

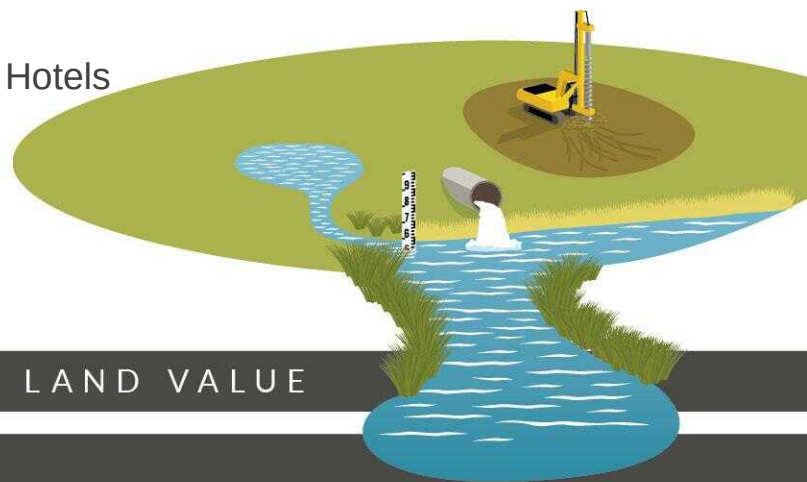
APH CAR PARK, BRADNOR ROAD, WYTHENSHAW

FLOOD RISK ASSESSMENT

Job Number: FRA 23 1105

Date: August 2023

Client: APH – Airport Parking and Hotels



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LK Consult			
Document Verification			
Site Address	APH Car Park, Bradnor Road, Sharston Industrial Area, Wythenshawe, M22 4TE		
Report Title	Flood Risk Assessment		
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Revision No.	Date	Nature of Revision	Approved By

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EXECUTIVE SUMMARY

Scope and Background

This Flood Risk Assessment (FRA) has been undertaken by LKC to support a planning application for the refurbishment of an existing car park off Bradnor Road, Wythenshawe. The development comprises the demolition and replacement of the existing car park building with a multi-storey car parking building and reinstatement of the bus garage boundary wall.

LKC has prepared this FRA in line with the NPPF and Technical Guidance where appropriate.

In considering the proposals the following key principles have therefore been applied:

- Identification of flood risks.
- Protection of users of the new development.
- No increased flood risk to third parties.

Consultations

The Environment Agency (EA) has been consulted to inform the preparation of this report. They have provided a more detailed flood map and modelled flood data.

Manchester City Council - Lead Local Flood Authority (LLFA) and United Utilities (UU) were also consulted concerning flood risk.

All relevant consultees have confirmed that there is a Negligible to Very Low risk of flooding to this site from all sources except pluvial water sources which pose a Low risk of flooding.

Flood Risk

The site is shown on the EA Flood Zone Mapping website as being in Flood Zone 1 (PPG Table 1).

The site is in Flood Zone 1 - Very Low Risk - annual probability of flooding less than 0.1% (1 in 1000).

Mitigation

Design

Site falls will be arranged to allow reasonably level access for occupants and visitors and allowing the site to be free-draining in case of local ponding at times of heavy rainfall. Floor levels will be set as high as possible above the flood level giving regard to necessary access for the less-able.

The development will not result in a reduction in flood plain storage compared to the existing situation.

The site is considered to be at Very Low risk of flooding. It is recommended that the minimum finished floor levels for the development should be set at a nominal height above the proposed ground levels. This is to allow for overland flow during exceedance flows from an extreme event or a drainage failure.

Access

Access close to the site is elevated above potential flood levels and will always provide safe access to and from the site from Bradnor Road.

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1 Introduction

1.1 Background

LKC were commissioned by APH – Airport Parking and Hotels to carry out an FRA for an existing car park off Bradnor Road, Wythenshawe. The report was undertaken in support of a future planning application to refurbish the car park area.

The report will address the vulnerability to flooding from all possible sources and will also consider the impact of the development on surface water runoff accounting for climate change and the potential to increase flood risk elsewhere. The issues of actual flood risk are discussed in Section 4.

Government policy with respect to development in flood risk areas is contained within the Department of Communities and Local Government National Planning Policy Framework¹ and accompanying Technical Guidance of March 2012 (revised to the Planning Practice Guidance (PPG)², which supersedes Planning Policy Statement 25 (PPS25) 'Development and Flood Risk'. The guidance on Climate Change allowance issued by the Environment Agency in June 2022 has also been considered.

LKC has prepared this FRA in line with the NPPF and the PPG where appropriate. The level of detail entered into any flood risk assessment is dependent upon the scale and potential impact of the proposed development, and the vulnerability classification of the proposed land-use.

¹ DCLG (2021). "National Planning Policy Framework." Department of Communities and Local Government. July 2021.

² DCLG (2016). "Planning Practice Guidance" <http://planningguidance.communities.gov.uk>, November 2016.

1.2 Site Details

A summary of the general site details is presented in Table 1-1. Plans, Drawings and Figures are provided in Appendix A. Figure 1 indicates the site location and boundary. Figure 2 indicates the proposed development.

Site Details	
Location	APH Car Park, Bradnor Road, Sharston Industrial Area, Wythenshawe, M22 4TE. Centred at approximate National Grid Reference 382890E, 389475N.
Area	Total area is approximately 2.82 Ha. Existing car park area is approximately 2.09 Ha. Bus garage area is approximately 0.73 Ha.
Topography	34.13 metres above ordnance datum (AOD) in the north west of the site and 34.48m AOD in the north east. The site is relatively level with a slight slope down towards the north west.
Current Land Use	<u>Site</u> Existing hardstood car parking area, car parking building to the centre and associated reception area in the south western corner. Bus garage to the east of Harling Road. <u>Surrounding Area/ Boundary Treatment</u> North: Playing field and commercial properties. East: Harling Road, bus garage and industrial units beyond. South: Bradnor Road and commercial properties. West: Established trees and residential properties beyond.
Proposed Development	Refurbishment of the existing development including the demolition and replacement of the existing car park building with a multi-storey car parking building. Reinstatement of bus garage boundary wall. Access will be from Bradnor Road.

Table 1-1: Summary of site details.

2 Site Setting

2.1 Vulnerability

As an initial phase in identifying whether a site is potentially at risk of flooding, LKC has consulted the EA's Flood Zone Mapping website. This mapping is (often) based on coarse scale modelling and provides only an initial indication of the flood risk to a site. The EA Flood Zone maps were developed using a very coarse Digital Elevation Map (DEM) and are superseded by a more detailed analysis of modelled flood levels and topographic survey levels.

The Flood Zones divide the floodplain into three categories of flood risk, and do not take flood defences into account. The NPPF defines the Flood Zones as:

- Flood Zone 1 – Very Low Risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000).
- Flood Zone 2 – Low Risk, with annual probability of flooding of 0.1 to 1.0% from rivers and 0.1 to 0.5% from the sea.
- Flood Zone 3 – Medium to High risk of flooding with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea.

The Flood Zone Mapping indicates the site as being within Flood Zone 1 in the PPG (paragraph 065, Table 1).

The development site is in Flood Zone 1, over 0.5 hectare in size and in a critical drainage area, so under current regulations a Flood Risk Assessment will be necessary to accompany the Planning Application.

The proposed development is for commercial use and this is classified within the 'Less Vulnerable' category in the PPG (paragraph 066, Table 2).

2.2 The Sequential and Exception Tests

The NPPF does not require that the Sequential Test be applied to development proposals in Flood Zone 1. Since the site has been shown to be located in Zone 1 for flood risk (see section 4.1), a sequential approach should not be required for planning.

However, the principles should still be applied for developments within the site such that, for example, dwellings are situated on a high part of the site when there is a risk of local surface water flooding. The issues of actual flood risk are discussed below. The issues of safety and reduction in flood risk to others required by an Exception Test are also addressed in this document.

The Local Planning Authority (LPA) will make the final decision with regard to any planning application.

2.3 Environmental Setting

LKC has undertaken a review of public domain information including British Geological Survey data, Environment Agency data, historical mapping and aerial photography to provide a summary of the environmental setting of the site. This is summarised in Table 2-1 below.

Summary of the Environmental Setting			
Geology	Superficial		Glaciofluvial Sheet Deposits, Devensian - Sand and gravel.
	Bedrock		Tarporley Siltstone Formation - Siltstone, mudstone, and sandstone.
	BGS Boreholes		BH Ref: SJ88NW150, 310m E: Sandy Clay to 1.52m, medium dense Gravel and sand with occasional cobbles to 3.96m, silty Clay with occasional fine gravel to 5.94m and sandy silty Clay with occasional fine to medium gravel to 8.83m. BH Ref: SJ88NW148, 265m S: Sandy silty Clay to 1.52m, medium dense fine to medium Sand with gravel to 2.26m, Sand and gravel to 4.08m, fine to coarse Sand to 5.33m, silty Clay with fragments of red and green mudstone to 6.85m, grey Mudstone to 7.92m and grey Sandstone to 9.22m. (Groundwater struck at 9.6mbgl).
	Defra Soilscape Mapping		Type 15 – Naturally wet very acid sandy and loamy soils.
Hydro-geology	Aquifer Designation	Superficial	Secondary A Aquifer.
		Bedrock	Secondary B Aquifer.
	Source Protection Zone (SPZ)		Site not within an SPZ.
Hydrology	All adjacent and internal surface water		No internal open or culverted watercourses within the vicinity of the site. The River Mersey (upstream of Manchester Ship Canal) is located approximately 820m east of site. The Sinderland Brook (Fairywell Bk and Baguley Bk) is located approximately 920m west of the site.
	Flooding		Flood Zone 1.
Site History			Historical mapping indicates that the site consisted of pastureland from the earliest mapping in 1898 until 1936. From 1936 the recreation ground to the north was present. From 1956 the site and surrounding area consisted of industrial works, factories and depots. A residential area was developed adjacent to the west. Satellite imagery indicates that the current car park has been present since at least 2000.

Table 2-1: Summary of the Environmental Setting.

2.4 Site and Access Levels

A topographic survey of the site was not provided, therefore opensource LiDAR levels have been extracted to OS GPS datum, and information is included on the drawings in Appendix B. The site elevation ranges from 34.13m AOD in the north west to 34.48m AOD in the north east. The site is relatively flat with a slight slope down towards the north west. The final site levels and ground floor levels of the multi-storey parking building have not been determined. The proposed access would join Bradnor Road at around 34.28m AOD.

3 Consultation

Information from all relevant consultees is summarised in Table 3-1 below.

Relevant correspondence / information is provided in Appendices C (EA) and D (others).

For modelled levels refer to extracted Level table and node location map in Appendix C.

Source	Details	
EA	Flood Zone 1: Very Low risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000).	
	Modelled River Mersey Levels (node: 1290763, approximately 820m E)	No detailed flood modelling data would impact the site as the site does not fall within 150 metres of an area at risk of flooding from rivers or the sea. <u>Defended</u> Level of 31.83m for 1% annual probability event. Level of 32.12m for 1% event with climate change allowance. Level of 32.24m for 0.1% annual probability event. <u>Undefended</u> Level of 30.00m for 1% annual probability event. Level of 30.19m for 1% event with climate change allowance. Level of 30.37m for 0.1% annual probability event.
	Records of Flooding	No records of flooding.
	Records of Flood Warning Service	Not within a flood warning service area.
	Surface Water Flooding	Very Low risk of surface water flooding across the majority of the site. There is a Low risk of shallow flooding in the western area of the site and adjacent to the east of the existing parking building. There is a Low risk of shallow flooding adjacent to the east of the bus garage. There is a small area to the west and adjacent to the site in Bradnor Road with a Medium risk of shallow flooding.
	Flooding from reservoirs	No risk from reservoirs.
Manchester City Council (LLFA)	No information provided at the time of writing.	
	Possible or known incidents of highway flooding	Unaware of any current flooding problems associated with Bradnor Road.

Table 3-1: Summary consultee information.

Source	Details	
United Utilities (UU)	Likely conditions for connecting into their sewerage system	UU Wastewater Development department was contacted regarding sewer flooding history for the site. UU confirmed that they did not have records of internal or external sewer flooding of properties in the vicinity of the site as a result of overloaded sewers.
Strategic Flood Risk Assessment (SFRA)	Level 2 Hybrid SFRA ³	The site has no history of flooding.
Preliminary Flood Risk Assessment (PFRA) ⁴	The Preliminary Flood Risk Assessment (PFRA) ³ for the area indicates that there are no records of flooding for the area which conforms with information supplied by the EA.	

Table 3-1: Summary consultee information (continued).

³ Strategic Flood Risk Assessment Level 2 Hybrid: Manchester City, Salford City and Trafford Councils; 'Level 2 SFRA' (2011), JBA Consulting.

⁴ Preliminary Flood Risk Assessment: Manchester Council; 'Preliminary Flood Risk Assessment' (2011), JBA Consulting.

4 Assessment of Flood Risk

4.1 Flood Zones

The detailed flood map provided by the EA indicates that the site is in Flood Zone 1. (see Appendix C).

A direct comparison was made between the provided EA flood levels at this location and the LiDAR levels.

The extents of the 0.1% (1000-year) flood level remain outside of the development area.

4.2 Sources of Flooding

The risk of flooding from the following flood sources has been considered:

Fluvial – The EA has confirmed the study area is within Flood Zone 1. Therefore, the flood risk associated with this source is considered Very Low.

Tidal – The study area is remote from the sea and tidally influenced water bodies. Therefore, the flood risk associated with this source is considered Negligible.

Pluvial (Rainfall) – The surface water flood risk maps show areas adjacent the western boundary of the site that have the potential to flood during prolonged heavy rainfall. These areas need consideration within the detailed design or there is the potential to have areas of standing water in gardens and landscaped areas not positively drained if overland flow routes are not considered. Therefore, the risk of flooding from pluvial sources is Low but should be considered further during the detailed design.

Surface Water (Overland flow) – This relates to surface water entering the site. Surface water arising from the north east of the study area is likely to be intercepted by the highway drains and therefore pose no threat to the development. If there was a drainage failure causing overland flow it would flow towards the north west boundary. Therefore, the flood risk of flooding from surface water sources is considered Very Low.

