
Fluvial Levels Map:
27 Ormskirk Road,
Knowsley, L34 8HG
Produced: 08 March 2021
Our Ref: CL204750
NGR: SJ4407395361

Key

 Main River

Fluvial undefended 1% (+ 20% Climate change) annual probability of flooding scenario

mAOD

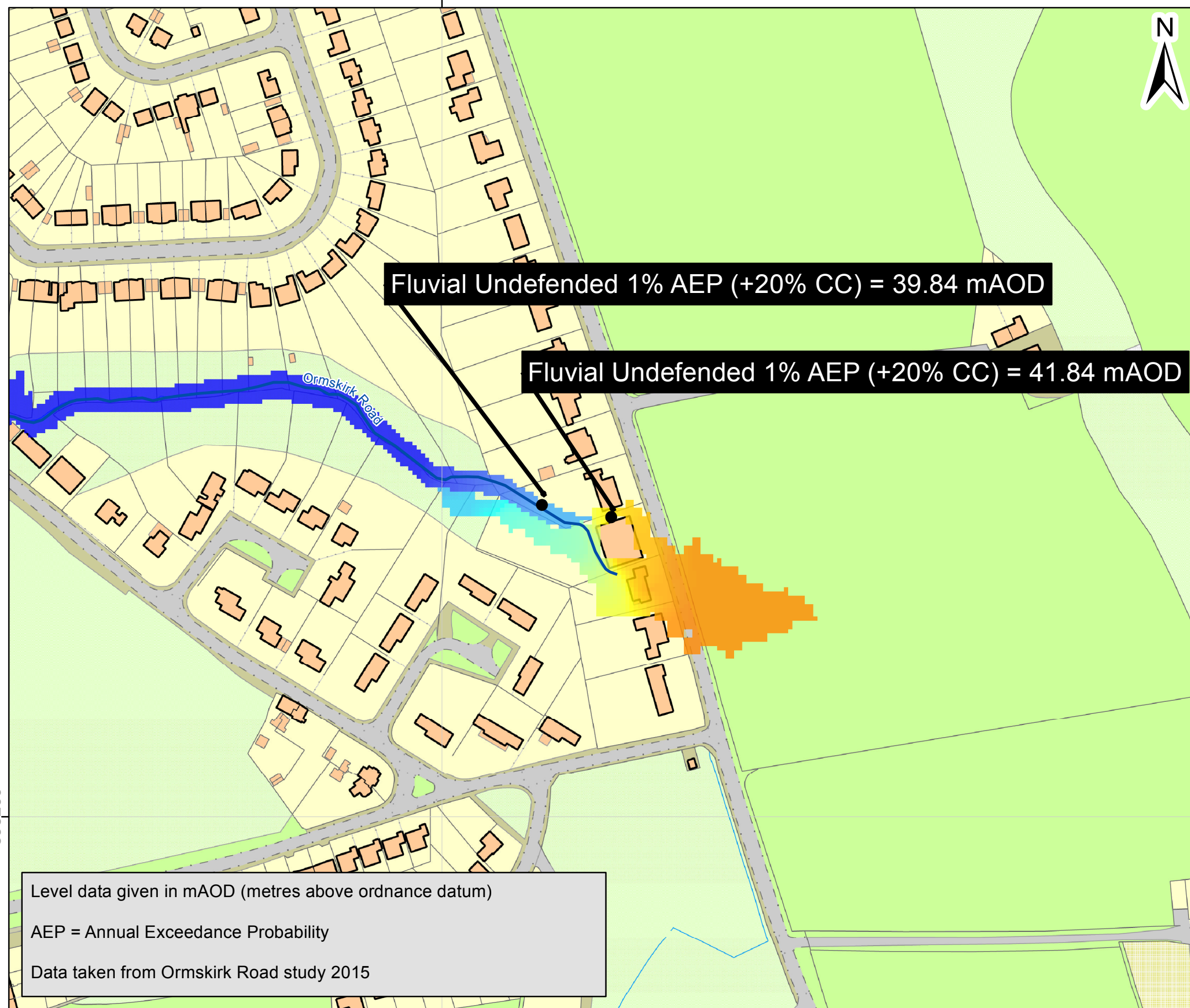
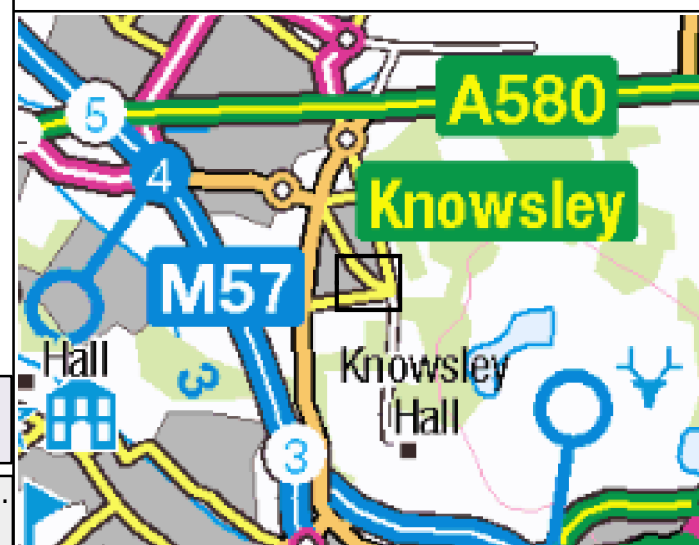
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ABDs (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

