SUDS / DRAINAGE ASSESSMENT
CONDITION DISCHARGE

AT

2 Highfield Road Manchester M19 3JX

May 2025

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1.0 Scope

This report contains the details of a SUDS strategy and design assessment for conditions discharge stage carried out by Envirosolution Limited for, 2 Highfield Road Manchester M19 3JX, henceforth referred to as “the site” in this report.

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2.0 Introduction

The scheme has been approved.

The planning stage SUDS strategy was approved.

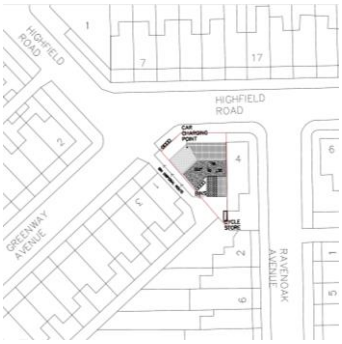
This document provides the design and specifications (cross sections, connections, etc,) required for the SUDS to be actually installed on site correctly.

We have worked with the architect, client and builder to ensure locations and specifications have been optimized.

3.0 Existing Site Status and Setting

3.1 Site Location and Status

The site is Brownfield and has a gross area of approx. 0.0154 ha (154.0m2) located at the junction of Highfield Road and Greenway Avenue. The site location is indicated below for ease:



The overall site comprises the former dwelling footprint / foundations and garden with mix of hardstanding and porous garden. The site is in a predominantly residential area.

3.2 Geology

Geology

Based on BGS mapping and boreholes (and know conditions of the majority of Redbridge area):

- Bedrock: Chester Sandstone
- Superficial deposits: Till

There are no lost / underground rivers documented at the site or near the site nor identifiable by the local geology mapping.

Given the superficial geology and proximity to other properties and the highway, the SUDS strategy necessarily needs to be storage on site with restricted discharge to sewer because there are no other options allowed.

No infiltration testing is required; there is no need to undertake BRE365 testing because a soakaway is not an option, regardless of the bedrock being a suitable stratum for infiltration.

3.3 Existing Drainage

Public sewer records have been requested.

The existing former dwelling already has connections to the public sewer in Highfield Road.

There is one connection from the existing dwelling to the public sewer network.

The invert levels for the adjacent sewers are understood to be c. 1.0m to 1.4m below ground level; the former dwelling discharged using gravity; there are no lower ground structures proposed that would suggest gravity drainage is not feasible even if the full site length was required to be covered by a fall to meet the existing sewer given the site is so small.

There is no evidence of any existing SUDS.

The site currently discharges unattenuated.

An assessment of the Greenfield equivalent discharge for the site has been carried out. This has confirmed an average discharge rate (QBAR) of a nominal less than 0.12 l/s. This low rate is due to the relatively small nature of the site. A copy of the calculation output is included in Appendix C. Exact sewer location subject to confirmation on site with appropriately managed excavations in liaison with United Utilities before any works commence.

3.4 United Utilities requirements

This is a replacement dwelling that incorporates the betterment required by United Utilties.

- United Utilities require SUDS to be incorporated
  - **The scheme achieves this.**
- United Utilities require a reduced discharge rate to lowest feasible of 1.0l/s.
  - **The scheme achieves this.**
- Unitied Utilties will only allow connection to their adjacent combined sewer
  - **The scheme achieves this**
- United Utilities will not allow Source Control SUDS at the ground level to be connected to a combined sewer.
  - **The scheme does not connect source control measures to the combined sewer.**

The scheme meets the United Utilities requirements for SUDS and connections.

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3.5 2024 Standard Drainage Officer Requests and Response

Confirmation of the extent of the permeable paving and the exact depth of the permeable granular material and its void.

We have included a scaled layout using the architect's scaled drawings demonstrating the area and dimensions of new permeable paving.

We cannot connect Source Control SUDS to the sewer because it is a combined sewer and Unitied Utilities will not accept that because of the risk of surcharging causing foul water to enter the site and contaminate the below ground source control SUDS which would have to then be excavated and replaced. This is not sustainable or allowed by UU.

However, we include an area of informal Source Control permeable patio with subbase.

The void space of Type 3 angular granular material being c. 30% has been fully addressed by the designs.

We are using this SUDS specification deliberately for the following reasons as per our discussions and with the additional recognised evidence:

- Using a geocellular specification is not as sustainable in lifetime / carbon emissions, even though they provide 95% void space and even though you can now get recycled plastic crates: these are not as sustainable as reclaimed granular angular material; recycled plastic crates require chemicals and a significant amount of energy to create
- Granular storage does not require maintenance whereas geocellular systems require hard engineering connections and detailing that can a) go wrong over time and b) therefore require maintenance which is not commensurate with the scale and sensitivity of the scheme
- The SUDS storage needs to be shallow in order to retain a gravity drainage given the scheme is not a full new build but has to utilise the existing connections in order to be sustainable
- There are no other suitable SUDS measures viable / feasible for the scheme as per the FRA planning report (significant constraints, available space for SUDS is small, existing structures, etc)

On a reality tack: the geocellular systems without maintenance for a short time can cease to work and can also create a flood risk in themselves. Granular angular systems if not maintained will continue to function and will not create a flood risk issue; this is therefore a more sustainable approach.

If the SUDS storage were to fail on this site, the pluvial input will simply drain away from the building across the permeable paving, as per the gradients noted in the drawings, and drain to the garden area; this is appropriate exceedance precaution given the scope and scale of the scheme.

3.6 Note on drainage rates, Building Regs Part H and BS EN 752-4

The joint DEFRA/EA R&D rainfall runoff management for developments Report-SC030219 states that

"a practicable minimum limit on the discharge rate from a flow attenuation device is often a compromise between attenuating to a satisfactorily low flow rate while keeping the risk of blockage to an acceptable level. This limit is set at 5 litres per second, using an appropriate vortex or other flow control device".

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Technology has indeed moved on and there are manufacturers providing improved flow control devices since the DEFRA/EA report was published, permitting flows lower than 5 l/sec through their devices without increasing the flood risk from blockages.

Drainage rates are a function of the size of the site, rainfall inputs, nature of the site and the likely coefficients / geology, etc.

It is impossible for this site based on the function of the size to discharge close to even 0.50 l/s even in the 1in200year event, (in fact the calculations demonstrate 0.11 l/s).

Thus, this and other very small sites (single dwelling plots usually) will have a maximum feasible discharge rate significantly lower than the lowest allowed restriction rate; this is a fact and is controlled by the official guidance. That is why a pragmatic sustainable response is required.

In accordance with Building Regs Part H, for surface water drainage, a self-cleansing velocity of 0.7 l/sec must be maintained in all pipes and all pipes sizes are required to be of a minimum pipe size of 75mm. Thus, peak flow rates lower than 3 l/sec will fail to meet BS EN 752-4 and/or the Building Regulations Part H requirements.

The reason for the Building Regs and BS is simple: “mitigate at source” and “design out the risk” i.e. it is logical to not design modern systems with pipes / restriction devices that could be too easily blocked over time as these will cause greater risks of flooding and make any expensive and heavily engineered SUDS schemes totally pointless.

