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FLOOD RISK ASSESSMENT

ON

LAND OFF HALL GARDENS
BRIERLEY,
BARNSLEY.

FOR

SAUL CONSTRUCTION LTD

JANUARY 2020

REF: E20/7318/FRA01
Rev A

Prepared By

MARTIN HUDDLESTON. M.Eng.

Haigh Huddleston Associates is the trading name of Haigh Huddleston Associates Limited
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Registered in England Number 6458196

1.0 INTRODUCTION

1.1 This report is commissioned to investigate and report on the Flood Risk for this site in accordance with Planning Practise Guidance- Flood Risk and Coastal Change April 2015 (PPG-FRCC). The report is based on information supplied by the client and from relevant authorities in both written and verbal format. Some of this information is in verbal form only. No liability can be accepted for information supplied by third parties which is subsequently found to be inaccurate or incorrect.

2.0 THE SITE

2.1 The site is situated off Hall Gardens, Brierley on land that was previously part of the Brierley Hall estate. The site is approximately square in shape, with no evidence of buildings having historically been constructed on the site, and it has remained as grassed field for the duration of the available map data circa 150 years.

2.2 The site lies around Ordnance Survey grid reference 441109 411235 and is approximately 2.0 hectares in area. A site location plan is included in Appendix A.

2.3 The proposed site is situated predominantly in an existing residential location with existing properties located adjacent to the East and West site boundaries. To the north and north west open space farmland is located with further residential development situated beyond. Brierley C of E Primary School is located to the south east of the site, and The Anglican Church to the south. There is an unmade track running parallel to the south eastern boundary, linking Church Street to the residential development to the north. To the south east situated along Church Street are convenience stores and further residential development. Scattered mature large trees occupy the site.

2.4 The current site boundaries consist of an approximately 2m high fence separating the site from the housing developments to the SW and east, and the primary school to the south. A dirt track separates the site from the field to the NW. The housing development to the east is separated from the site by garden hedges. In addition there are a number of mature trees located within the development.

2.5 The site slopes gently from an average level of 104m in the south to a low point of 99.0m in the north at a grade of approximately 1 in 40, a copy of the current site survey is included in the appendices at the rear of this report. The current site lies approximately 1-1.5m lower at the boundary than the previously developed site to the west. The proposed site levels will need to be raised in this area to suit the road tie-in level.

3.0 PROPOSED DEVELOPMENT AND CONSTRAINTS

3.1 It is understood that the proposed development is for a series of detached, semi-detached and terraced town houses with associated car parking and access roads. A preliminary site layout is attached in the appendices.

3.2 The BGS Digital Geological map of Great Britain at 1:10,000 has been consulted and we would report as follows:-

3.3 The site is underlain by the Brierley Rock Formation, which consists of Sandstone bedrock. There are no fault lines indicated through or close to the site boundaries. No made ground or infilled ground is noted on the site.

3.4 The groundwater vulnerability map for the area indicates that the site overlies rocks of variable permeability that are designated as a minor aquifer. These soils will readily transmit any non-absorbed pollutants and liquid discharges. This is based on limited available local information. The site is not within a currently defined (Groundwater) Source Protection Zone (SPZ).

3.5 The site has been subject to a preliminary site investigation comprising of a series of trial hole excavations undertaken on 26th July 2018. A total of seven trial pits were excavated and all materials encountered in the trial pits were examined and categorised. Generally, the trial pit investigation revealed a layer of dark brown sandy topsoil with thickness of 0.1-0.3m, over a sandy layer with sandstone gravels with a thickness of 1.4-1.7m. A moderately strong light brown weathered sandstone was encountered at the base of the trial pits.

3.6 Soakaway tests were carried out in six of the seven trial pits prior to backfilling. The soakaway tests were undertaken in accordance with the method specified in BRE

Digest 365 Soakaway Design. The infiltration rate has been calculated in each case between the 75% and 25% full values as recommended in the BRE Digest 365. The results are such that infiltration methods would be feasible on this site.

3.7 **Table 2- Soakaway results from trial pits**

TP	BRE value (ms^{-1})
1	$1.7x10^{-5}$
2	$1.6x10^{-5}$
3	$2.3x10^{-5}$
4	$1.4x10^{-5}$
5	$2.5x10^{-5}$
6	$7.9x10^{-6}$
Average	$1.72x10^{-5}$

3.8 The six tests carried out indicated infiltration rates in the range of $7.9x10^{-6}$ to $2.5x10^{-5}$ ms^{-1}. An average percolation rate for the six tests undertaken was $1.72x10^{-5}$ ms^{-1}. We would suggest that the average rate should be utilised for the design of the proposed surface water soak-a-ways.

3.9 No groundwater was encountered during the excavation of the trial pits.

3.10 There are no known surface water drainage systems on site or adoptable sewers crossing the site. There may be some existing surface water land drainage on site but there are no indications of this. Any stormwater falling on the site on site will either permeate into the soils or run overland to the east.