Groundwater – The BGS has groundwater records for the study area in the form of borehole records. The records show the water table is recorded at 9.6mbgl. This makes it unlikely for groundwater flooding to occur. Therefore, the flood risk associated with groundwater sources is considered Very Low.

Sewers – Correspondence with United Utilities states that no property within the vicinity of the site is at risk of internal flooding due to overloaded public sewers. Therefore, the flood risk associated with sewers is considered Very Low.

Artificial sources – According to the EA online maps, the study area is not at risk from reservoir flooding. Therefore, the flood risk associated with artificial sources is considered Negligible.

4.3 Summary of Flood Risk

Source of Flooding	Risk Assessment Level
Fluvial	Very Low
Tidal	Negligible
Pluvial (Rainfall)	Low
Surface Water	Very Low
Groundwater	Very Low
Sewers	Very Low
Artificial Sources	Negligible

Table 4-1: Summary of Existing Risk Level.

The site is located within Flood Zone 1 and a Negligible to Very Low risk of flooding from all sources except pluvial which poses a Low risk of flooding has been identified for the site. LKC consider that a strategy for surface water management will be required at the site to mitigate the risk to others. The assessments of a range of measures that are feasible for the site are outlined in Section 5.

5 Mitigation Measures

5.1 Proposed Site levels and Developments Level

The 0.1% annual probability (1 in 1000-year) are below the lowest existing ground level measured on site. On this basis the finished floor levels (FFL) should be set at a nominal height above the finalised ground levels to allow for any overland flow from a drainage failure. No further mitigation measures are therefore recommended.

5.2 Safe Access

Safe and dry access is available via Bradnor Road to the south. The site is approximately 2m to 4m above the 1% annual probability event. Therefore, no mitigation is proposed.

5.3 Flood Resistance and Resilience

The development proposed may be subject to flooding at more extreme events than those considered. However, the risk appears to be sufficiently low that flood resilience measures need not be included into ground floor construction to aid recovery after any event. If utilised, typical measures would include solid floors, use of suitable materials and services fed from upper floors with outlets at high level. The need can be discussed and agreed with building control officers during detailed design.

5.4 Residual Risk

It is impossible to completely guard against flooding since extreme events greater than the design standard event are always possible. However, it is likely that with the 1% annual probability flood event with allowance for climate change significantly below the lowest site levels, the relatively elevated position of the development will safeguard it from localised fluvial flooding during extreme rainfall events and fluvial flooding events outside the scope of this assessment. However, ground floor levels should be set above proposed levels across the site and provide a nominal freeboard to allow overland flow under exceptional conditions. Overland flow routes should be considered in case of drainage failure and the extreme events.

6 Conclusions

The site is currently an existing hardstood car parking area, car parking building and associated reception area and a bus garage is present to the east. The proposal is the refurbishment of the existing development including the demolition and replacement of the existing car park building with a multi-storey car parking building.

The site is shown on published mapping to be located within the EA's Flood Zone 1. Comparison of LiDAR data with the EA modelled flood level data indicates that the whole site is in Flood Zone 1 – Very Low Risk of fluvial flooding.

Negligible to Very Low risks of flooding from all sources except pluvial water sources which pose Low risk of flooding have been identified from information provided by the LLFA, BGS and EA.

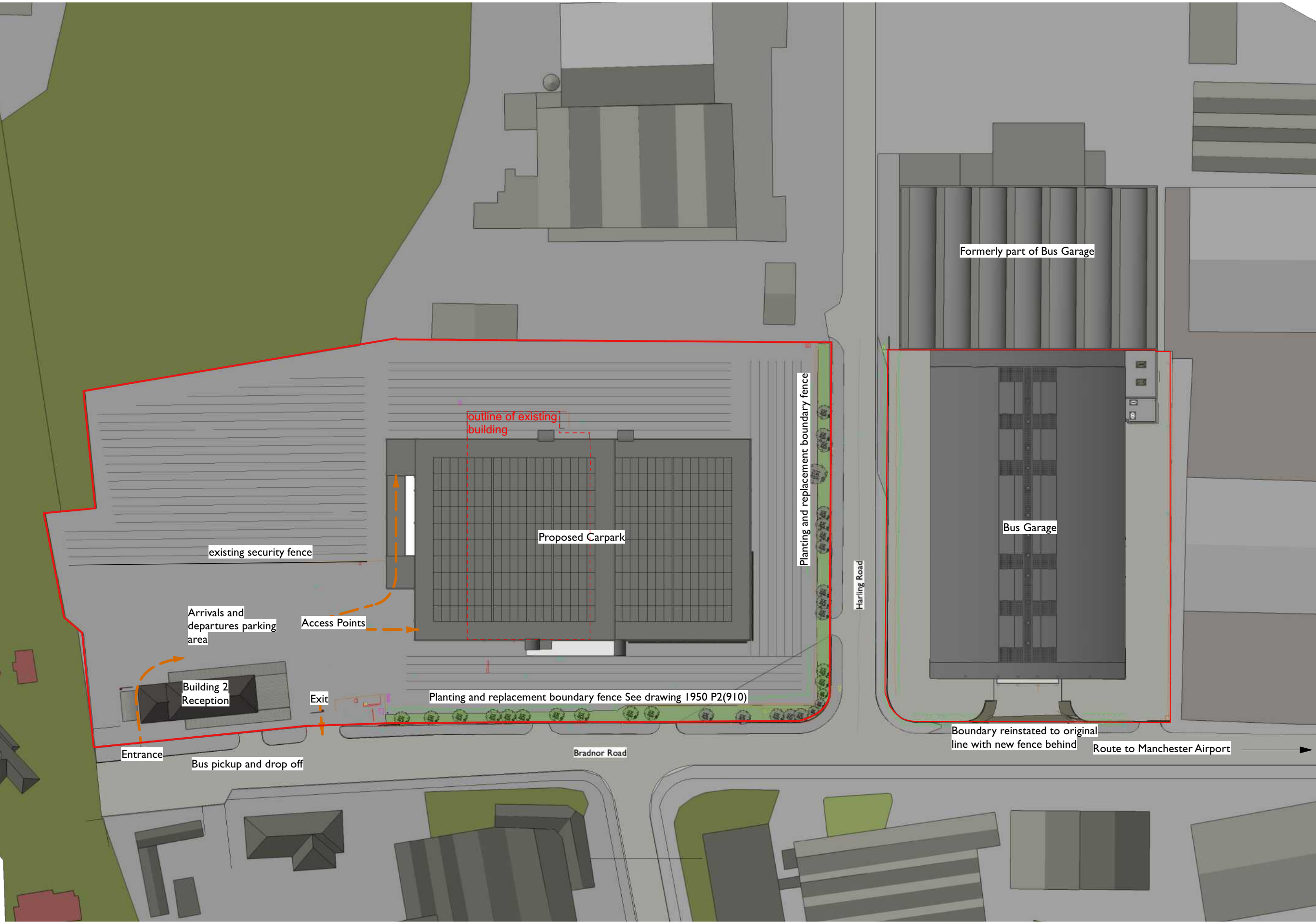
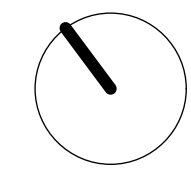
An assessment of these risks in conjunction with the development proposals have resulted in the following recommendations for the safe development of the site:

- » The finished floor level should be set at a nominal height above the finished ground levels to allow for overland flow routes in extreme events and drainage failures.
- » Pedestrian and vehicular safe access to and from the site is achievable under all conditions via the access road off Bradnor Road.
- » A formal evacuation plan is not considered to be required.

Further details on the proposed mitigation measures are provided in Section 5. All proposed measures should be agreed with the Local Authority prior to commencement of the development.

Appendix A

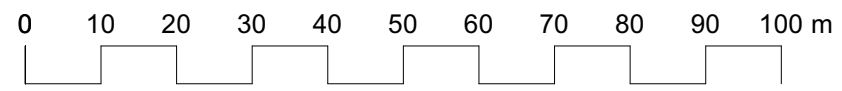
Figures, Plans and Drawings



1

Proposed Site Plan

Scale: 1:1000



Rev	Note	DRN	CHK
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Wythenshawe Bus Garage and Car Park

Proposed Site Plan

scheme	1950
drwg no.	P2(900)
revision	

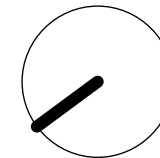
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drawn	PL

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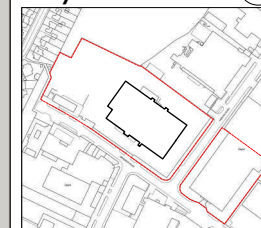
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Appendix B

Site Information



Key Plan



Scale 1:10 000

Rev	Note	DRN	CHK
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Wythenshawe Bus Garage and Car Park

Proposed New Car Park
Level 0 Plan

scheme	1950
drwg no.	P2(100)
revision	

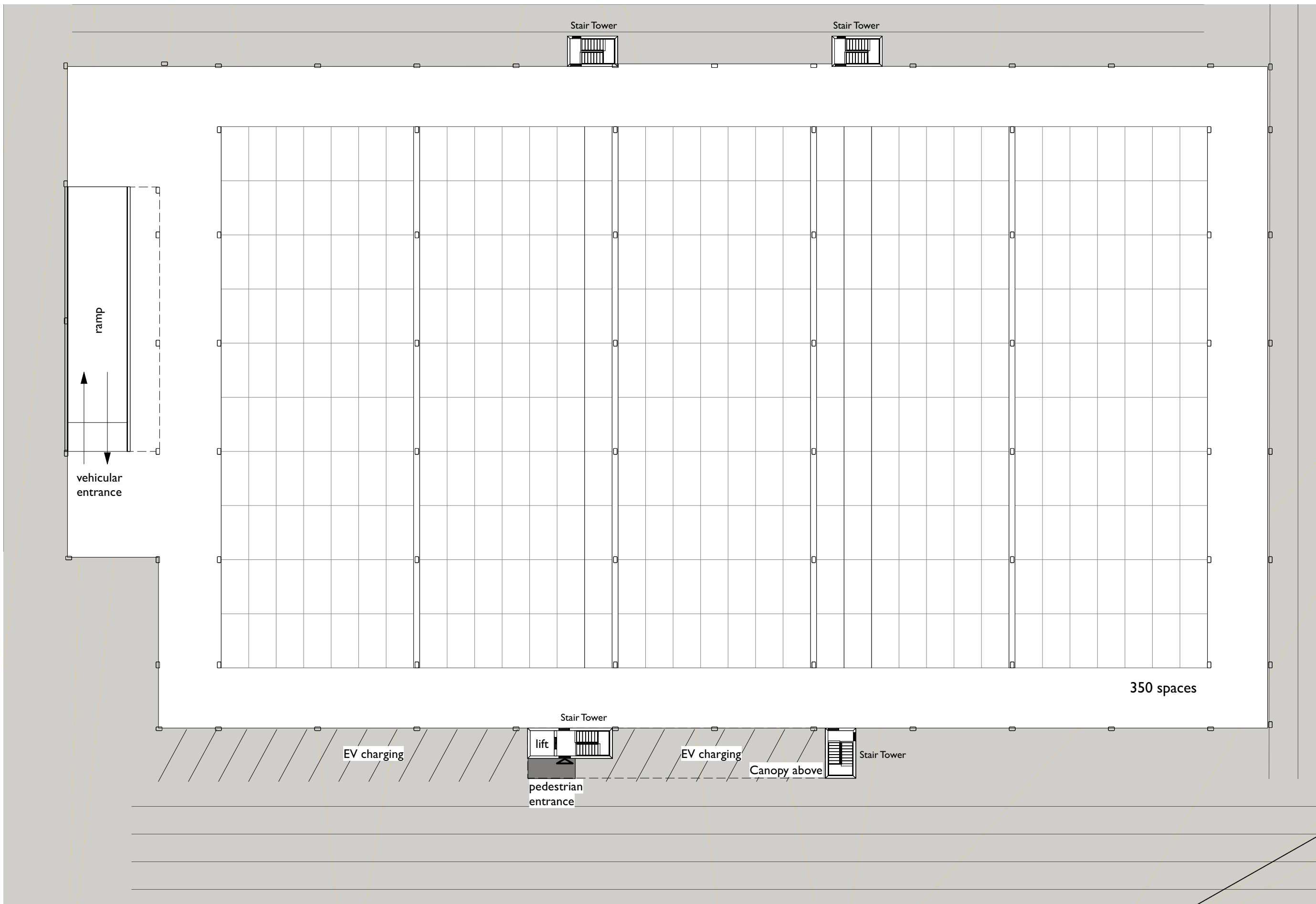
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drawn	PL

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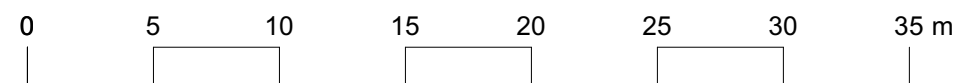
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Urban Architects



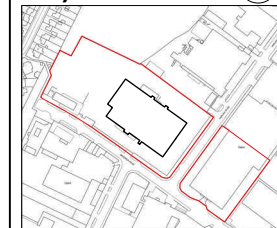
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Proposed Level 0 Plan

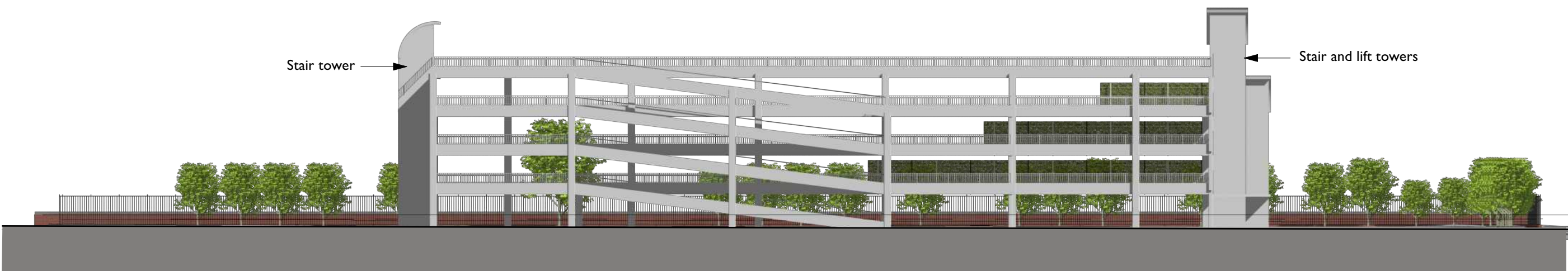
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Key Plan