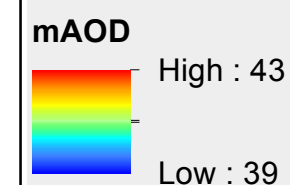
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Fluvial Levels Map:
27 Ormskirk Road,
Knowsley, L34 8HG
Produced: 08 March 2021
Our Ref: CL204750
NGR: SJ4407395361

Key

Fluvial undefended 0.1% annual probability of flooding scenario

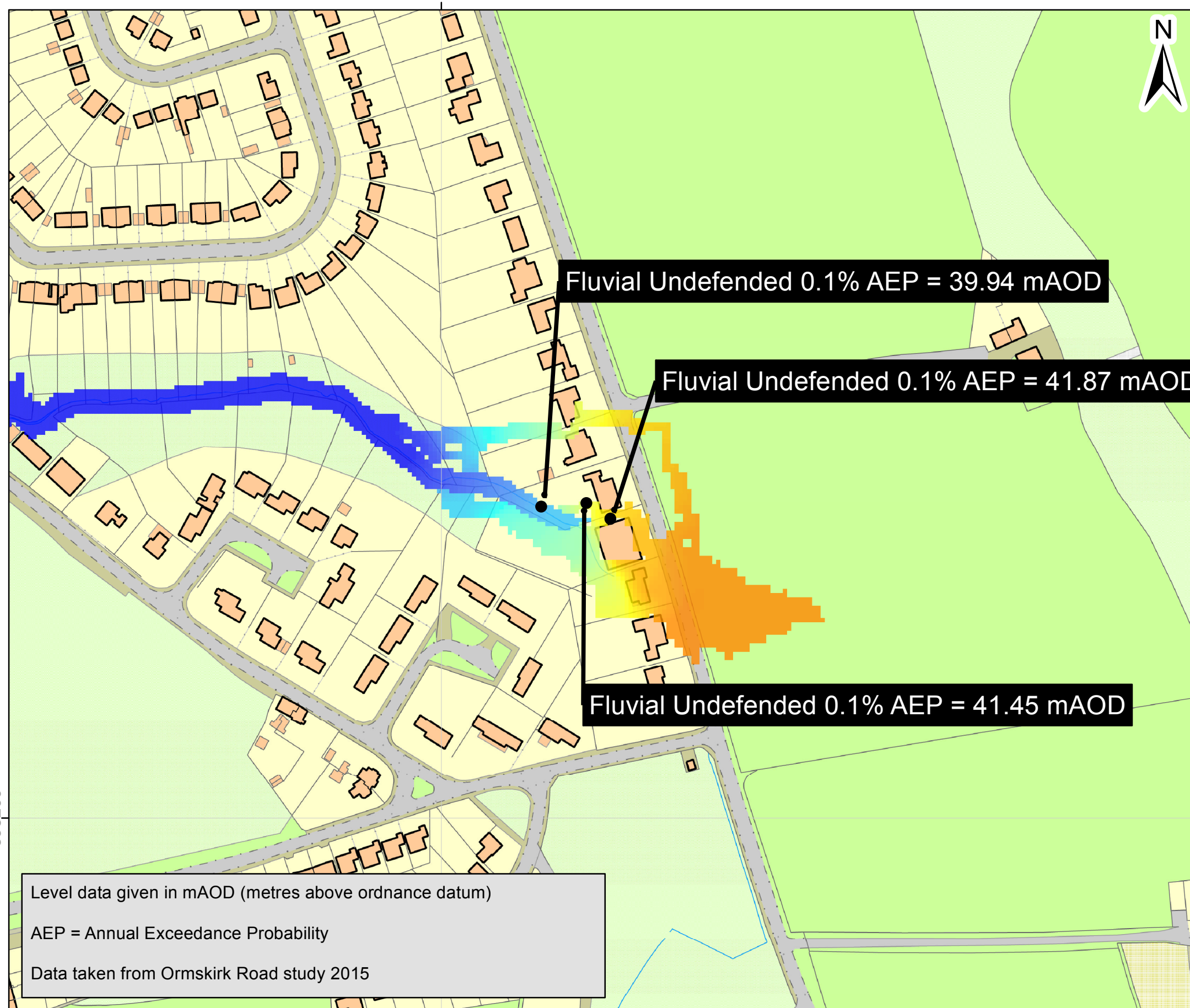
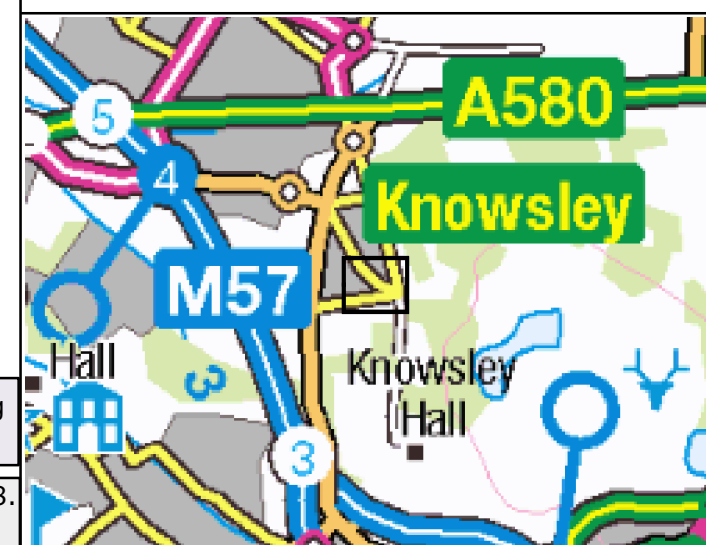