4.0 Planning Conditions: Surface Water Designs

4.1 Discussion with LLFA's, SAB's and SPA

The strategy has maximised the available area for SUDS storage.

Despite the small size of the site, we have accommodated all the required storage volume. We are using the higher forms of SUDS measures which also have lower maintenance.

These also provide the required "Source Control".

We could have easily designed a larger attenuation tank to fully meet the reduction; however, this and the connections require more maintenance, and if not maintained, either create a greater flood risk or just cease to operate as there is always an emergency overflow thus there would end up not being any SUDS storage on the site.

What we have committed the client to is the largest feasible / sensible amount of storage volume using materials that have lower emissions / life cycle impacts, that can be sourced using fully recycled / re-used materials and which do not require comprehensive maintenance; furthermore, even if their maintenance were not undertaken (eg: clearing / weeding of permeable paving), they would still continue to operate and hence the SUDS storage is maintained regardless.

The SUDS measures will have a positive impact in reducing flood risk by delaying the discharge to the sewer for the lifetime of the scheme.

4.2 Connections & Inverts

Based on the scheme being a reconfiguration and extension scheme with new porous & permeable areas within a constrained site, the existing surface water connection to the public sewer is to be re-used but with the betterment as per above and detailed below.

As per confirmation of the existing manhole invert level:

- Ground (and upper levels (rainwater downpipes) to be gravity drained: above the sewer invert level
- Rear rain downpipes drain first to informal Source Control SUDS (not connected to the sewer and not infiltration, just informal storage "hybrid" approach)
- Then connect through structure via existing drainage system (as is standard) first to oversized easily jetted pipe, then to existing manhole and thence to the combined sewer
- This is an existing operating system
- All new connections, pipe materials / sizes / falls as per Building Regs
- Site contractor to confirm the 1.2m depth of invert
- There is sufficient drop from the SUDS storage at the front to permit gravity drainage
    - Lowest SUDS invert on site is 0.6m depth hence sufficient drop and distance to drain by gravity and meet Building Regs Part H

See SUDS detailed connections in Appendix B.

Contractor to confirm exact existing manhole connection detail when on site.

4.3 Surface Water Drainage

In accordance with the NPPF, PPG and LLFA policy requirements, sustainable drainage systems (SUDS) should be incorporated wherever possible to reduce positive surface water run-off and flood risk to other areas.

Intrusive ground investigation works have not been carried out on site at this stage, however, as per the explanation in the Geology section, soawkaways are not feasible on this site or for this scheme.

As a precaution for the discharge connection, so as not to rely on an unknown and to demonstrate a worse case of SUDS storage on site with restricted discharge, it is recommended that SUDS techniques are restricted to the use of the highest forms of SUDS feasible i.e. surface storage, with also permeable paving and underground storage.

It is proposed to provide an attenuation based surface water strategy to serve run-off from the proposed roof area, with a residual positive discharge rate being restricted to a minimal 1.5 l/s (the lowest aperture feasible without causing a residual risk of flooding allowed by United Utilities).

4.4 Planning Approved SUDS Storage Calculations

Calculations were prepared based on the Micro Drainage software package to assess the size of structure require.

The following criteria were used:

- The calculations will use 100% of the site regardless of the c. 20% porous / permeable areas
    - This is oversizing by 20% (significant)
- Design event for storage - 100 year (with climate change; see below)
- Climate change allowance - 40%
- Max. residual Discharge rate – 1.5 l/s (lowest acceptable but no restriction device is required as the site is too small to discharge at that rate (as per Greenfield 1in200year in AppC)
- The storage calculation output is included within Appendix C.
    - Storage required: 1.0m3

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4.5 SUDS Specifications

Formal Storage

- Oversized Pipe at Front
- 3.2m by 0.8m by 0.4m depth = 1.024m3

Informal Source Control (not connected to sewer)

- Use lined granular subbase under the patio as per drawing in Appendix B
- This is confirmed as:
  - Patio rear: 4.0m by 1.8m = 7.2m2
- Use 0.30m depth of permeable angular granular material (not crushed Type 1)
- Use a void ratio of 30%

- **This is 0.648m3 of storage including for the 30% void**

  - **(7.2m2 x 0.3m depth) x 0.3 void**

Void Space Accommodation:

- The total void space afforded by the granular storage has been suitably addressed as this site has the available area to meet and in fact better the LLFA requirement
- Details and connections as per detailed designs in Appendix B
- Depth of lined granular invert still feasible to join the manhole with gravity drainage where required / drain to ground as existing areas of porous surfacing
- This is still above the existing sewer invert level hence gravity drainage is confirmed

4.5 Permeable Patio & Granular Storage Specifications: Building Regs standards

- Use inert angular granular material
- MOT Type 3 (no fines)
- Perforated pipe to British Standard / Building Regs requirements
- All manufactured in accordance with ISO 9001, ISO 14001 and OHSAS 18001
- Use EA specification guidance (see Appendix B) and as per the additional specification in Appendix B also
- All 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

In addition, but only if feasible:

- Downpipes at front / rear to have splayed ends to discharge over the permeable paving / porous landscaping

4.6 Restriction Device Specifications

Given the small size of the site and the maximum feasible of 0.23l/s even in the 1in200year: no further restriction devices are required

The layout plan included within Appendix B shows locations for the SUDS structures.

It is proposed to connect the now restricted discharge from the permeable paving + granular storage directly to the public sewer system.

The scheme restricts the discharge to the sewer hence the approval of United Utilities is obtainable as this is betterment with future-proofing for the 100 year lifetime of the scheme and reduces flood risk to and from the infrastructure.

Note of SUDS Hierarchy as per Planning report for clarity

The SUDS approach has been approved based on the site specific flood and geology conditions and scheme / surrounding constraints specifics AND the United Utilities requirements.

With respect to other SUDS techniques, the proposed building is not suitable for the use of a green roof as the flat roof is of a very lighweight structure and the remaining roof areas are pitched rooves and therefore has a lightweight roof structure at angles that cannot take additional weight.

Whilst internal rainwater harvesting is not proposed, it is recommended that rainwater pipes are also fitted with water butts wherever feasible. Whilst the use of water butts won't reduce the design criteria of the receiving below ground drainage system, their use will reduce the time of entry and provide a supply of water for irrigation.