Scale 1:10 000

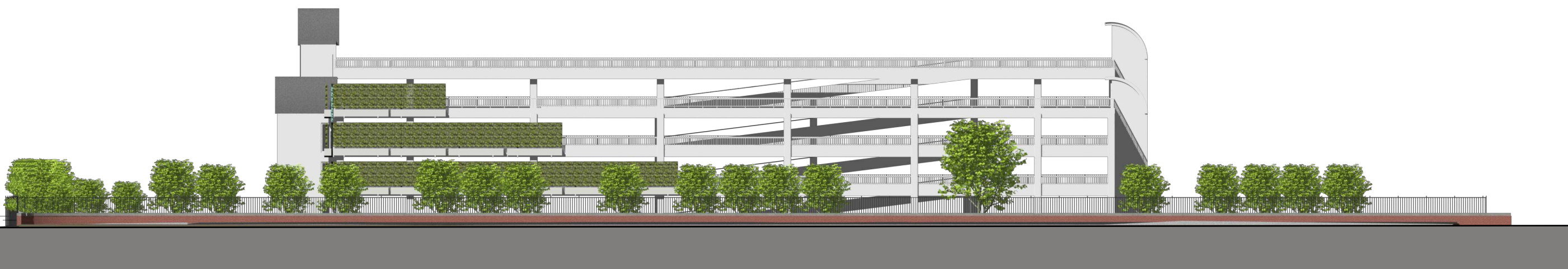


1 **Proposed West Elevation**
Scale: 1:300

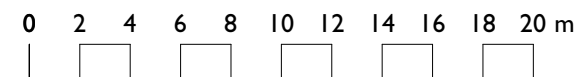
Materials:

Stair and lift towers:
Walls: coloured render finish
Roofs: grey Sika Decathane

Carpark perimeter:
Polyester powder coated guarding over concrete panels
Wall Planter green wall with powder coated trough and mesh plant support and intergrated irrigation system
Monocrystaline silicon PV panels on g.s. mounting frame



2 **Proposed East Elevation**
Scale: 1:300



Rev Note DRN CHK

Wythenshawe Bus Garage and Car Park

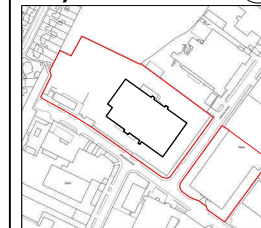
Proposed Car Park
Elevations I

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drwg no.	P2(200)
revision	
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date first drawn	Aug 22
drawn	PL

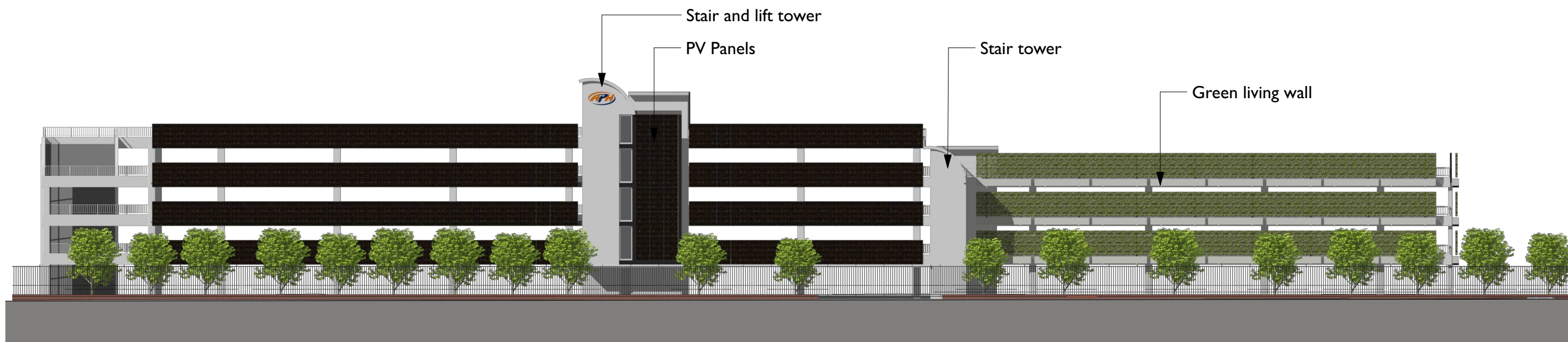
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Key Plan



Scale 1:10 000



1

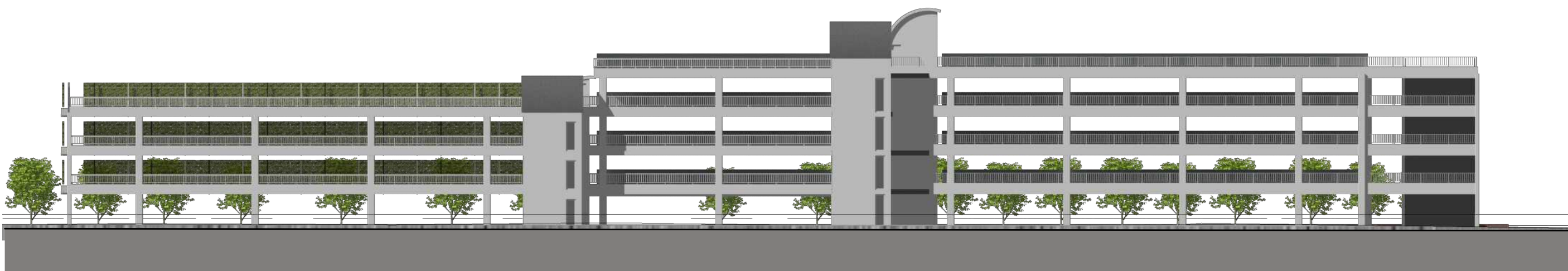
Proposed South Elevation

Scale: 1:300

Materials:

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Walls: coloured render finish
Roofs: grey Sika Decathane

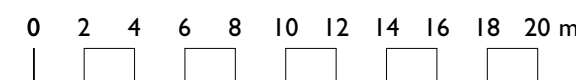
Carpark perimeter:
Polyester powder coated guarding over concrete panels
Wall Planter green wall with powder coated trough and mesh plant support and integrated irrigation system
Monocrystalline silicon PV panels on g.s. mounting frame



2

Proposed North Elevation

Scale: 1:300



Rev Note DRN CHK

Wythenshawe Bus Garage and Car Park

Proposed Car Park
Elevations 2

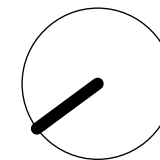
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date first drawn	Aug 22
drawn	PL

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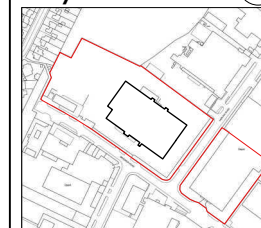
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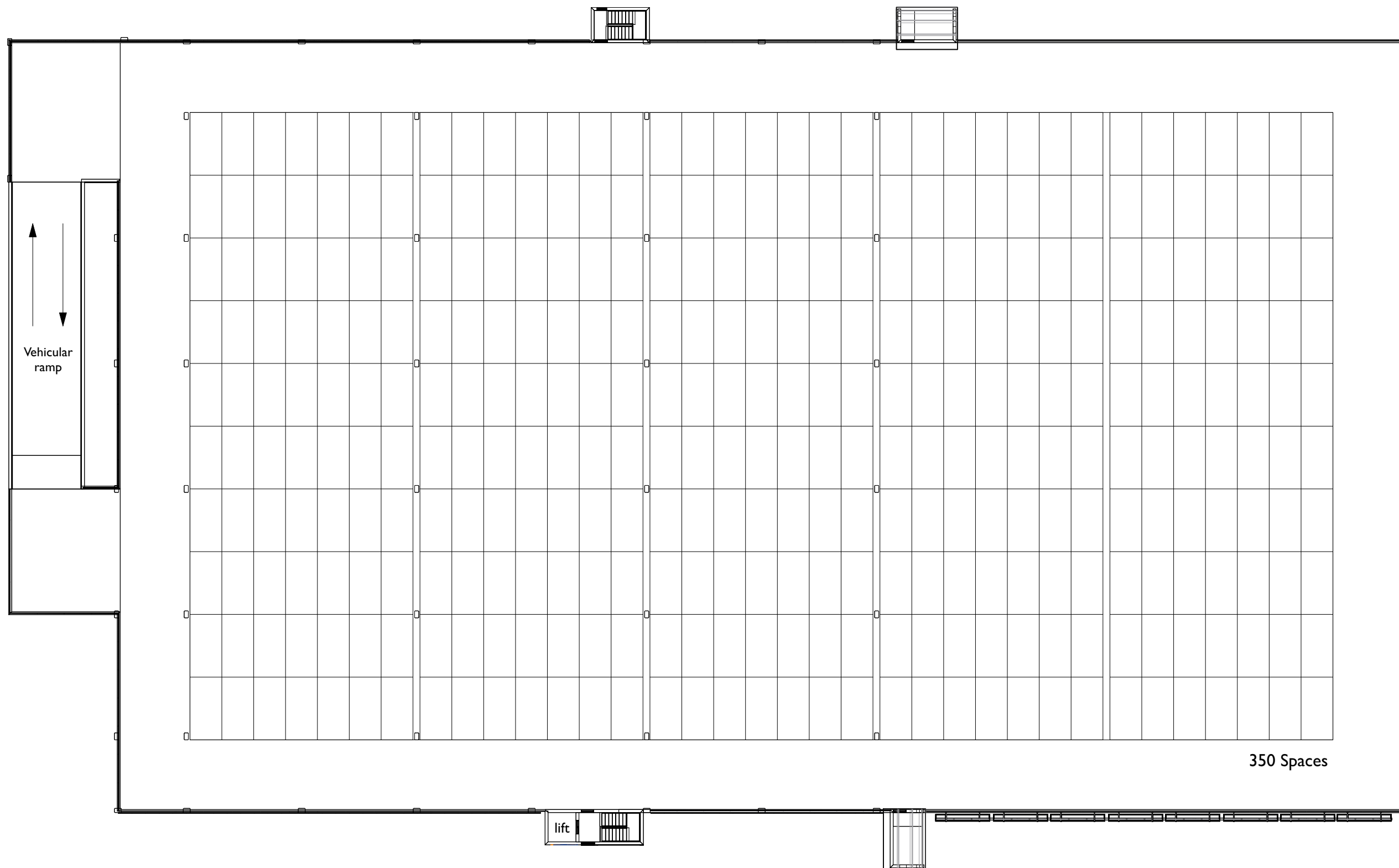
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Urban Architects



Key Plan



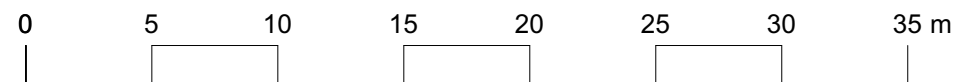
Scale 1:10 000



1

Proposed Levels 3 Plan

Scale: 1:300



Rev	Note	DRN	CHK
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Wythenshawe Bus Garage and Car Park

Proposed New Car Park
Level 3 Plan

scheme	I950
drwg no.	P2(I20)
revision	

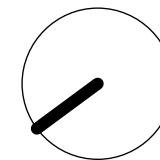
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drawn	PL

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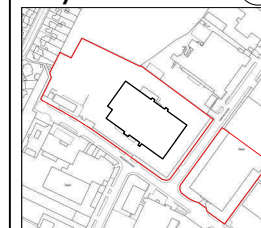
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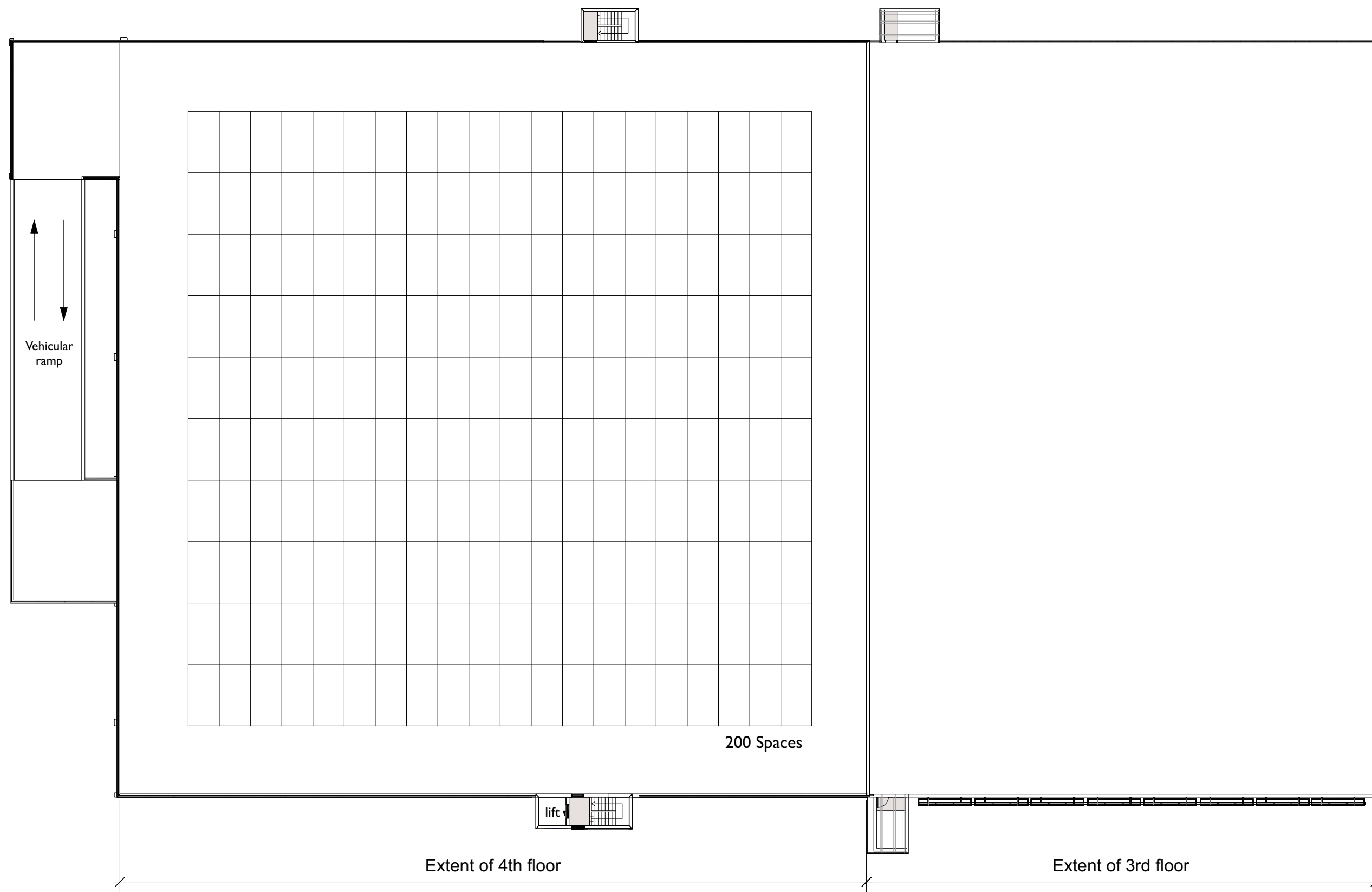
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Urban Architects