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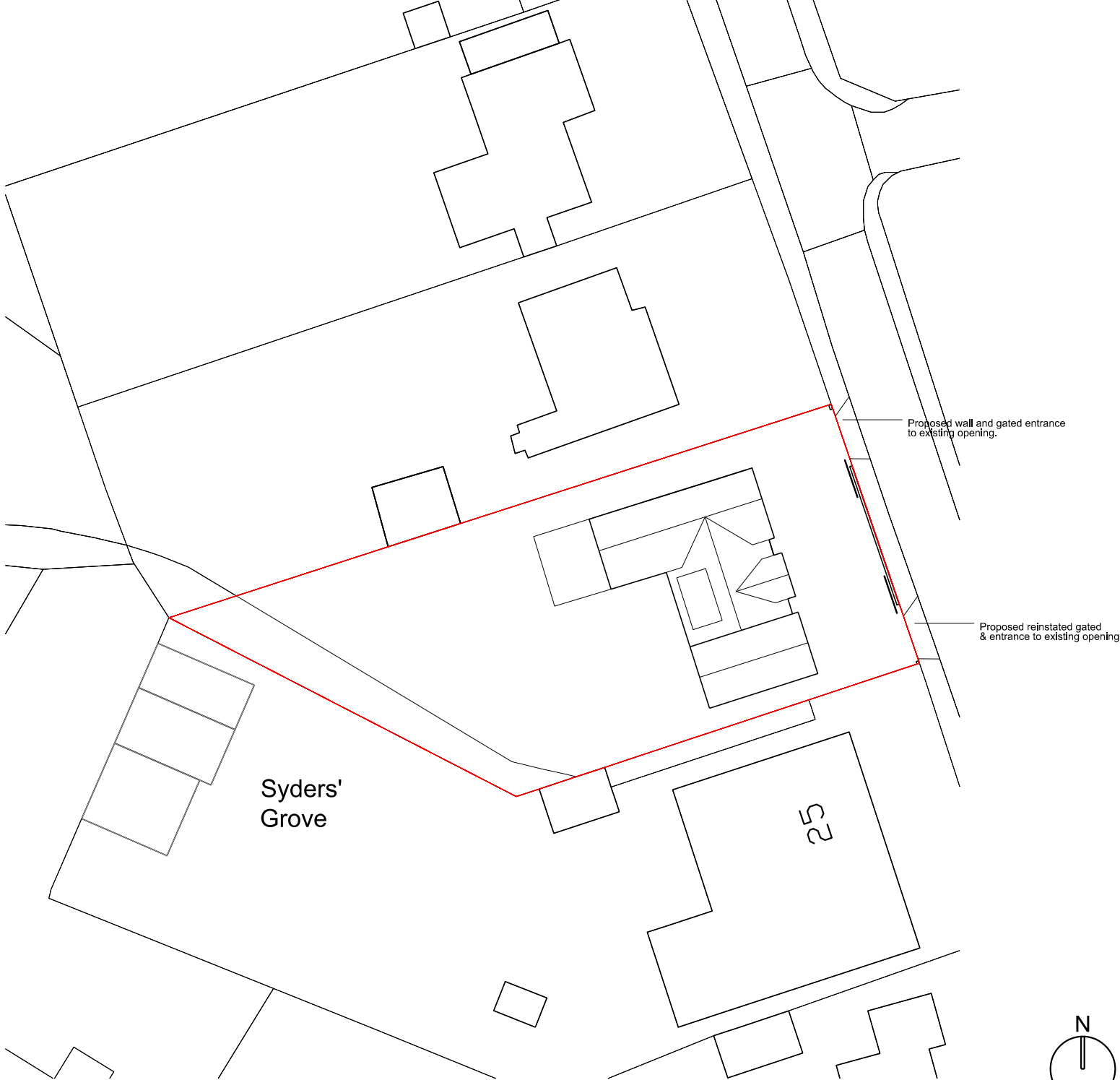
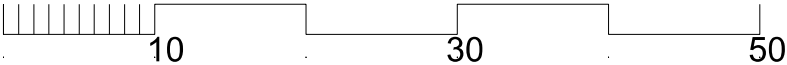