The surface water drainage system as designed complies with the Environment Agency's pollution prevention guidance:

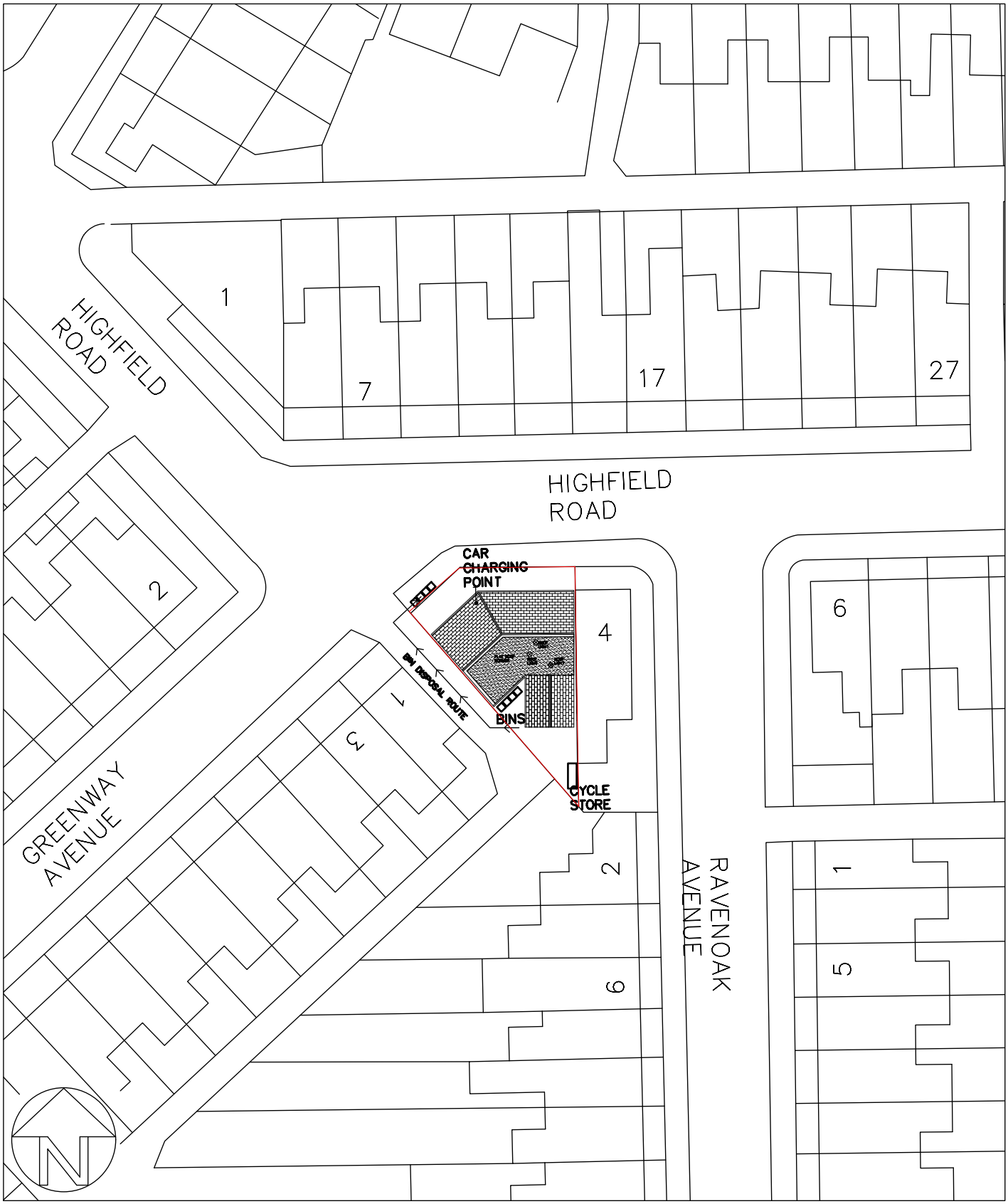
- Roof run-off is classified as uncontaminated and, in accordance with EA pollution prevention guidance, will not require any treatment.
- Any surface water run-off draining through the permeable areas will receive an adequate level of filtration through the associated substrate.

4.8 Maintenance

With respect to maintenance, the proposed SUDS techniques should be maintained in accordance with the appropriate regimes set out within the SUDS manual and will be the responsibility of the owner / management company. A SUDS maintenance schedule is included within Appendix D.

APPENDICES

APPENDIX A



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REV	DATE	NOTE	BY

REV	DATE	NOTE	BY
A	03.01.21	WASTE COLLECTION ROUTE INDICATED, BIN, CYCLE STORE AND CAR CHARGING POINT ADDED FURTHER TO COMMENTS RECEIVED BY THE PLANNING AUTHORITIES	MRE

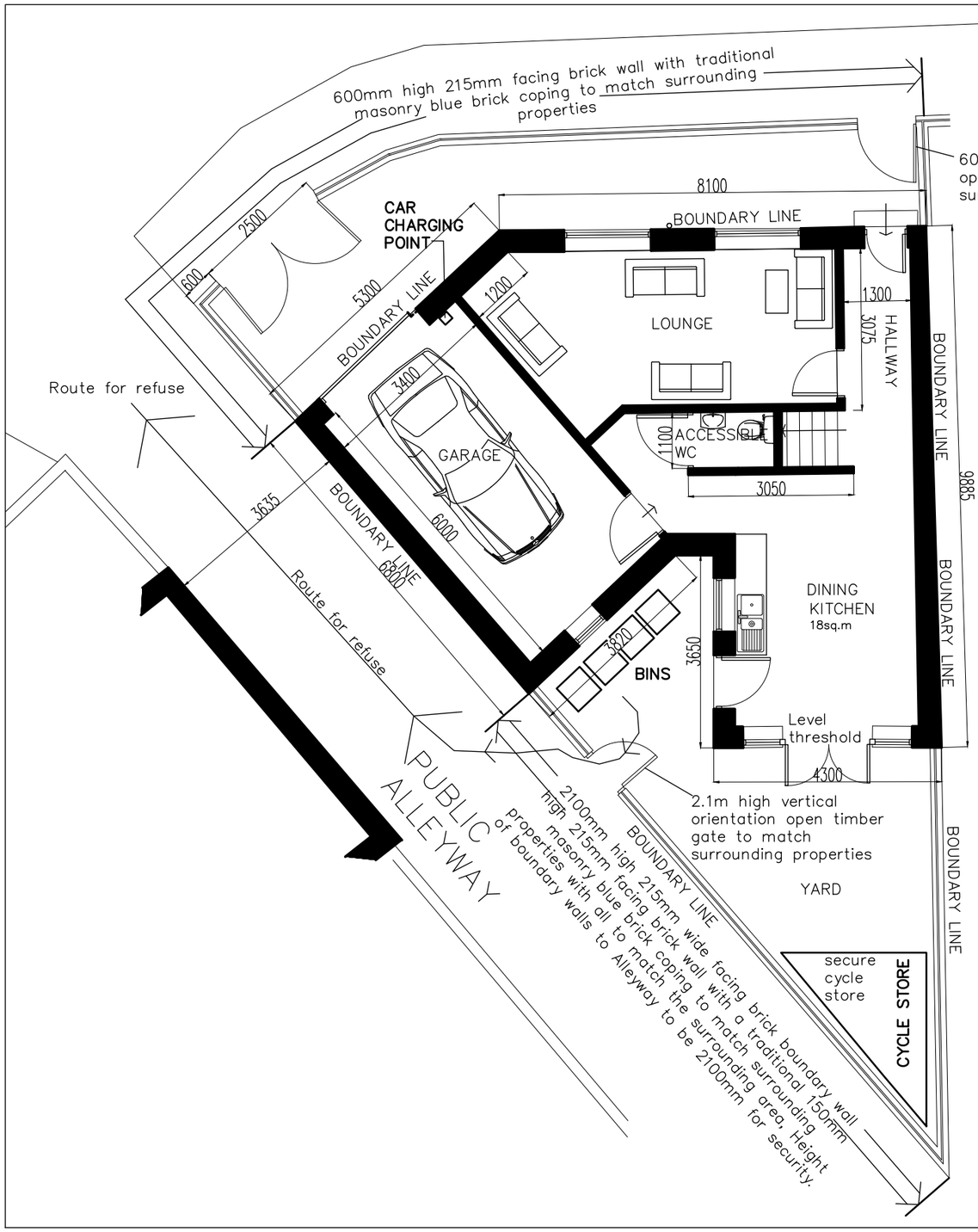
Project:
2 Highfield Road,
Levenshulme.