Key Plan



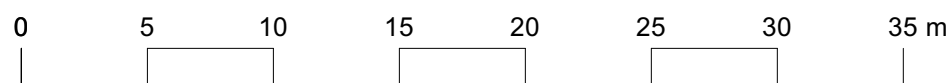
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2

Proposed Level 4 Plan

Scale: 1:300



Rev Note DRN CHK

Wythenshawe Bus Garage and Car Park

Proposed Car Park Level Plan

PRELIMINARY

scheme 1950
drwg no. **P2(130)**
revision

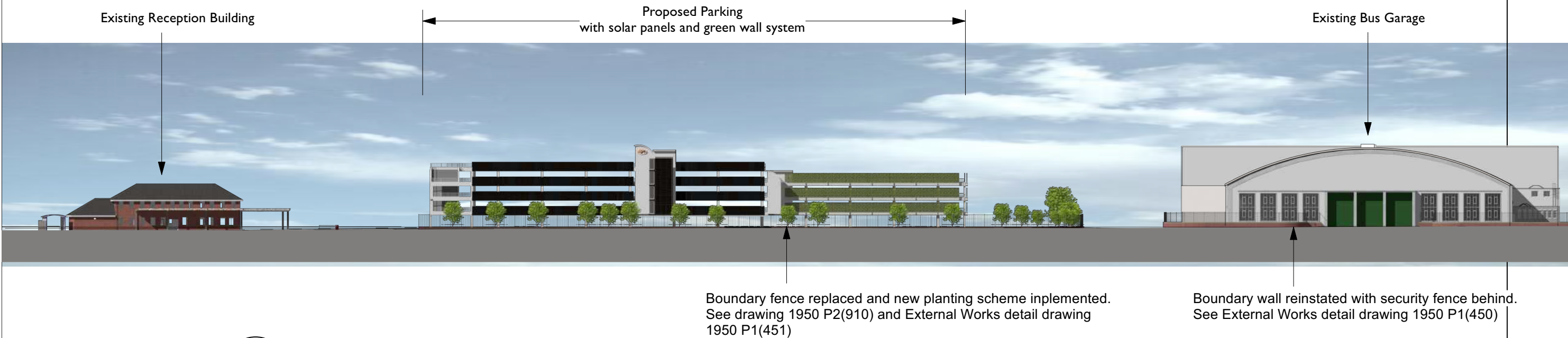
scale 1:200 @ A3
date first drawn Aug 22
drawn PL

SK sketch E existing P proposed T tender C construction FI final issue

www.ateliermb.co.uk
t 0161 236 0051
e architect@ateliermb.co.uk



Atelier MB
Urban Architects



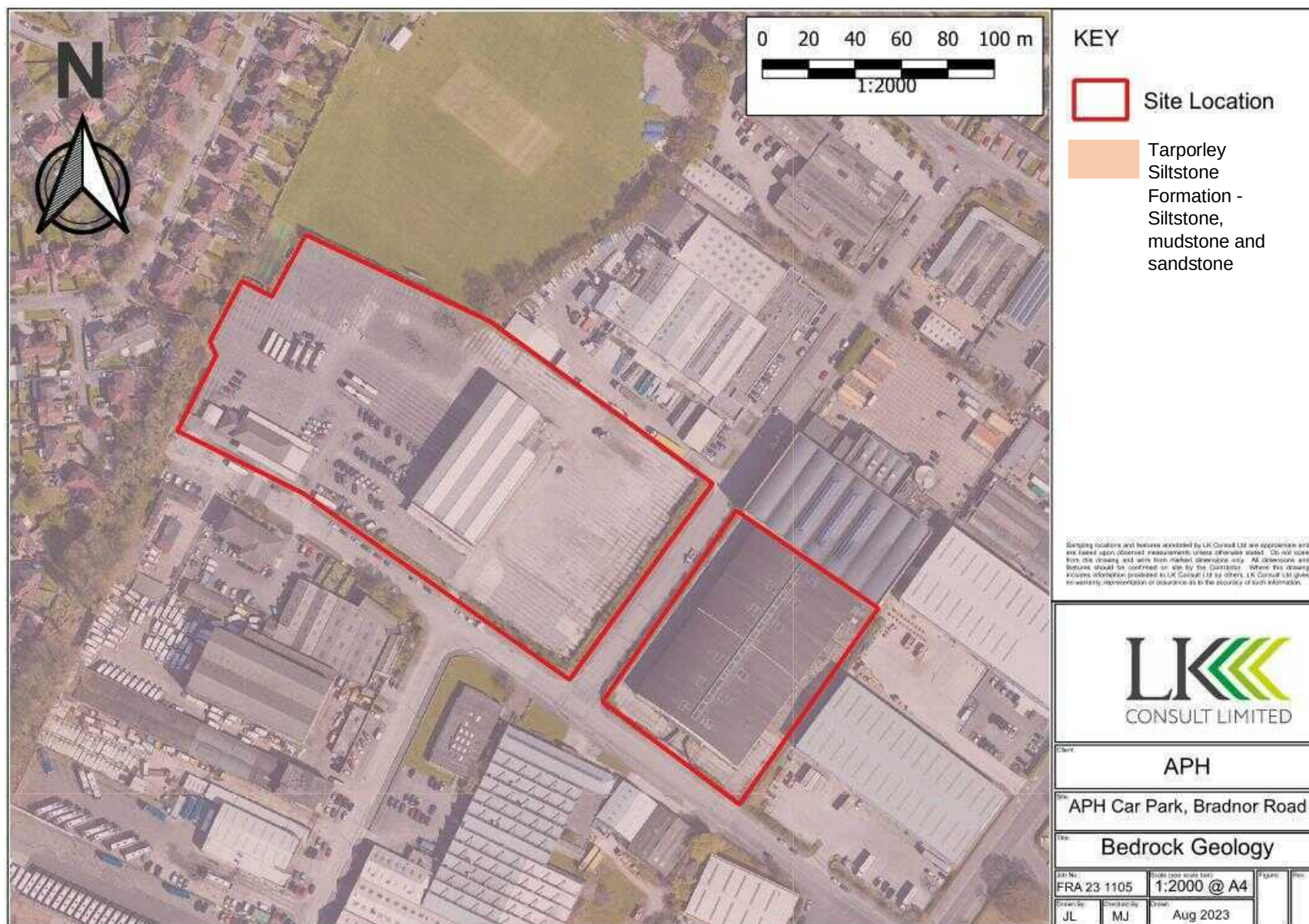
1 **Proposed Bradnor Road Street Scene**
Scale: 1:750



2 **Bradnor Street Massing Visualisation**
Scale: Not to Scale

Rev Note DRN CHK

Wythenshawe Bus Garage and Car Park	
Proposed Bradnor Road Street Scene	
scheme	1950
drwg no.	P2(220)
revision	
scale	1:750 @ A3
date first drawn	Aug 22
drawn	PL
SK sketch E existing P proposed T tender C construction FI final issue	
www.ateliermb.co.uk	
t 0161 236 0051	
e architect@ateliermb.co.uk	



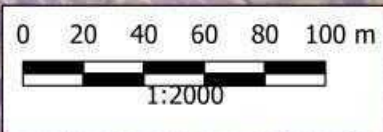
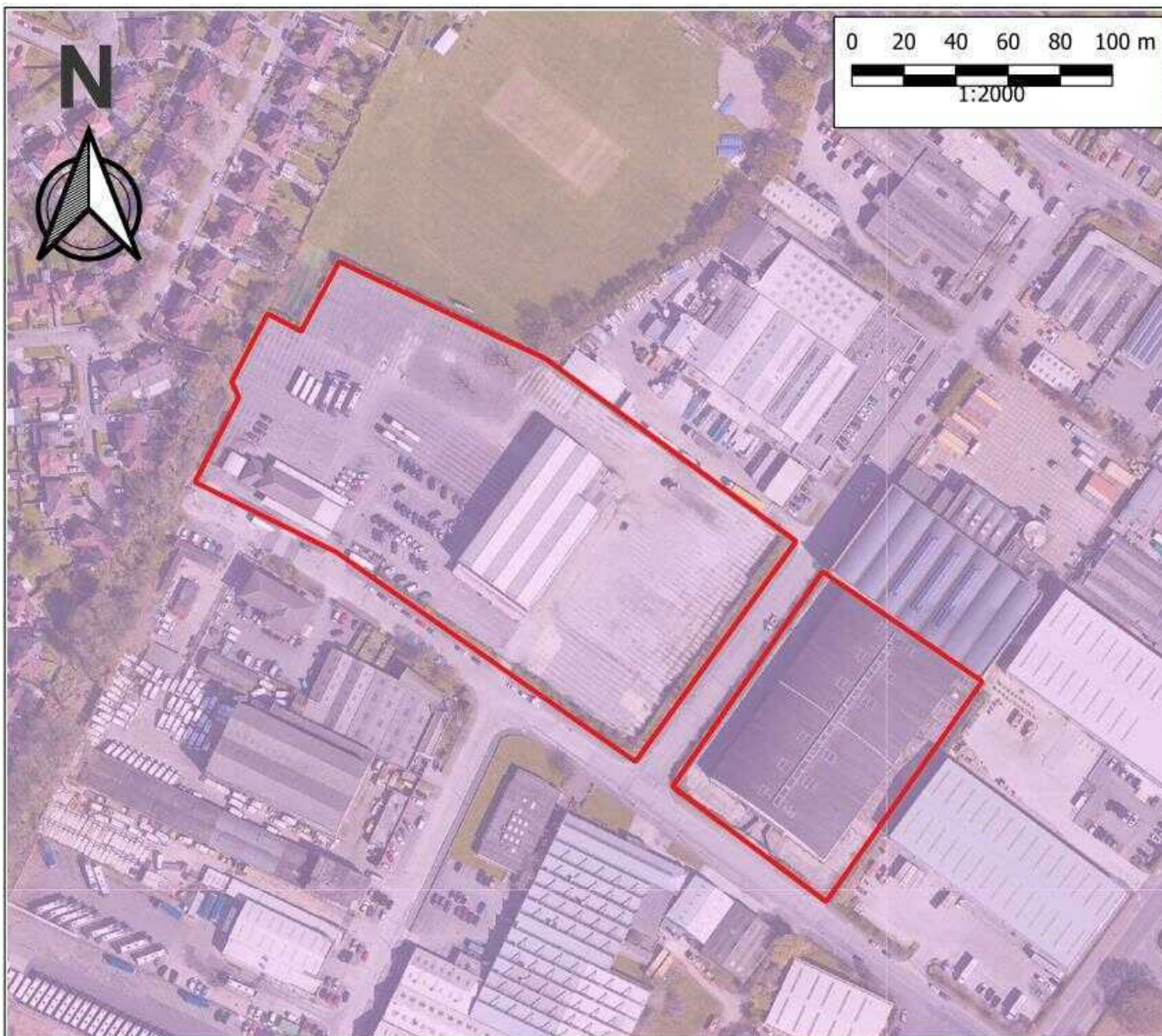
KEY

- Site Location
- Tarporley Siltstone Formation - Siltstone, mudstone and sandstone

Sampling locations and features indicated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and use from marked dimensions only. All dimensions and features should be confirmed on site by the Contributor. Where this drawing includes information provided by LK Consult Ltd to others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client		APH	
Site		APH Car Park, Bradnor Road	
Title		Bedrock Geology	
Job No.	Scale (see scale bar)	Figure	Rev.
FRA 23 1105	1:2000 @ A4		
Drawn By	Checked By	Date	
JL	MJ	Aug 2023	



KEY



Site Location



Glaciofluvial Sheet
Deposits, Devensian
- Sand and gravel.