4.0 FLOOD RISK

4.1 The site currently falls within flood zone 1 according to the Flood Risk Map for Planning. The development is classified as More Vulnerable in Table 2 of the Planning Practise Guidance- Flood Risk and Coastal Change April 2015 (PPG-FRCC) and Table 3 of that document also states that the development is appropriate within zone 1.

4.2 The site does not fall within an area subject to surface water flooding according to the EA maps but there is a small areas in the south west area of the site that are shown to

flood to a depth of 300m but these relate to a localised shallow depressions on site and do not constitute a flood zone.

4.3 The site does not fall within an area subject to flooding from reservoirs according to the EA maps.

4.4 Due to the size of the development over 1Ha it would be necessary to prepare a site Specific Flood Risk Assessment for the site.

4.5 There are a number of potential flooding mechanisms that PPG-FRCC now requires are evaluated for each proposed development site. Each method of flooding requires an assessment to be made on its probability relative to the site development. The normal requirement of the document is for no flooding of properties for storms up to a 1% probability or a once in a 100 years storm. The risk assessment also includes for flooding both on site and off site, and the effects of the development on the downstream catchment or the flow regime of the watercourse. PPG-FRCC also requires that the effects of severe storms above the normal 1% probability are reviewed together with the effects of climatic change relating to the design life of the development. These relate to a 30% increase in allowances for climatic change when connected to an existing surface water drainage system.

4.6 It also requires that the effects of climate change are taken into account together with the impacts of extreme events and flood defence failures. Prior to this the Sequential Test or the Exceptions test as outlined in PPG-FRCC, must also be applied to each development site. These are not covered in this report.

4.7 NPPG – Flood risk and Coastal Change (2015) requires that each flooding mechanism is addressed and levels of risk evaluated. We consider there are three main risks of flooding to the site the alternative mechanisms are not applicable to this site.

4.7.1 Inundation from floodwaters leaving watercourses or rivers entering the site. This can include the effects on culverted watercourses and where the risk of blockage can occur and from breach scenarios.

4.7.2 Rainwater falling on the site and not being able to leave the site at sufficient rate to prevent flooding on the site.

4.7.3 Overland flows from adjacent land sites due to surcharging of sewerage systems or other watercourses.

4.7.4 The impact of the developed site on the existing drainage systems and off-site surface water systems must also be assessed as part of this flood risk assessment.

5.0 DISCUSSION OF FLOOD RISKS

5.1 Flood Risk from Watercourses, River & Tidal

5.1.1 The proposed development area does not fall within the 1% probability Flood Risk Maps (Zone 3) as published by the Environment Agency. The site is therefore considered not to be at risk from fluvial flooding for the once in 100 year flood event.

5.1.2 The DEFRA plans show some slight flooding within the site, but these are shown as being 300mm or less and are designated as a low risk scenario. They are due to localised depressions in the topography which will disappear when the site is redeveloped. The designations of high and low risk on the DEFRA Maps are as follows.

High risk means that each year this area has a chance of flooding of greater than 3.3%. This takes into account the effect of any flood defenses in the area. These defenses reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

5.1.3 The site maps shows no significant flooding due to a high risk scenario. We therefore consider that the risk of flooding to the houses is low and the access road should be

passable up to the 1 in 100 year scenario and therefore the development is acceptable and the level of flood risk is sufficiently low to allow it to proceed.

5.2 Risk of Flooding from overland flows from adjacent land.

5.2.1 The site lies on a gently sloping site with residential development to the west and north that are at slightly higher levels than the site. There are open playing fields to the north and west but these generally would shed any overland flows away to the east of the site. The surrounding residential area to the east and south are all served by public drainage systems and as such the level of risk of flooding from surcharged sewers or drains is considered to be less than 3%. There is always the risk of these systems blocking or being surcharged in extreme events. There is a small catchment area to the west of the site that may produce some overland flows, in extreme conditions or if blockages occur but these are likely to be small and slow flowing, if at all. We would therefore recommend that an overland flood route is provided through the site to cater for such events as is normal under the sewers for adoption criteria and floor levels are based a minimum of 300mm above existing ground levels.

5.3 Risk of Flooding from Rainwater Falling on Site

5.3.1 The risk of flooding from water falling on site and not being able to leave the site is relatively high. The impermeable area of the site will increase due to the development and this would increase the run off from the site if measures are not under taken to attenuate these flows.

5.3.2 The normal hierarchy for surface water discharge is primarily the use of infiltration systems, in accordance with current policies of the EA and Barnsley MDC. There has been a site investigation for this site which indicates that there is sufficient capacity for the site to use infiltration methods. Further testing may be required to ensure all of the site is suitable for infiltration systems. For the purposes of this report, the use of infiltration methods has been considered as the preferable option. This being the case and if these systems are designed to cater for the 1 in 100 year scenario there would be no increase in the risk of flooding either on or offsite from the development of the site.

5.3.3 The use of open swales and ponds would allow the use of reed beds and other organic systems to be employed if large areas or communal infiltration beds are to be used but these do take up significant areas of land and can be problematical in terms of future maintenance and adoption by the relevant authorities. Primary treatment for the roads would be the use of trapped gullies for all hard standings. Car park areas over 40 number cars may require the use of an interceptor to remove contaminants. The use of filter drains adjacent to private drives would also provide a first stage treatment of run off from drives.