Site/Location Plan

Drawing No:
05A

Date: 29.11.20

Scale: 1:500@A4



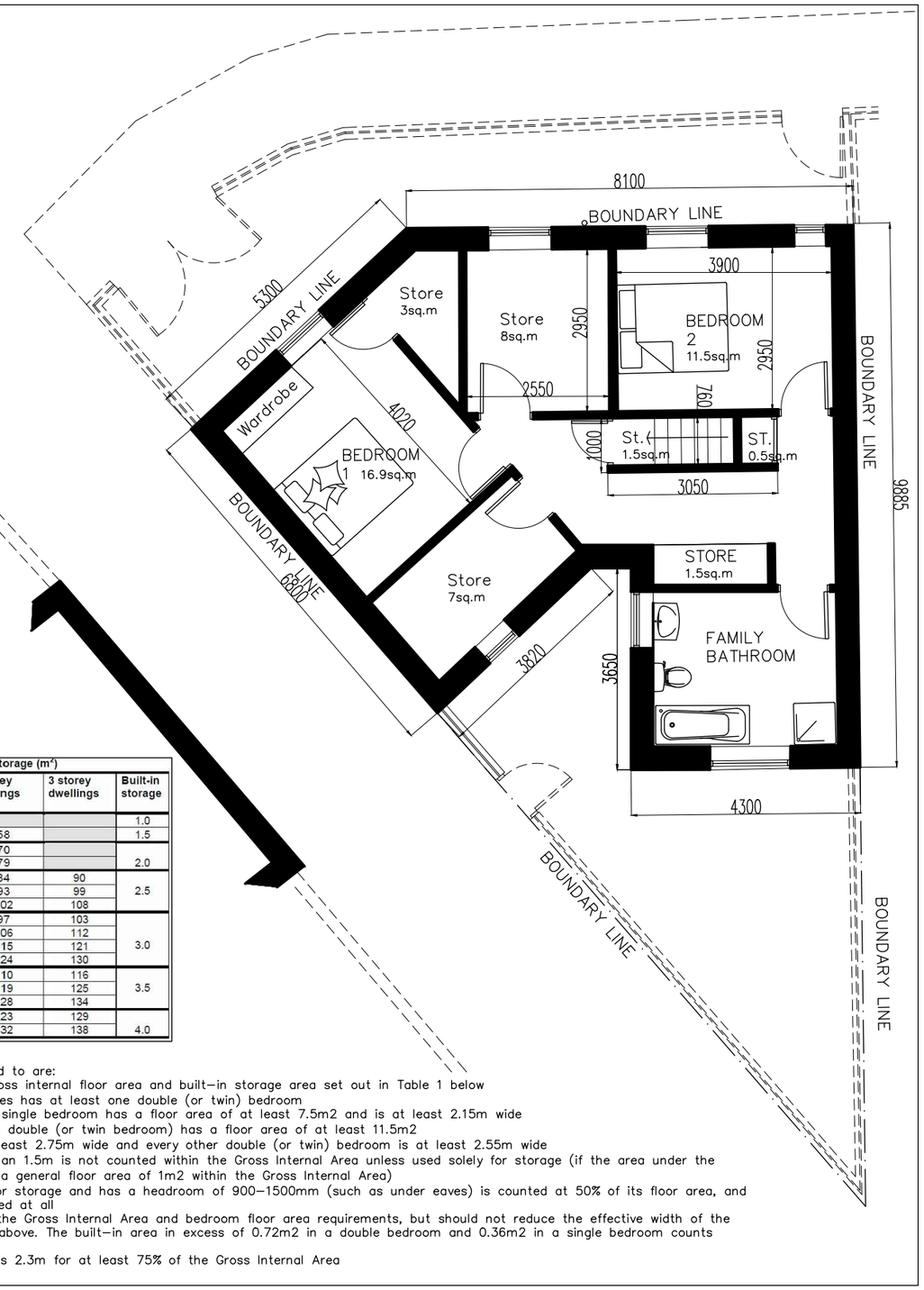


Table 1 - Minimum gross internal floor areas and storage (m²)

Number of bedrooms(b)	Number of bed spaces (persons)	1 storey dwellings	2 storey dwellings	3 storey dwellings	Built-in storage
1b	1p	39 (37) *			1.0
	2p	50	58		1.5
2b	3p	61	70		2.0
	4p	70	79		
3b	4p	74	84	90	2.5
	5p	86	93	99	
	6p	95	102	108	
4b	5p	90	97	103	3.0
	6p	99	106	112	
	7p	108	115	121	
	8p	117	124	130	
5b	6p	103	110	116	3.5
	7p	112	119	125	
	8p	121	128	134	
6b	7p	116	123	129	4.0
	8p	125	132	138	

The standard requires and we have worked to are:

a. the dwelling provides at least the gross internal floor area and built–in storage area set out in Table 1 below
b. a dwelling with two or more bedspaces has at least one double (or twin) bedroom
c. in order to provide one bedspace, a single bedroom has a floor area of at least 7.5m2 and is at least 2.15m wide
d. in order to provide two bedspaces, a double (or twin bedroom) has a floor area of at least 11.5m2
e. one double (or twin bedroom) is at least 2.75m wide and every other double (or twin) bedroom is at least 2.55m wide
f. any area with a headroom of less than 1.5m is not counted within the Gross Internal Area unless used solely for storage (if the area under the stairs is to be used for storage, assume a general floor area of 1m2 within the Gross Internal Area)
g. any other area that is used solely for storage and has a headroom of 900–1500mm (such as under eaves) is counted at 50% of its floor area, and any area lower than 900mm is not counted at all
h. a built–in wardrobe counts towards the Gross Internal Area and bedroom floor area requirements, but should not reduce the effective width of the room below the minimum widths set out above. The built–in area in excess of 0.72m2 in a double bedroom and 0.36m2 in a single bedroom counts towards the built–in storage requirement
i. the minimum floor to ceiling height is 2.3m for at least 75% of the Gross Internal Area

Ground Floor Plan As Proposed

First Floor Plan As Proposed

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REV	DATE	NOTE	BY
C	26.04.21	PLANS UPDATED FURTHER TO COMMENTS RECEIVED FROM THE PLANNING AUTHORITIES	MRE
B	07.03.21	PLANS UPDATED AND FLOOR AREAS REDUCED FURTHER TO COMMENTS RECEIVED FROM THE PLANNING AUTHORITIES	MRE
A	03.01.21	BIN, CYCLE STORE CAR CHARGING POINT ADDED FURTHER TO COMMENTS RECEIVED FROM THE PLANNING AUTHORITIES	MRE