Sampling locations and features associated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided by LK Consult Ltd to others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client:

APH

Site:

APH Car Park, Bradnor Road

Site:

Superficial Geology

Ref No:

FRA 23 1105

Scale (see scale bar):

1:2000 @ A4

Drawn By:

JL

Checked By:

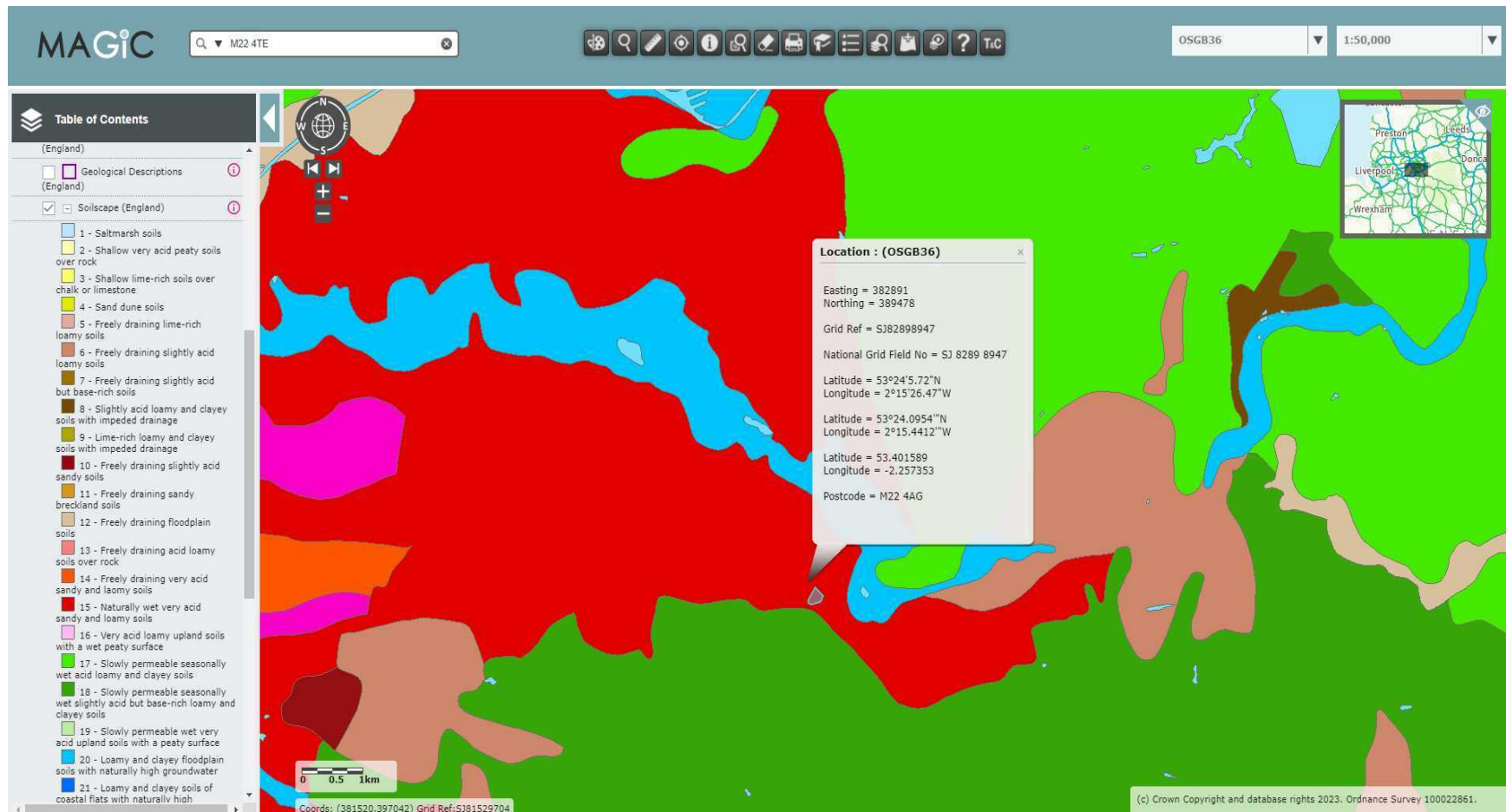
MJ

Date:

Aug 2023

Figure:

Rev:



Defra Soilscape Mapping - (c) Crown Copyright and database rights 2023. Ordnance Survey 100022861

RECORD OF BOREHOLE NO.130 SJ 88 NW 148

83133 89091

Ground level : 118.1ft above O.D. Newlyn

Dia. of boring : 8in

Type of boring : Shell and Auger

Lining tubes : 8in to 22ft

Daily Progress	Samples		Change of Strata			Description of Strata
	Depth	Type	Legend	Depth	O.D. Level	
14.6.67	1'0" - 2'6"	U(4)		2'6"	118.6	TOPSOIL
	2'6" - 4'0"	D		5'0"	113.1	Brown sandy silty CLAY
	5'6" - 6'6"	S(15)		7'6"	110.6	Medium dense light brown fine to medium SAND with gravel
	8'0" - 9'0"	C(35)				Medium dense to dense brown medium to coarse SAND and GRAVEL with occasional pebbles
	7'6" - 9'0"	BD				
	11'0" - 12'0"	C(24)				Medium dense to dense brown medium to coarse SAND and GRAVEL with occasional pebbles
	10'6" - 12'0"	BD		13'6"	104.6	
	14'0" - 15'0"	PS(55)				Very dense brown fine to coarse SAND
				17'6"	100.6	
		17'6" - 19'0"	U(4) D			
	19'0" - 21'0"	D				
14.6.67	22'6" - 22'10"	C(50)		22'6"	95.6	Gray MUDSTONE with occasional bands of hard grey silty clay (Keuper Waterstones)
	23'0" - 25'6"	BD				
15.6.67	25'6" - 26'1"	C(50)				Gray SANDSTONE
	25'6" - 26'1"	BD		27'0"	91.1	
15.6.67	28'6" - 30'0"	BD				Gray SANDSTONE
	30'0" - 30'3"	C(50)		30'3"	88.8	
Key to type of sample :			Remarks : (Observations on ground-water, etc.)			
U (4) — 4 in. dia. undisturbed sample.			Ground-water stood at a depth of 9ft 6in below ground level on the morning of 16.6.67 after completion of boring. A sample was taken. * Sample tested.			
U (1 1/2) — 1 1/2 in. dia. " "						
D — disturbed sample.						
BD — bulk disturbed sample.						
V — vane test.						
S { } — standard penetration test.						
C { } — dynamic cone penetration test.						
Figure in brackets is No. of blows for penetration given in depth column (see Notes, page 1).						

SHARSTON BY-PASS

Lab Ref No.
S/5968

FIG. 123

RECORD OF BOREHOLE NO. 132 SJ 88 NW 150

83263 89259

Ground level: 115.3ft above O.D. Newlyn

Dia. of boring: 8in

Type of boring: Shell and Auger

Lining tubes: 8in to 15ft 6in

Daily Progress	Samples		Change of Strata			Description of Strata
	Depth	Type	Legend	Depth	O.D. Level	
17.6.67	0'0" - 3'6"	BD		3'6"	111.8	FILL (gravel, sand and silty clay)
	3'6" - 5'0"	BD		5'0"	110.3	Yellow-brown sandy CLAY
17.6.67	6'0" - 7'0"	C(14) BD				Medium dense pale brown fine to coarse GRAVEL and SAND with occasional cobbles
	5'6" - 7'0"	BD				
	9'0" - 10'0"	C(27) BD				
	8'6" - 10'0"	BD				
	12'0" - 13'0"	C(22) BD		13'0"	102.3	Stiff laminated brown silty CLAY with occasional fine gravel
	11'6" - 13'0"	BD				
	13'0" - 14'6"	U(4) D				
	14'6" - 16'0"	D				
	16'0" - 18'0"	U(4) D		18'0"	95.8	Stiff brown sandy silty CLAY with occasional fine to medium gravel
	18'0" - 19'6"	D				
19'6" - 21'0"	D					
23'0" - 24'6"	U(4) BD					
23'0" - 24'6"	BD					
25'6" - 27'0"	U(4) D					
27'0"	D					
19.6.67	29'0"	D		29'0"	86.3	
Key to type of sample : U (4) — 4 in. dia. undisturbed sample. U (14) — 1 1/4 in. dia. " " D — disturbed sample. BD — bulk disturbed sample. V — vane test. S () — standard penetration test. C () — dynamic cone penetration test. Figure in brackets is No. of blows for penetration given in depth column (see Notes, page 1). Remarks : (Observations on ground-water, etc.) Ground-water was not encountered during boring. † Unable to recover sample. ⊗ Sample tested.						
SHARSTON BY-PASS						Lab Ref No. S/5968 FIG. 125

NORTHENDEN

Northenden





ORDNANCE SURVEY

Scale 1:10,560 or 6 Inches to 1 Mile

LANCASHIRE

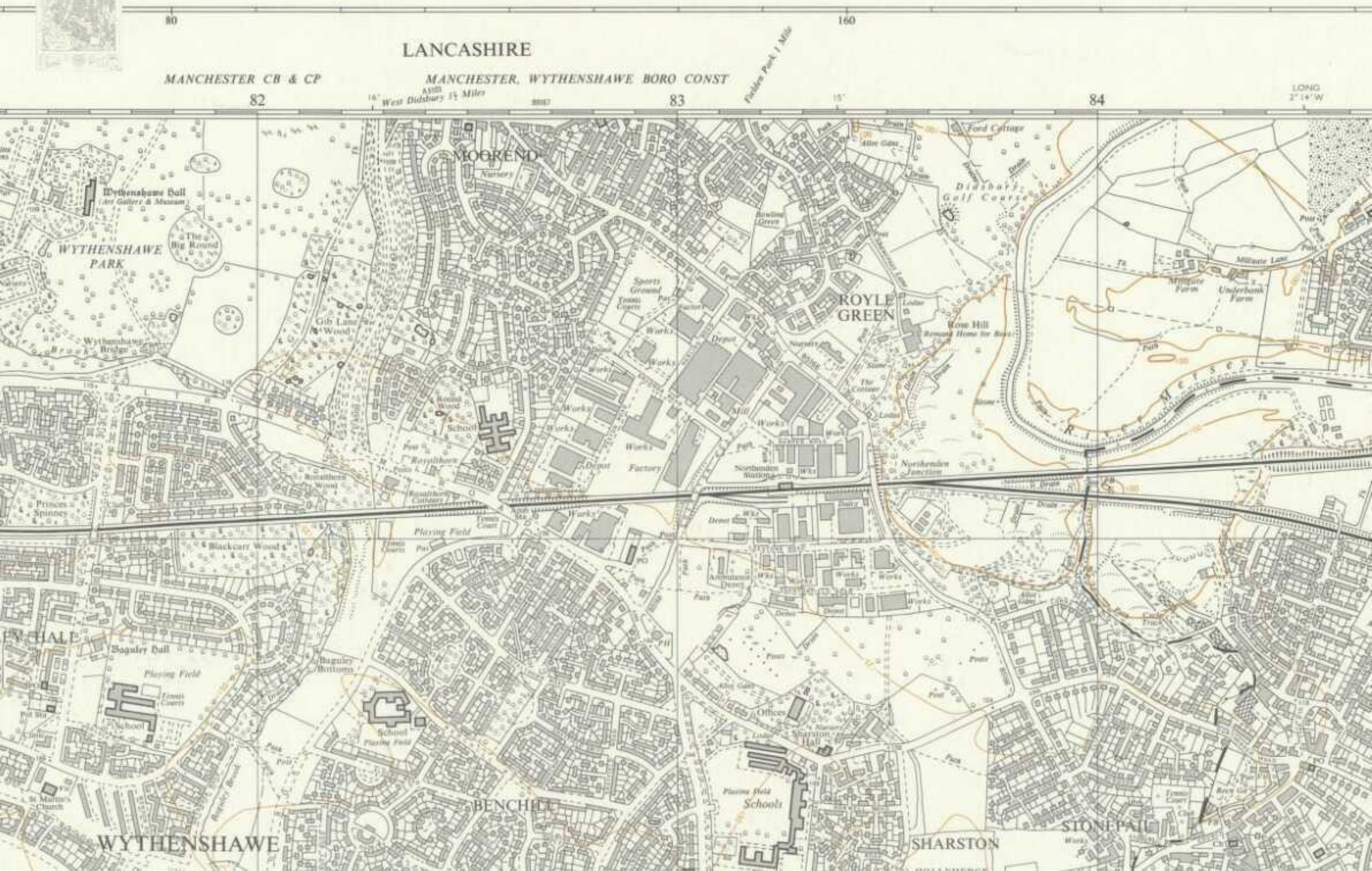
MANCHESTER CB & CP

MANCHESTER, WYTHENSHAW BORO CONST

West Didsbury 1½ Miles

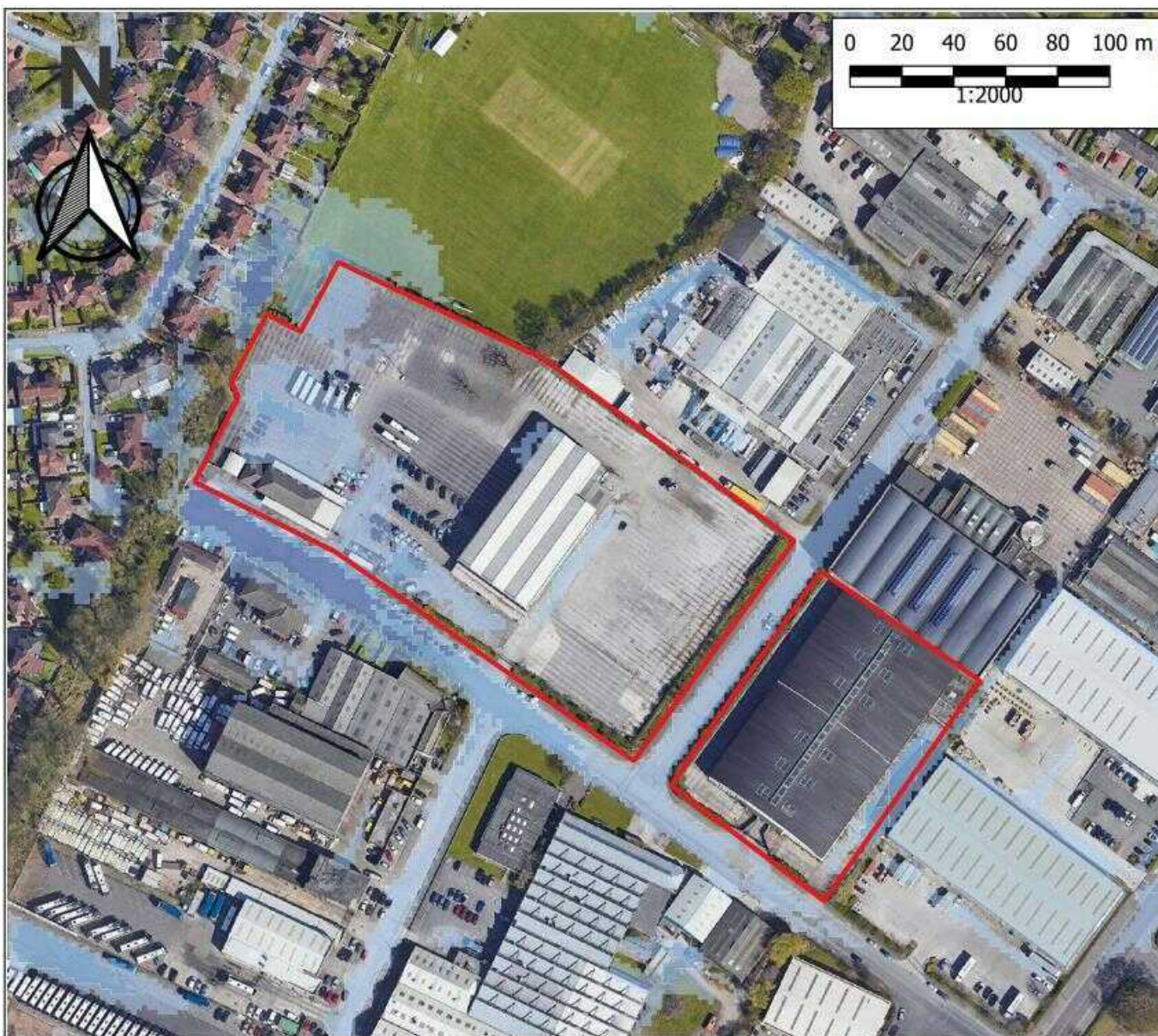
Falshaw Park 1 Mile

LONG
2° 14' W



Appendix C

Environment Agency Data



KEY

-  Site Location
-  High Risk
-  Medium Risk
-  Low Risk

Sampling locations and features annotated by LK Consult Ltd are appropriate and are based upon observed measurements, unless otherwise stated. Do not scale from this drawing and were from market intelligence only. All extensions and features should be confirmed on site for the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client: APH