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Appendix B



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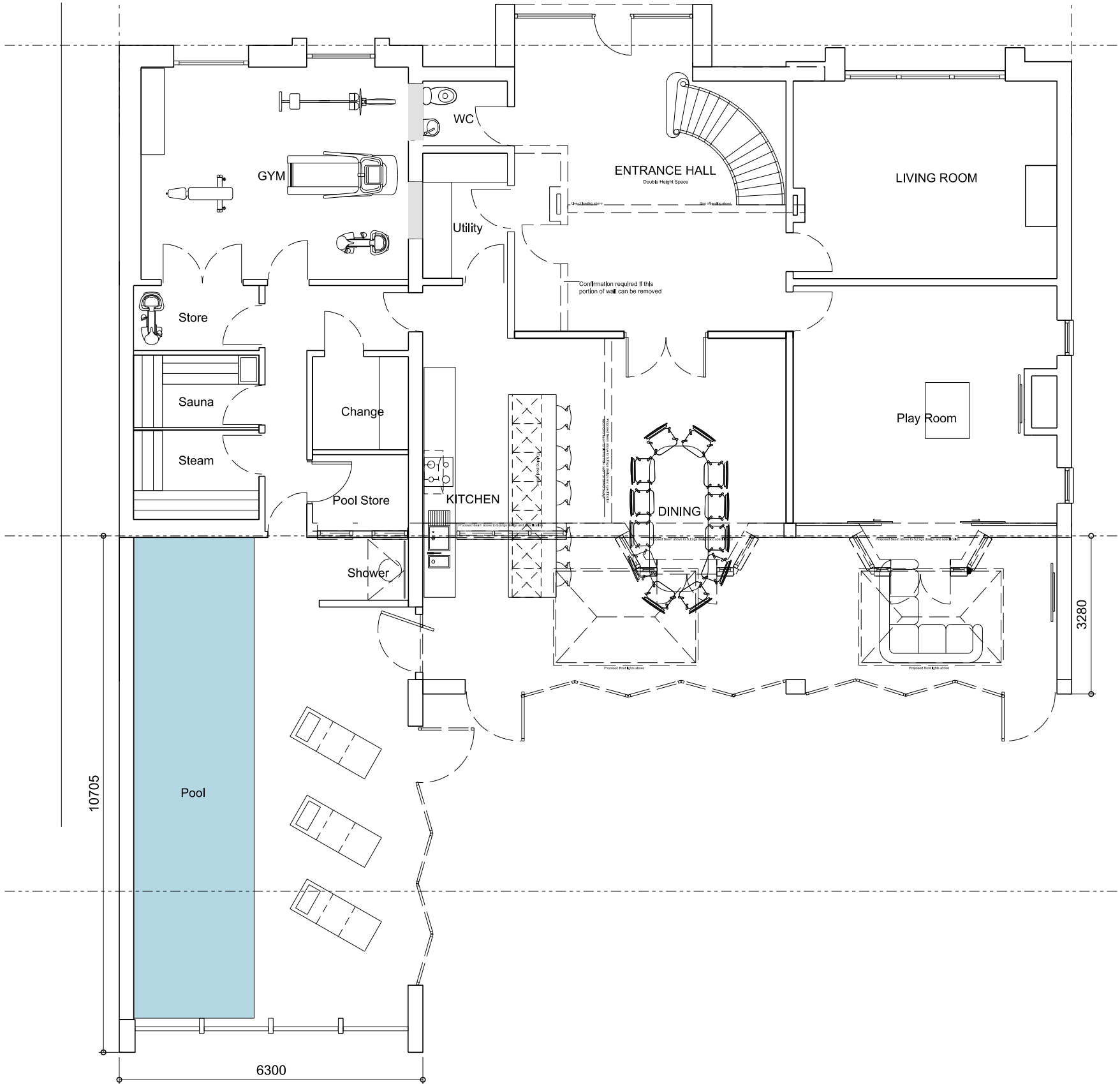
Version	Amendment	Drawn & Date
P01	Issued for Information	08/02/2

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Internal Project Number			
20-50			
Client			
Mr Costello			
Project Name			
Ormskirk Rd Knowsley Village			
Drawing Title			
Proposed Site Plan			
Original Size		RIBA 2013 Stage	
A4		03	
Scale		Checked	Approved
1:500			
Drawing Number			Status
2050-SAT-ZZ-00-DR-A-1200			S3
			Revision
			P01