Project:

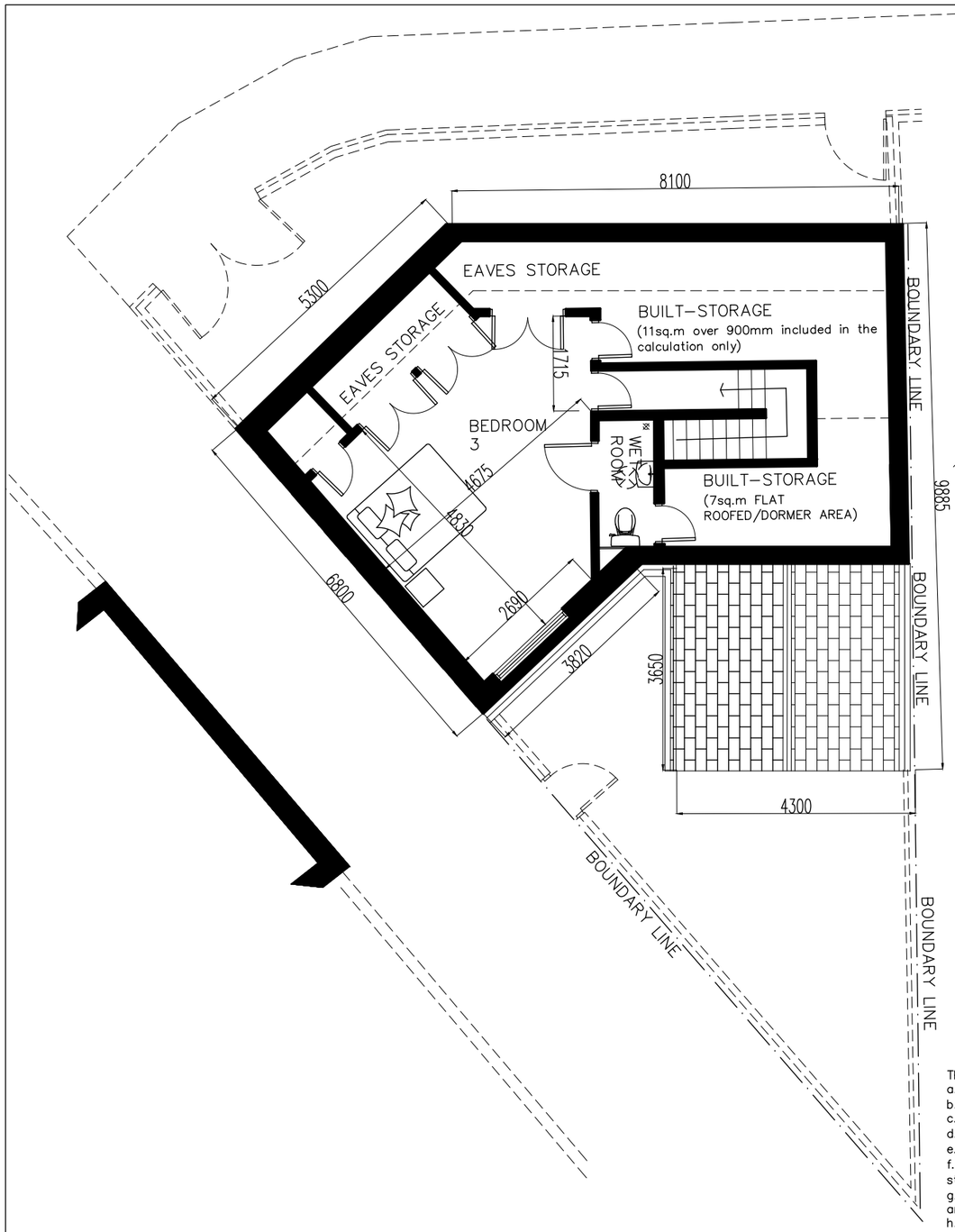
2 Highfield Road, Levenshulme

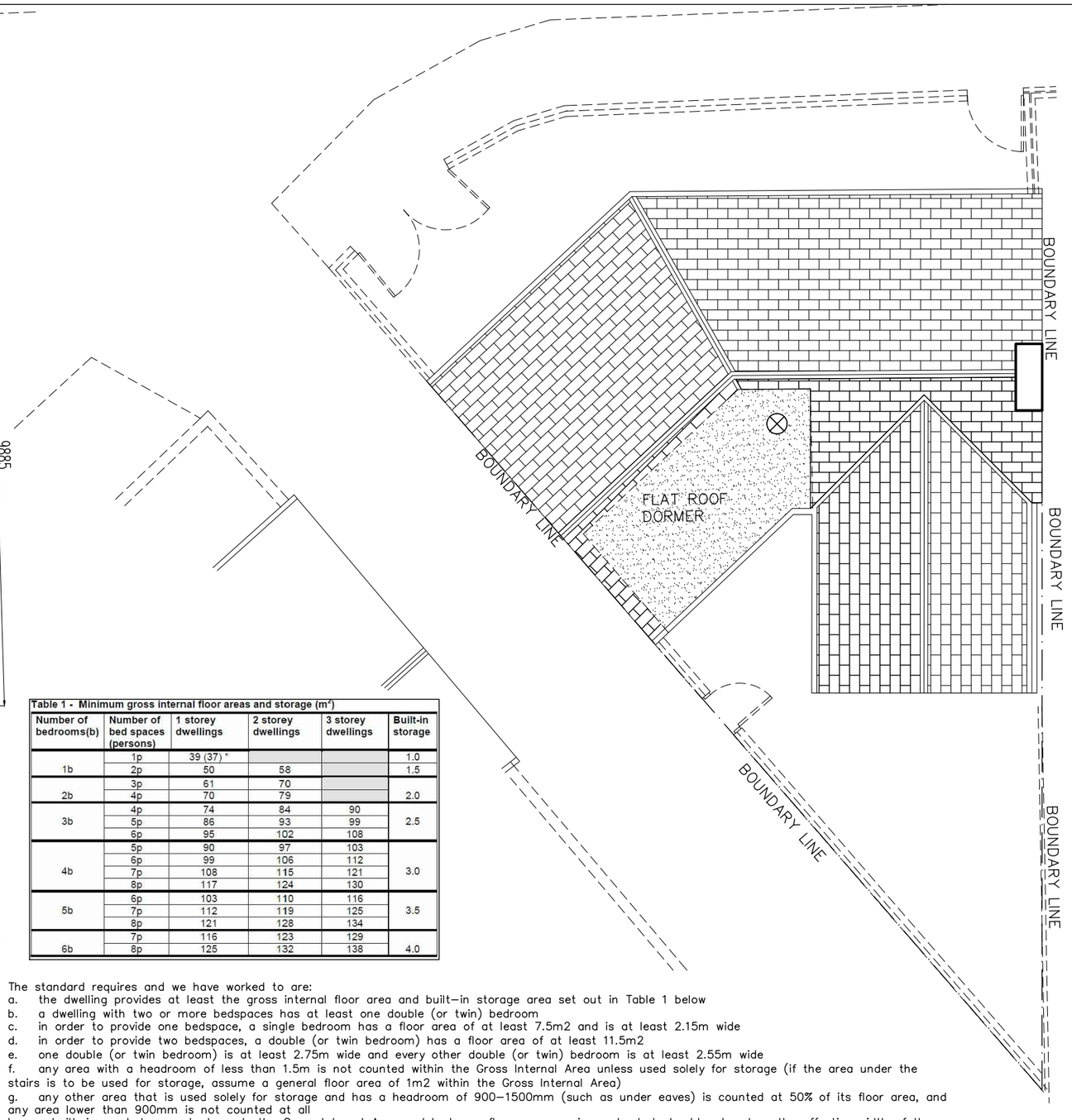
Ground and First Floor Plans As Proposed