Site: APH Car Park, Bradnor Road

Title: Surface Water Risk

Job No:	FRA 23 1105		Scale (see scale bar):	1:2000 @ A4		Figure:	Rev:
Drawn By:	JL	Checked By:	MJ	Drawn:	Aug 2023		

Flood map for planning

Your reference
APH Car Park

Location (easting/northing)
382911/389455

Created
3 Aug 2023 12:02

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2022 OS 100024198. <https://flood-map-for-planning.service.gov.uk/os-terms>



Flood map for planning

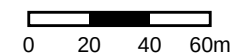
Your reference
APH Car Park

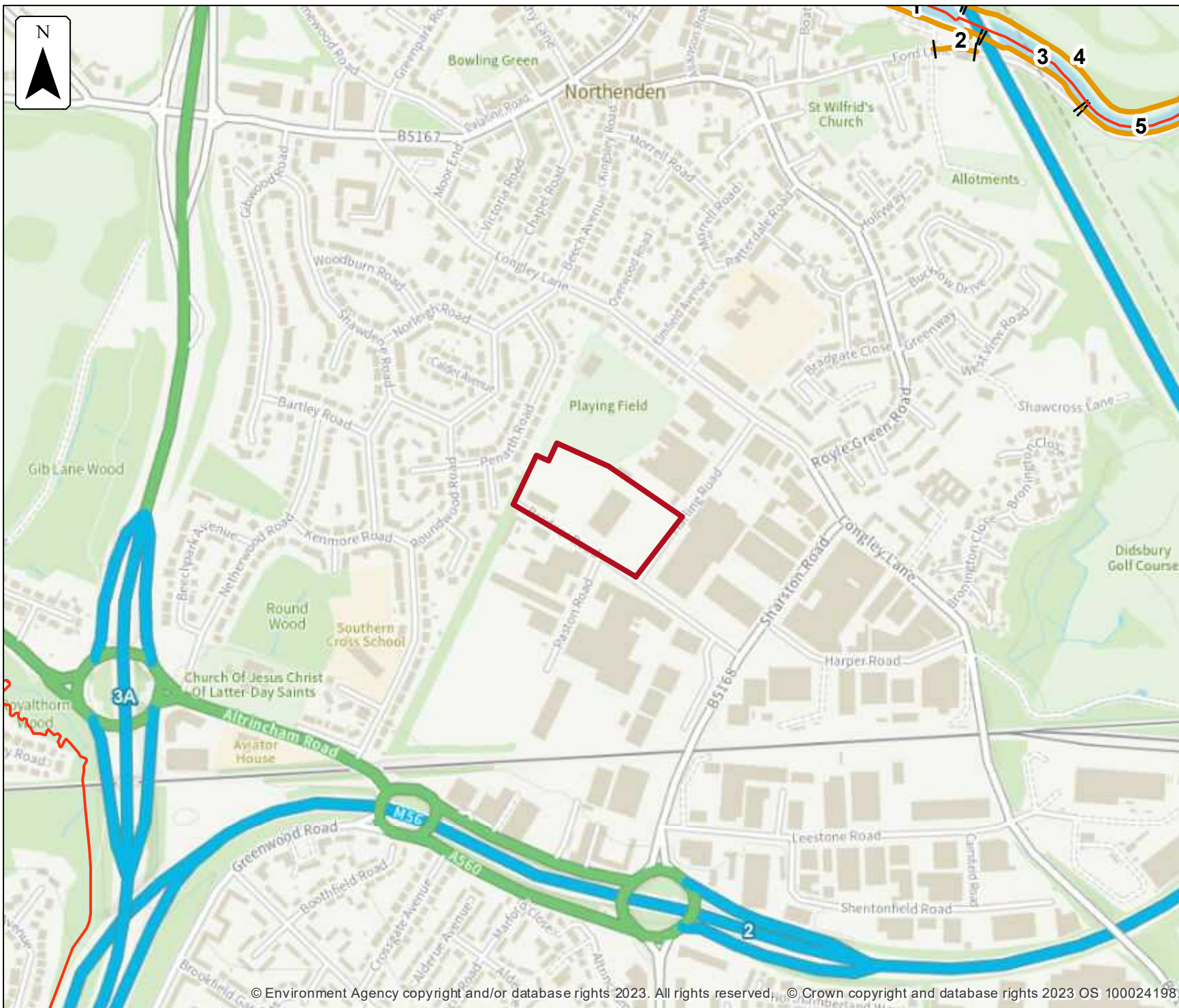
Location (easting/northing)
382911/389455

Scale
1:2500

Created
3 Aug 2023 12:02

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area





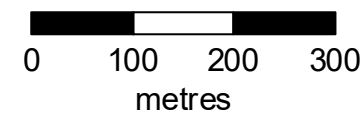
Flood defences

Location (easting/northing)
382908/389457

Scale
1:7,500

Created
2 Aug 2023

- Selected area
- Main river
- Flood defence



Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	120542	Wall	150	Fair	30.35	30.38	
2	533434	Wall	150	Fair	30.40	30.40	30.40
3	59069	Engineered High Ground	100	Fair	27.28	35.14	
4	120735	Embankment	100		29.84	30.70	
5	178438	Engineered High Ground	5		27.28	30.57	

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



Defended modelled fluvial extent

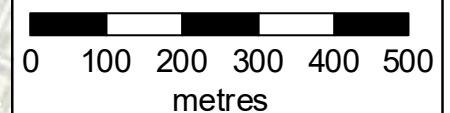
Location (easting/northing)
382908/389457

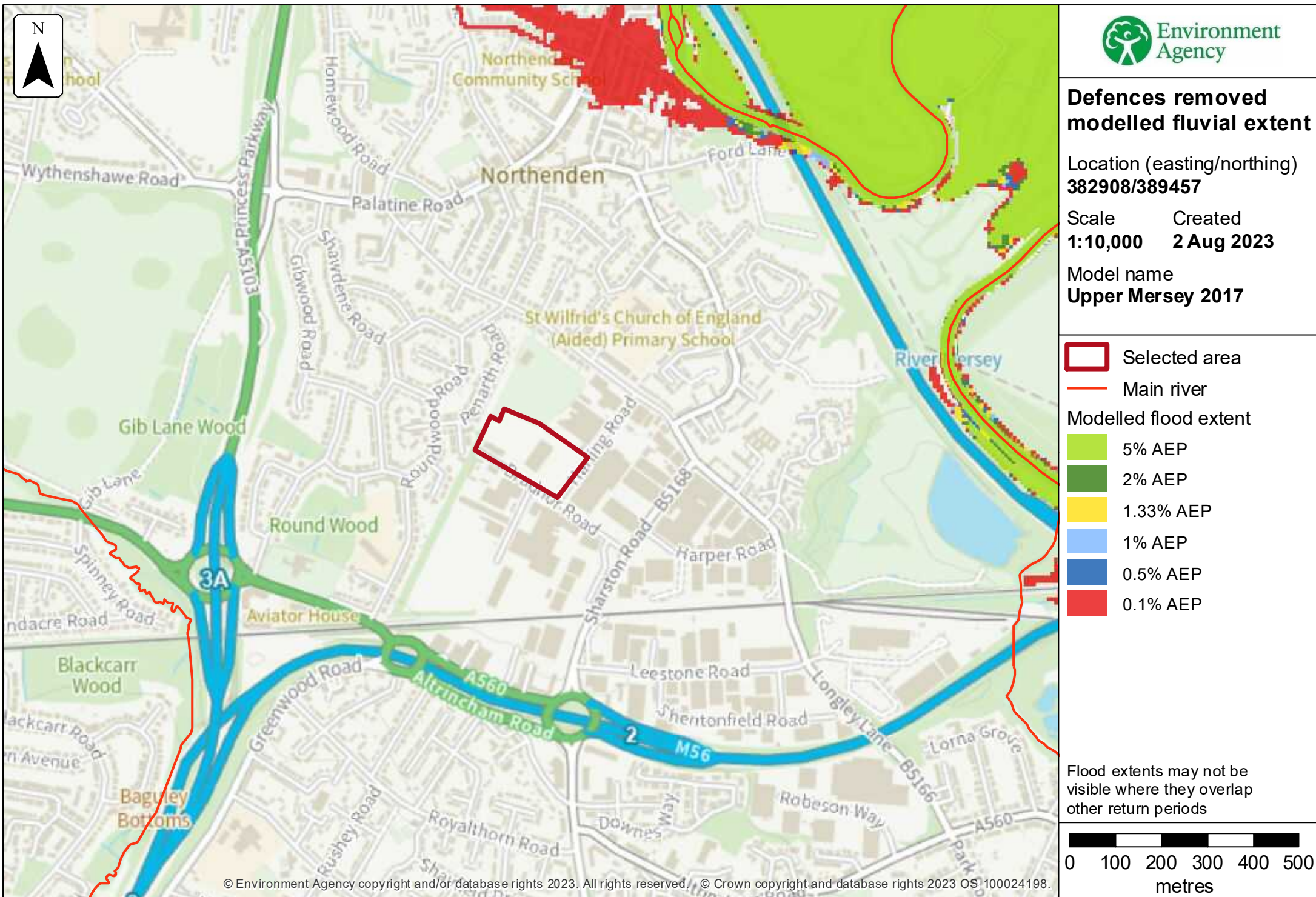
Scale Created
1:10,000 2 Aug 2023

Model name
Upper Mersey 2017

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

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







No defences exist modelled fluvial extent

Location (easting/northing)
382908/389457

Scale Created
1:10,000 2 Aug 2023

Model name
GatleyBrook 2009 U

 Selected area

 Main river

Modelled flood extent

 5% AEP

 1% AEP

 0.1% AEP

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


0 100 200 300 400 500
metres



Defended climate change modelled fluvial extent

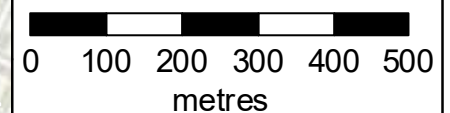
Location (easting/northing)
382908/389457

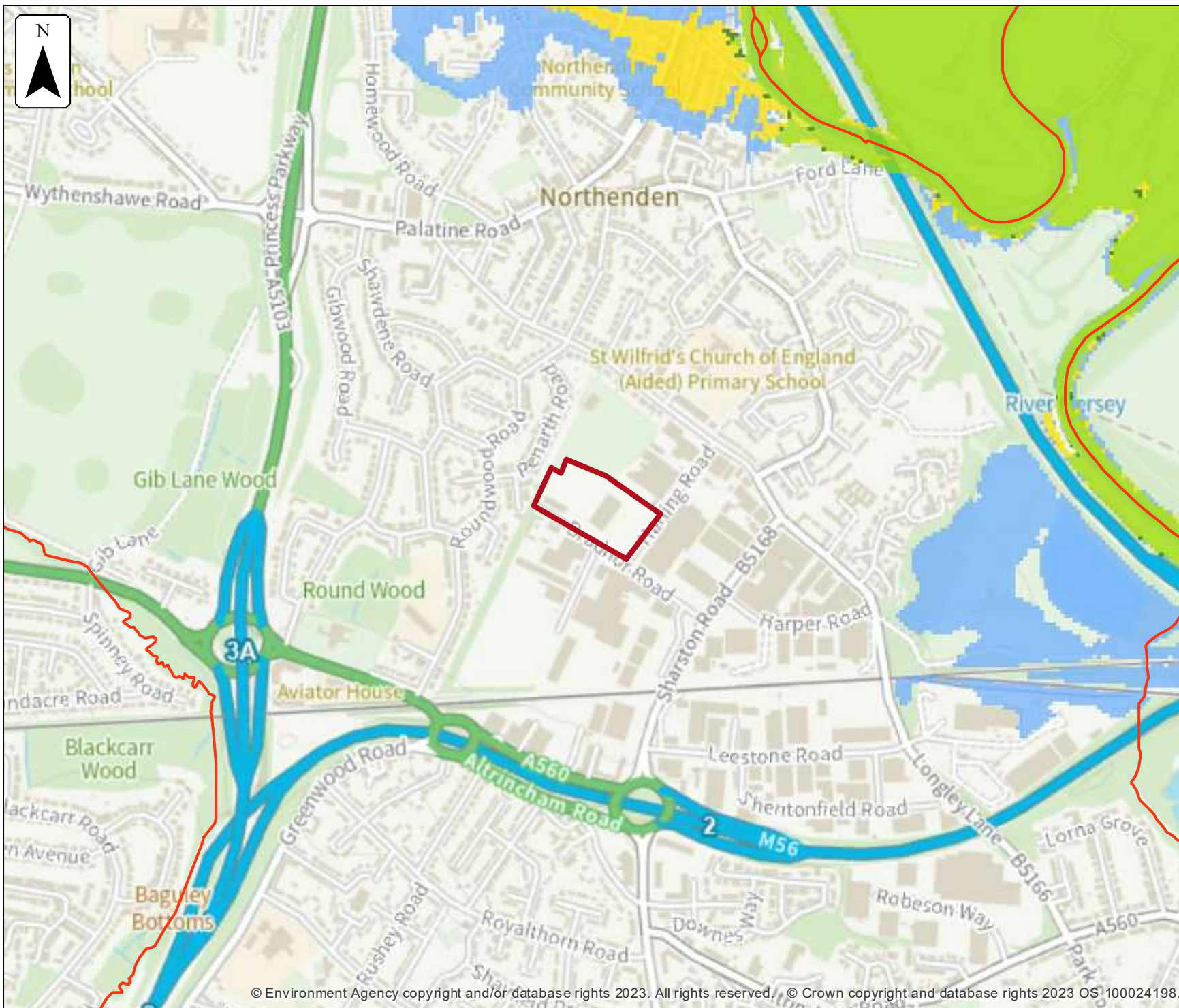
Scale Created
1:10,000 2 Aug 2023

Model name
Upper Mersey 2017

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

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





Defences removed climate change modelled fluvial extent

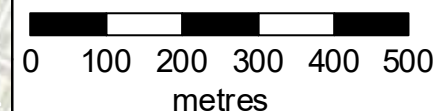
Location (easting/northing)
382908/389457