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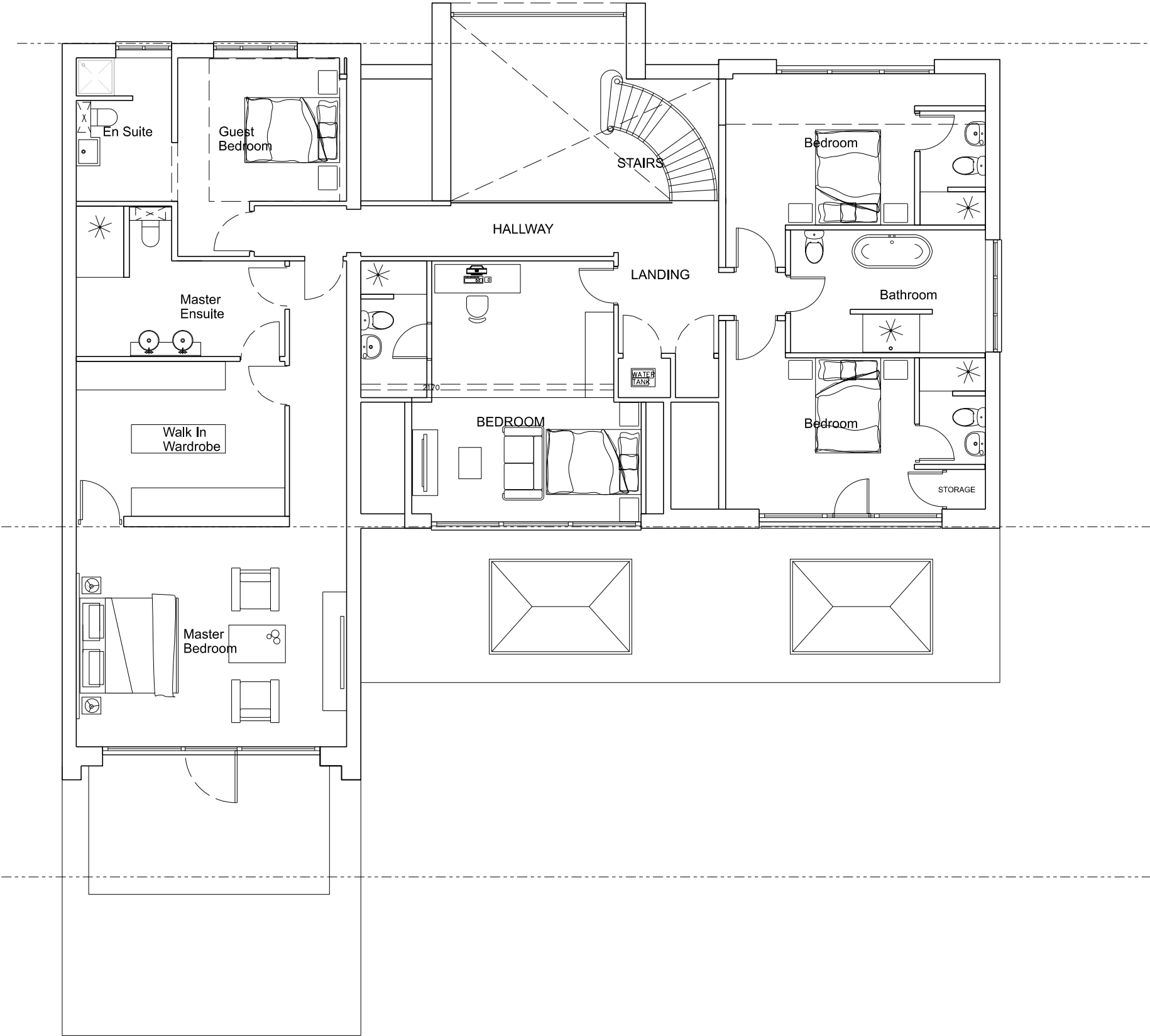
Version	Amendment	Drawn & Date
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Info@StudioAttis.co.uk		
Internal Project Number		
20-50		
Client		
Mr Costello		
Project Name		
27 Ormskirk Rd Knowsley Village		
Drawing Title		
Proposed Ground FL Plan		
Original Size	RIBA 2013 Stage	
A3	03	
Scale	Checked	Approved
1:100		
Drawing Number		Status
2050-SAT-ZZ-00-DR-A-1201		S3
		Revision



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Internal Project Number 20-50	
Client Mr Costello	
Project Name 27 Ormskirk Rd Knowsley Village	
Drawing Title First FL Plan	
Original Size A3	RIBA 2013 Stage 03
Scale 1:100	Checked Approved
Drawing Number 2050-SAT-ZZ-00-DR-A-1202	Status S3 Revision P01

Appendix C

Calculated by:	George Locke
Site name:	27 Ormskirk Road, L34 8HE
Site location:	27 Ormskirk Road, L34 8HE

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.45152° N
Longitude:	2.84323° W
Reference:	519435654
Date:	Mar 09 2021 10:12

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.092
-----------------------	-------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	880	880
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is $Q_{\text{BAR}} < 2.0 \text{ l/s/ha}$?

When Q_{BAR} is $< 2.0 \text{ l/s/ha}$ then limiting discharge rates are set at 2.0 l/s/ha .

(2) Are flow rates $< 5.0 \text{ l/s}$?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $\text{SPR/SPRHOST} \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.22	0.22
1 in 1 year (l/s):	0.19	0.19
1 in 30 years (l/s):	0.37	0.37
1 in 100 years (l/s):	0.46	0.46
1 in 200 years (l/s):	0.52	0.52

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.