Drawing No: 01C

Date: 11.10.20

Scale: 1:100@A3





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3b	4p	74	84	90	2.5
	5p	86	93	99	
	6p	95	102	108	
4b	5p	90	97	103	3.0
	6p	99	106	112	
	7p	108	115	121	
	8p	117	124	130	
5b	6p	103	110	116	3.5
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Roof Void Floor Plan As Proposed

Roof Plan As Proposed

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B	26.04.21	PLANS UPDATED FURTHER TO COMMENTS RECEIVED FROM THE PLANNING AUTHORITIES	MRE
A	07.03.21	PLANS UPDATED AND FLOOR AREAS REDUCED FURTHER TO COMMENTS RECEIVED FROM THE PLANNING AUTHORITIES	MRE

Project:

2 Highfield Road, Levenshulme

Roof Void Plans and Roof Plans As Proposed

Drawing No:

02B

Date: 11.10.20

Scale: 1:100@A3

APPENDIX B

2 Highfield SUDS layout

As with most highway manholes in the area, they have been tarmacked over, so will require UU to fix as it is their responsibility to ensure access

UU combined sewer hence only option:

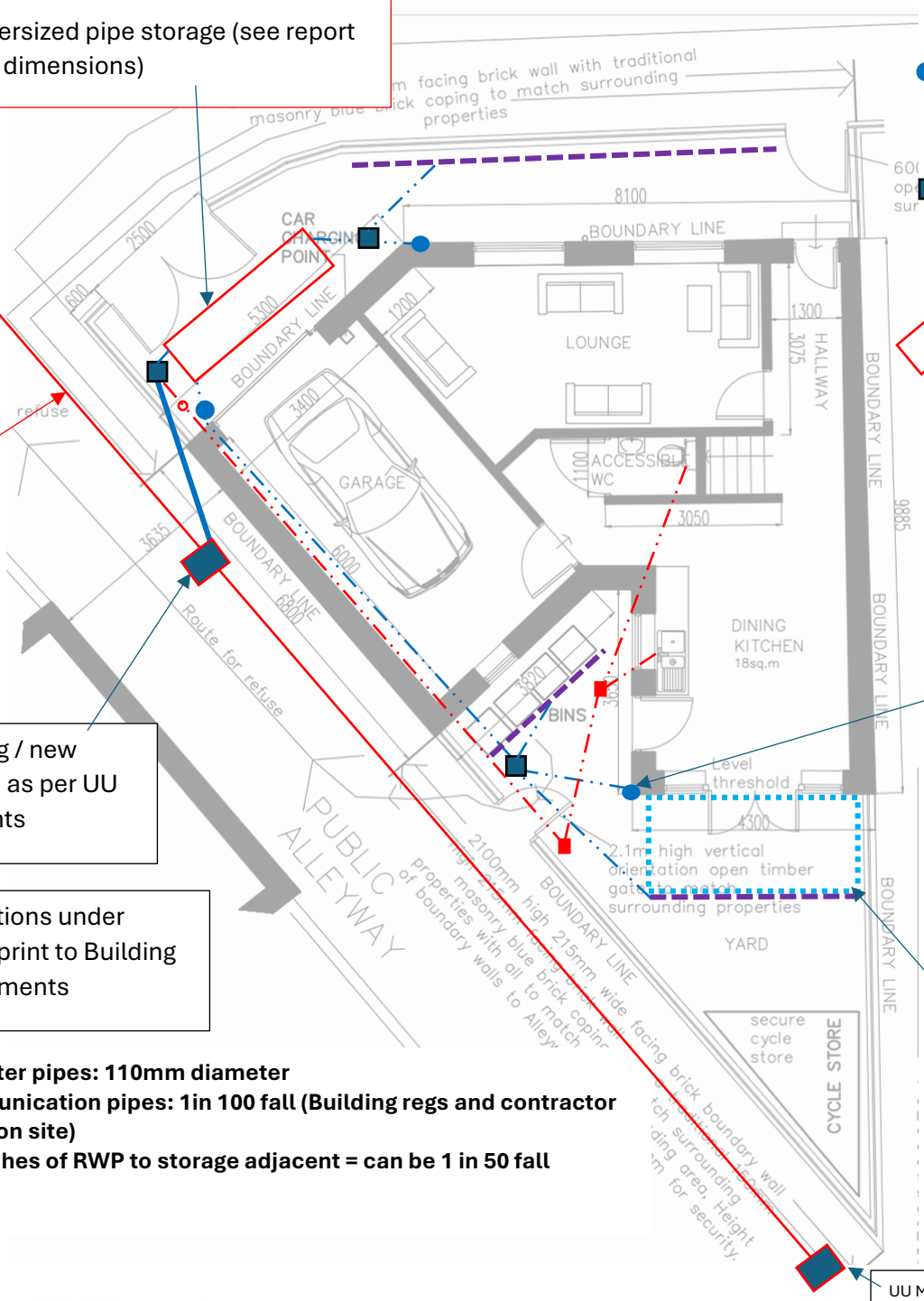
Oversized pipe storage (see report for dimensions)

Key

Rainwater Downpipes and connection to SUDS

Inspection Chamber / Manhole Chamber

Oversized Pipe



Existing sewer with junction connections from site

Use existing / new connection as per UU requirements

Pipe connections under garage / footprint to Building Regs requirements

This RWP can be fitted with diverter to allow water over permeable patio and drain Low Order storm to subbase

Informal subbase storage under Patio area: not connected to sewer

Surface Water pipes: 110mm diameter
Main communication pipes: 1in 100 fall (Building regs and contractor to conform on site)
Minor branches of RWP to storage adjacent = can be 1 in 50 fall