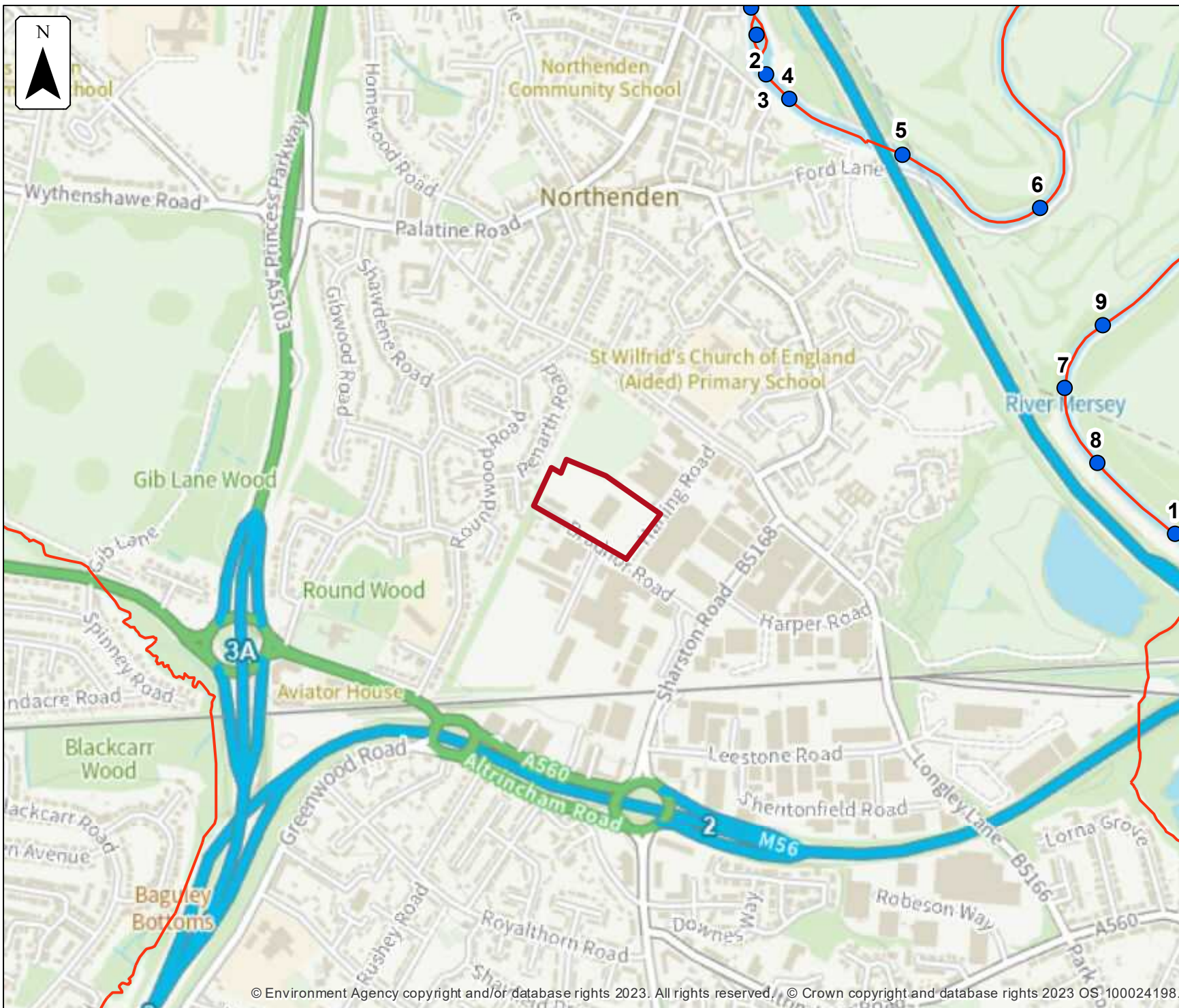
Scale Created
1:10,000 2 Aug 2023

Model name
Upper Mersey 2017

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

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





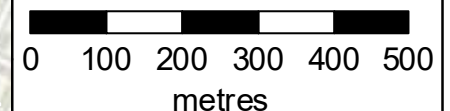
Defended modelled fluvial node locations

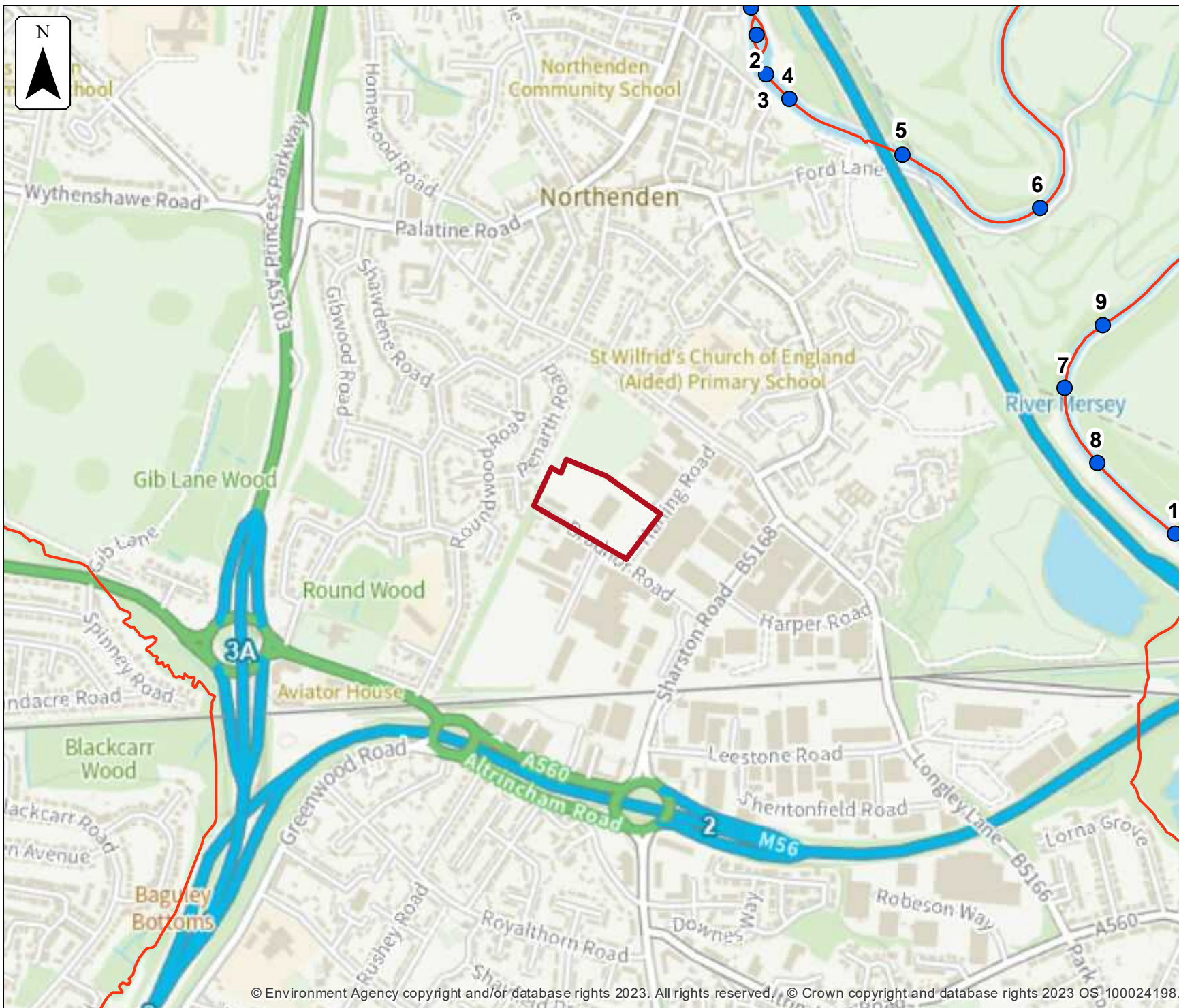
Location (easting/northing)
382908/389457

Scale Created
1:10,000 2 Aug 2023

Model name
Upper Mersey 2017

-  Selected area
-  Modelled location
-  Main river





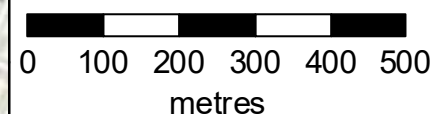
Defences removed modelled fluvial node locations

Location (easting/northing)
382908/389457

Scale Created
1:10,000 2 Aug 2023

Model name
Upper Mersey 2017

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1290768	383211	390427	27.88	277.13	28.13	296.55	28.26	301.83	28.35	304.90	28.59	311.28	29.71	325.28
2	1290562	383220	390374	28.05	277.50	28.30	296.53	28.41	301.98	28.50	305.12	28.72	311.47	29.79	325.81
3	1290683	383238	390296	28.15	277.58	28.39	296.92	28.50	302.06	28.59	305.21	28.81	311.67	29.84	326.24
4	1290538	383284	390249	28.12	272.53	28.35	290.16	28.45	295.36	28.52	298.33	28.72	304.68	29.77	319.0
5	1290777	383502	390142	29.16	180.37	29.38	183.27	29.45	184.35	29.50	184.78	29.63	186.88	30.16	246.89
6	1290620	383769	390038	29.32	102.97	29.50	103.38	29.56	103.59	29.61	103.71	29.72	103.97	30.12	104.97
7	1290789	383817	389687	30.34	273.98	30.45	300.71	30.50	313.22	30.54	322.91	30.64	349.20	31.11	478.84
8	1290682	383882	389542	30.74	273.87	30.88	300.38	30.95	312.69	31.01	320.37	31.17	342.41	31.83	457.11
9	1290763	383891	389810	29.87	273.83	29.94	300.45	29.98	313.14	30.0	322.99	30.07	348.86	30.37	478.87
10	1290570	384032	389405	31.31	255.22	31.51	274.20	31.61	282.40	31.65	293.33	31.80	312.64	32.53	412.60

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

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

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



**No defences exist
modelled fluvial
node locations**

Location (easting/northing)
382908/389457

Scale Created
1:10,000 2 Aug 2023

Model name
GatleyBrook 2009 U

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

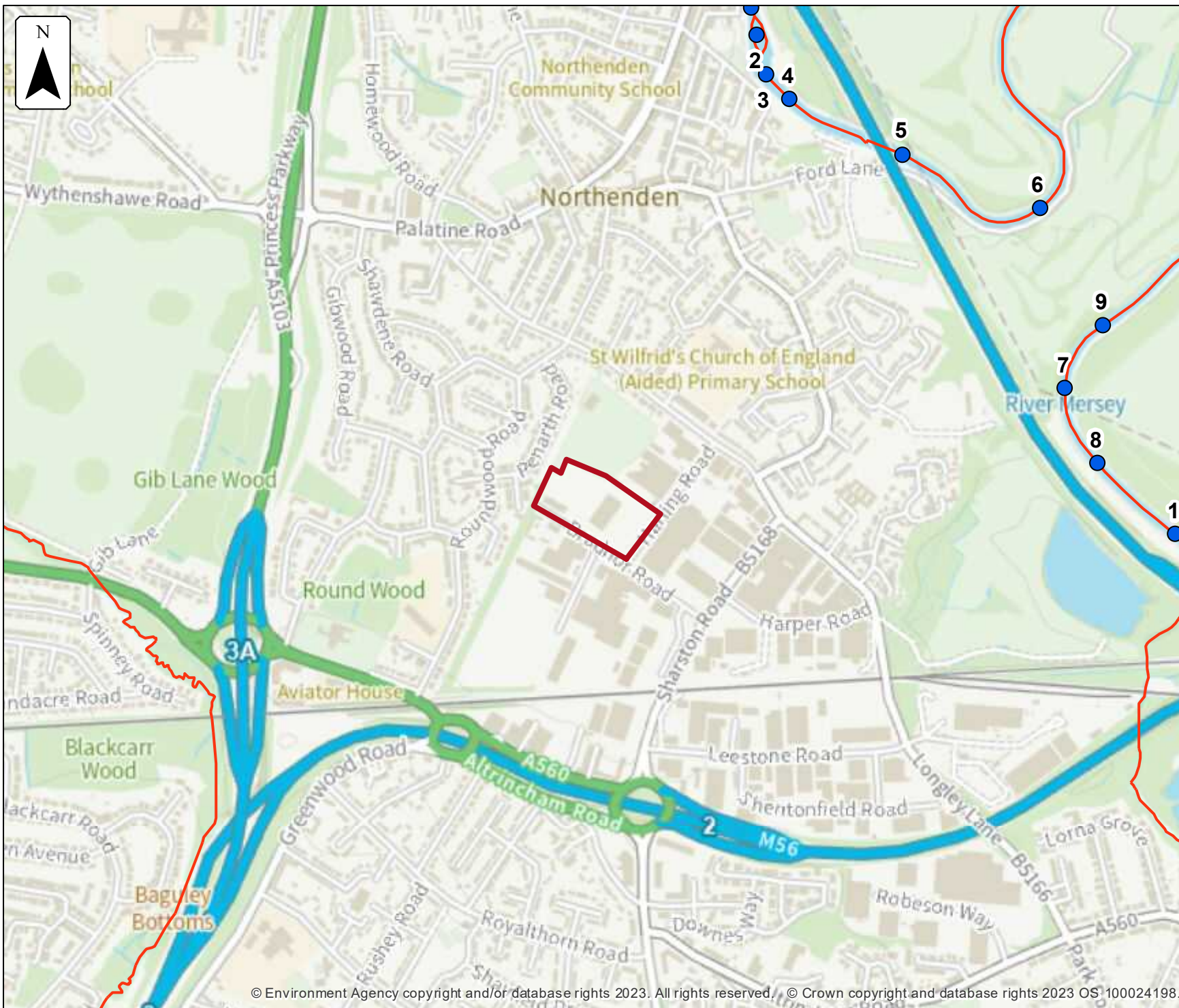
No defences exist

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	218954	383949	388920	31.03	5.05					31.33	7.08			31.79	10.35
2	329086	383963	389067	30.71	5.06					30.97	7.04			31.43	10.41
3	335705	383963	388990	30.75	5.04					31.03	7.10			31.50	10.19
4	21119	383978	389167	30.45	4.96					30.56	6.92			30.80	10.10
5	230306	383991	388860	31.22	5.02					31.52	7.09			32.10	8.44
6	170475	384027	388821	31.33	4.94					31.57	8.20			32.09	9.93
7	84403	384039	389240	30.39	4.96					30.46	6.86			30.60	9.93

Data in this table comes from the GatleyBrook 2009 U model.