UU Manhole 0011

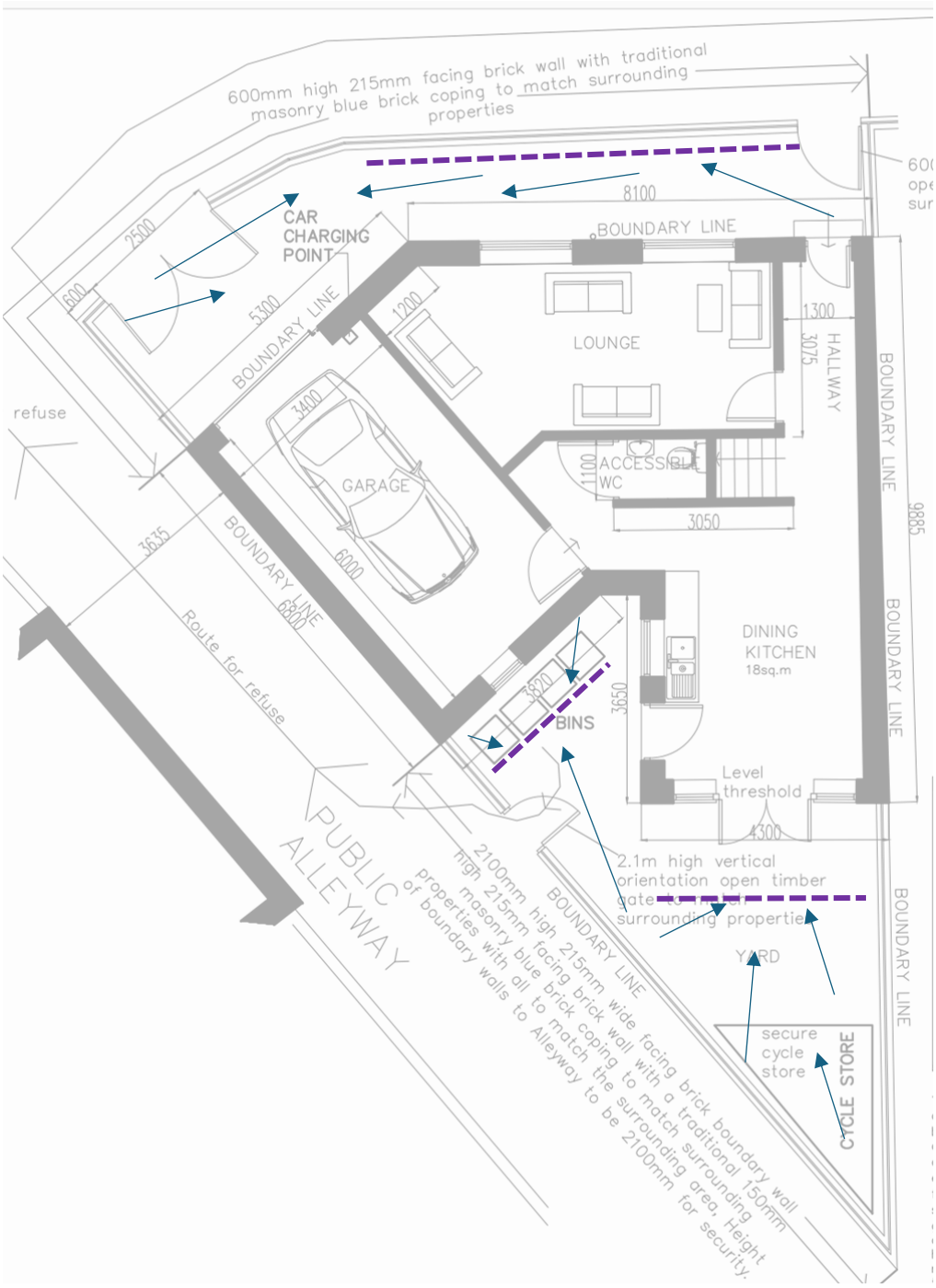
See separate drawing below for Foul Connections for UU

Example Inspection chamber / catch pit: fully roddable

Standard c. 190mm diameter gully top grate

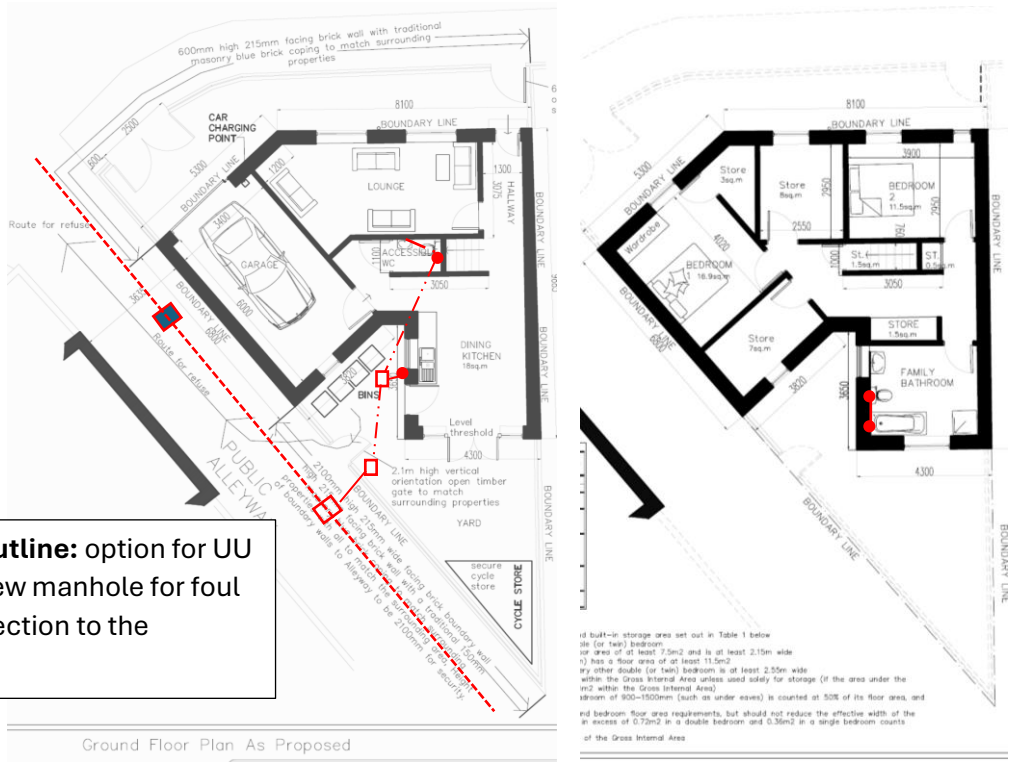
2 Highfield SUDS layout

Design for Exceedance



2 Highfield SUDS layout

Foul Connections for UU

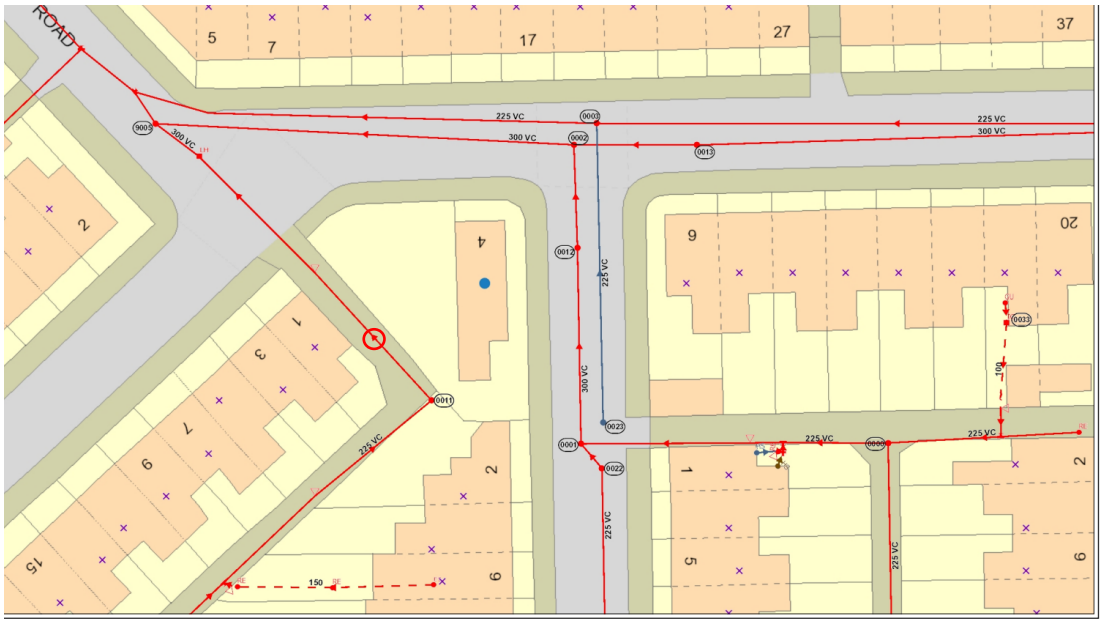


Orange Outline: option for UU to allow new manhole for foul only connection to the combined

100mm diameter pipes

All dimensions and falls as per Building Regs Part H

Exact depths, specifications and connections to be confirmed on site



e underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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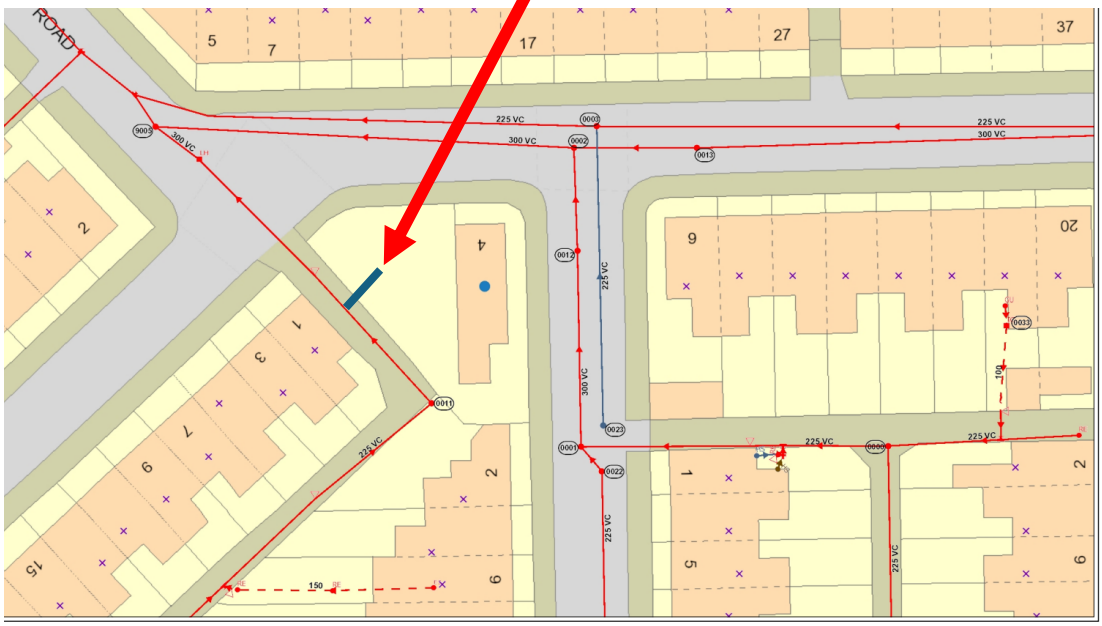
2 Highfield SUDS layout

Existing connection via junction to access road adjacent to west of site:

Existing combined comes in at that location to the sewer in the access road off Greenway Ave

Junction to be retained, pipework inside the site to be amended / extended as necessary



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Water for the North West

APPENDIX C

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	George Locke
Site name:	2 Highfield M19 3JX
Site location:	2 Highfield M19 3JX

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:	53.44285° N
Longitude:	2.18188° W
Reference:	3736318156
Date:	May 03 2024 11:24

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.0154

Methodology

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

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	881	881
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_{BAR} < 2.0 l/s/ha?

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

(2) Are flow rates < 5.0 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 SPR/SPRHOST ≤ 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):	0.1	0.1
1 in 1 year (l/s):	0.08	0.08
1 in 30 years (l/s):	0.17	0.17
1 in 100 year (l/s):	0.2	0.2
1 in 200 years (l/s):	0.23	0.23

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.

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	George Locke
Site name:	2 Highfield M19 3JX
Site location:	2 Highfield M19 3JX

This is an estimation of the storage volume requirements that are needed 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). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	53.44284° N
Longitude:	2.18189° W
Reference:	3388313438
Date:	May 03 2024 11:26

Site characteristics

Total site area (ha):	0.0154
Significant public open space (ha):	0
Area positively drained (ha):	0.0154
Impermeable area (ha):	0.0154
Percentage of drained area that is impermeable (%):	100
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.02
Net impermable area for storage volume design (ha):	0.02
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
SPR:	0.47	0.47

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	55
Rainfall 100 yrs 12 hrs:	--	73.08
FEH / FSR conversion factor:	1.16	1.16
SAAR (mm):	881	881
M5-60 Rainfall Depth (mm):	17	17
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.38	1.38
Growth curve factor 30 year:	1.7	1.7

Design criteria

Climate change allowance factor:	1.4	Growth curve factor 100 years:	2.08	2.08
Urban creep allowance factor:	1.1	Q_{BAR} for total site area (l/s):	0.1	0.1
Volume control approach	Use long term storage	Q_{BAR} for net site area (l/s):	0.13	0.13
Interception rainfall depth (mm):	5			
Minimum flow rate (l/s):	1.5			

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	1.5	1.5
1 in 30 years (l/s):	1.5	1.5
1 in 100 year (l/s):	1.5	1.5

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	1	1
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	1	1

This report was produced using the storage estimation tool developed by HRWallingford 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 http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. 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 these data in the design or operational characteristics of any drainage scheme.

APPENDIX D

SUDS Maintenance Schedule

Installation	Maintenance Required	Frequency	Responsibility
Granular Attenuation	No maintenance required	No maintenance required	No maintenance required
Permeable Paving (incl. associated distribution pipework and sump chambers / manholes / gulleys / rain downpipes) Oversized Pipe Storage	Inspection, debris removal and jetting: part of general garden maintenance	Follow manufacturer guidance Same as for general drainage infrastructure / clearance of gulleys etc Typically, inspection is recommended annually or after a severe or significant storm event, with any jetting/cleaning being carried out as necessary.	Household (part of deeds)