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

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



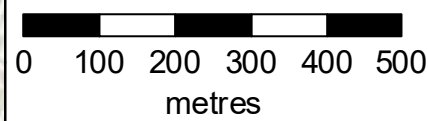
**Defended
climate change
modelled fluvial
node locations**

Location (easting/northing)
382908/389457

Scale Created
1:10,000 2 Aug 2023

Model name
Upper Mersey 2017

- Selected area
- Modelled location
- Main river



Modelled node locations data

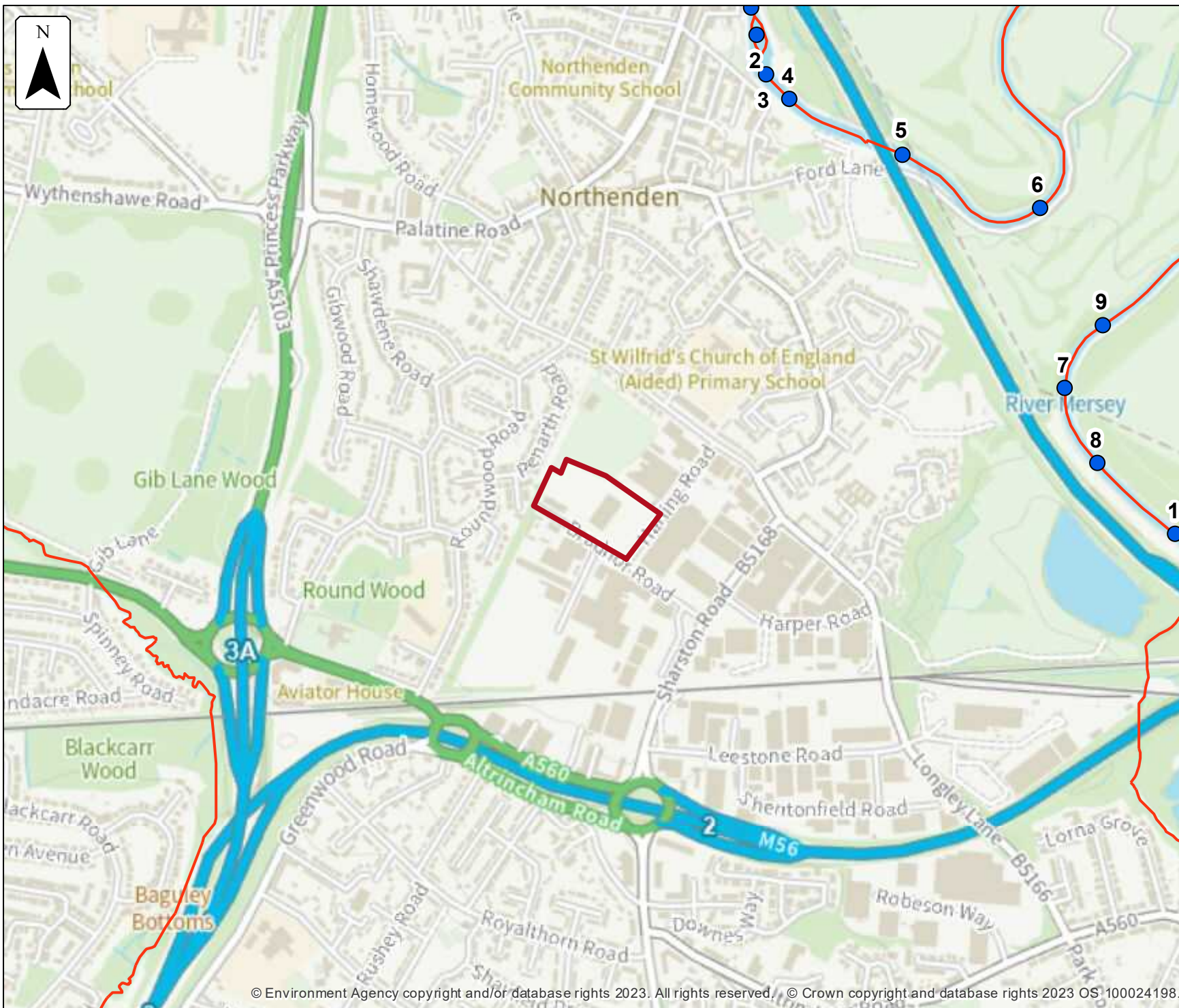
Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+30%)		1.0% AEP (+35%)		1.0% AEP (+70%)		0.1% AEP (+30%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1290768	383211	390427	29.77	314.89	29.83	315.92	30.08	321.56	30.31	333.90
2	1290562	383220	390374	29.84	315.26	29.90	315.84	30.13	321.81	30.37	334.85
3	1290683	383238	390296	29.90	313.77	29.96	315.56	30.18	321.40	30.43	335.29
4	1290538	383284	390249	29.80	313.98	29.86	315.37	30.09	321.60	30.33	336.07
5	1290777	383502	390142	30.07	313.40	30.12	315.06	30.26	321.66	30.51	337.24
6	1290620	383769	390038	30.27	332.26	30.28	335.49	30.29	349.77	30.61	361.59
7	1290789	383817	389687	32.24	469.16	32.27	482.46	32.39	535.62	32.69	608.65
8	1290682	383882	389542	32.58	443.86	32.64	453.52	32.86	491.51	33.23	552.49
9	1290763	383891	389810	32.09	456.57	32.12	469.36	32.21	520.02	32.42	605.08
10	1290570	384032	389405	32.95	432.11	33.0	441.02	33.23	479.24	33.55	554.67

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

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

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



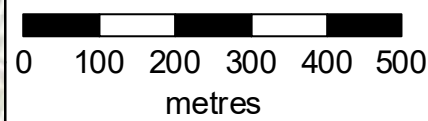
**Defences removed
climate change
modelled fluvial
node locations**

Location (easting/northing)
382908/389457

Scale Created
1:10,000 2 Aug 2023

Model name
Upper Mersey 2017

-  Selected area
-  Modelled location
-  Main river



Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+30%)		1.0% AEP (+35%)		1.0% AEP (+70%)		0.1% AEP (+30%)	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	1290768	383211	390427	29.01	317.12	29.10	318.33	29.60	322.93	30.17	309.35
2	1290562	383220	390374	29.11	317.61	29.20	318.70	29.67	323.42	30.19	310.04
3	1290683	383238	390296	29.18	317.73	29.27	318.95	29.73	323.79	30.23	310.55
4	1290538	383284	390249	29.08	310.87	29.16	311.85	29.67	316.56	30.17	306.05
5	1290777	383502	390142	29.80	189.16	29.85	189.48	30.12	210.35	30.34	234.27
6	1290620	383769	390038	29.87	104.21	29.91	104.24	30.08	104.72	30.44	168.43
7	1290789	383817	389687	30.78	387.84	30.82	399.03	31.06	464.88	31.76	578.98
8	1290682	383882	389542	31.38	375.67	31.44	385.17	31.78	443.15	32.62	516.28
9	1290763	383891	389810	30.17	387.78	30.19	399.01	30.34	465.04	31.21	578.51
10	1290570	384032	389405	32.03	341.59	32.07	357.01	32.46	402.05	33.10	495.84

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

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

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

Appendix D

Consultee Correspondence

Jenna Lowe

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 04 August 2023 13:17
To: Jenna Lowe
Subject: RE: FRA QUERY - FRA 23 1105 - APH Car Park, Bradnor Road, Wythenshawe

Good Afternoon,

'I can confirm that we have no current record of sewer flooding within the vicinity of the proposed development.

Please note that United Utilities Water Limited (Uuw) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the register.

Our response does not include:

- any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which Uuw has no control and not a facet of sewer capacity; or*
- any historical sewer flooding events that have been removed from the register as a result of investment in our infrastructure.*

As with all development sites, we recommend you liaise with our water and wastewater engineers by contacting our Developer Services team so the details of your development proposal can be considered further. Details can be found at the following link.

<https://www.unitedutilities.com/services/builders-developers/>

Should you require any further information please do not hesitate to contact me.'

Kind Regards,



Tonicha Wilde
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: N/A
Tel: 0345 026 8989 (option 4)
unitedutilities.com

If you have received a great service today why not tell us?

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Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the

orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry <https://www.unitedutilities.com/builders-developers/> or you can email us at WastewaterDeveloperServices@uuplc.co.uk

----- Original Message -----

From: Jenna Lowe [j.lowe@thelkgroup.com]

Sent: 02/08/2023 11:05

To: wastewaterdeveloperservices@uuplc.co.uk

Subject: FRA QUERY - FRA 23 1105 - APH Car Park, Bradnor Road, Wythenshawe

Dear Sir/Madam,

LK Consult Ltd. has been commissioned to undertake a Flood Risk Assessment (FRA), for a car park located at Bradnor Road, Sharston Industrial Area, Wythenshawe. Nearest Postcode M22 4TE, centred at approximate National Grid Reference 382896E, 389472N.

The area of interest appears to be within Flood Zone 1.

BGS data indicates that the site is within an area underlain by Glaciofluvial Sheet Deposits, Devensian - Sand and gravel superficial deposits and Tarporley Siltstone Formation - Siltstone, mudstone and sandstone bedrock.

The site location is attached to this email.

To complete the FRA, we would be grateful if you could supply us with the following, if available, for the vicinity of the site:

1. Records of any historic flood events and potential sources of flooding from foul and surface water sewers on site and in the area.

We will be in contact with all other relevant authorities to get a more complete understanding of the issues in the area.

Regards

Jenna



Jenna Lowe MSc, BSc. (Hons)
Flood Risk Engineer
0161 763 7200 | 07467 957756
Manchester | London | Swindon | Liverpool | Glasgow
www.thelkgroup.com

I N C R E A S I N G L A N D V A L U E



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Jenna Lowe

From: Jenna Lowe
Sent: 02 August 2023 11:03
To: floodriskmanagement@manchester.gov.uk
Subject: FRA QUERY - FRA 23 1105 - APH Ca Park, Bradnor Road, Wythenshawe
Attachments: FRA 23 1105 - Figure 1 Boundary.pdf

Dear Sir/Madam,

LK Consult Ltd. has been commissioned to undertake a Flood Risk Assessment (FRA), for a car park located at Bradnor Road, Sharston Industrial Area, Wythenshawe. Nearest Postcode M22 4TE, centred at approximate National Grid Reference 382896E, 389472N.

The area of interest appears to be within Flood Zone 1.

BGS data indicates that the site is within an area underlain by Glaciofluvial Sheet Deposits, Devensian - Sand and gravel superficial deposits and Tarporley Siltstone Formation - Siltstone, mudstone and sandstone bedrock.

The site location is attached to this email.

To complete the FRA, we would be grateful if you could supply us with the following, if available, for the vicinity of the site:

- Details of any flood defences in the immediate area, including their extent, crest levels (and datum), assumed level of standard, construction and maintenance regime, as well as any other structures which may influence the local hydraulics.
- Records of any historic flood events and potential sources of flooding from rivers, land drainage, groundwater, foul and surface water sewers on site and in the area.
- Any restrictions applied to ordinary watercourses and sewers in the area.
- Highway drainage restrictions and records.
- Indications if the site is within the Critical Drainage Area.
- Policies that may relate to Sustainable Drainage Systems (SuDS).

If you have any queries, please do not hesitate to get in touch.

We are, of course, happy to pay your reasonable charge for this service. Please let me know by return what information is available, what the charge will be, and we will pay the relevant fees by debit card as soon as possible.

Any advice or recommendations you may have regarding the potential discharges from the development of this site would also be appreciated.

We will be in contact with all other relevant authorities to get a more complete understanding of the issues in the area.

Regards
Jenna



Jenna Lowe MSc, BSc. (Hons)
Flood Risk Engineer
0161 763 7200 | 07467 957756
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I N C R E A S I N G L A N D V A L U E

Jenna Lowe

From: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Sent: 02 August 2023 11:03
To: Jenna Lowe
Subject: Automatic reply: FRA QUERY - FRA 23 1105 - APH Ca Park, Bradnor Road, Wythenshawe

*Thank you for contacting Manchester City Council **Lead Local Flood Authority**.*

Your support enquiry has been received and a response will be provided within 21 days.*

**Pre-app advice is currently suspended, due to longer-than-normal response times on planning applications. We apologise for any inconvenience caused.*

Lead Local Flood Authority
Highways Service,
Growth and Neighbourhoods Directorate
Manchester City Council
PO Box 532
Town Hall
Manchester
M60 2LA
Web: <http://www.manchester.gov.uk>

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