5.3.4 The proposed discharge of highway discharges to ground will need to be formally agreed with Yorkshire Water and Barnsley MDC, the Local Land Drainage Authority, prior to final detail design being undertaken.

5.4 **Impact on existing drainage systems.**

5.4.1 If the site is to be developed with infiltration systems and an agreed design infiltration rate there would be no increase in the flood risk to properties off site or in the drainage networks downstream of the site.

6.0 CONCLUSIONS

6.1 The area of the site to be developed currently falls within Flood Zone 1 as defined by the EA Flood maps. The area of the site to be developed is not at risk of flooding from river or tidal water up to a 1% return period. The flood risk is considered to be acceptable for residential development.

6.2 The development of the site utilising infiltration techniques for the site is considered to be feasible but further on site testing and investigation may be required before these would be acceptable to Barnsley MDC or Yorkshire water. If these are utilised there would be no change in the run off from the site and hence no change in the flood risk to the site. Any such systems should be designed for the 100 year storms with due allowances for climatic change.

6.3 The risk of overland flows entering the site is considered to be very low due to the topography of the area around the site and the drainage systems to the previously developed areas to the north and west. The risk can be further minimised by providing

a flood water route through the site to ensure flood water flows are directed away from the existing and proposed housing.

6.4 The site is shown to be at low risk of shallow flooding from surface water flows in the middle of the site due to local topographical depressions that will be removed when the site is developed. The floor levels of the proposed houses should be a minimum of 300mm above the existing ground level in these areas.



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APPENDIX A
LOCATION PLANS

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Firth Building
99-101 Leeds Road
Dewsbury
WF12 7BU

Client : SAUL CONSTRUCTION

Job Title: HALL GARDENS, BRIERLEY

Job Number : E19/7318

Rev A. Site extended to wall on the south.
17.11.20 CM

LOCATION PLAN

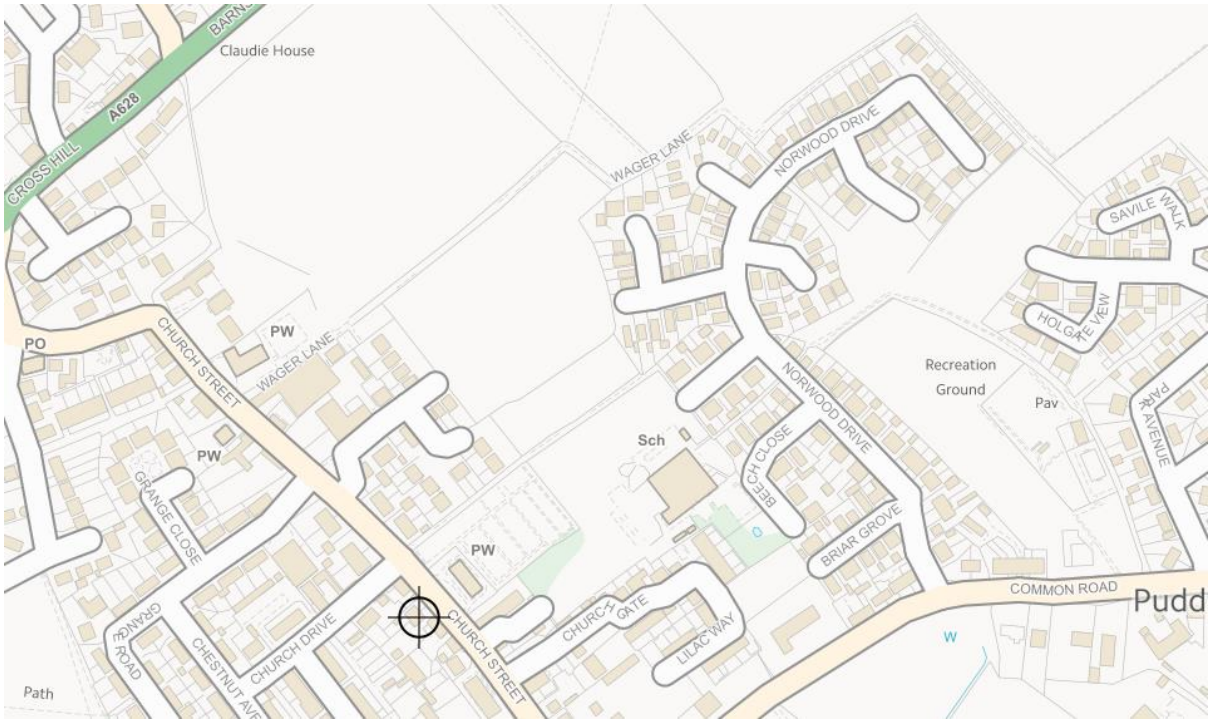
OS Grid Reference : SE 41111 11248
Easting : 441111
Northing : 411248

Topographical Survey carried out using GPS.

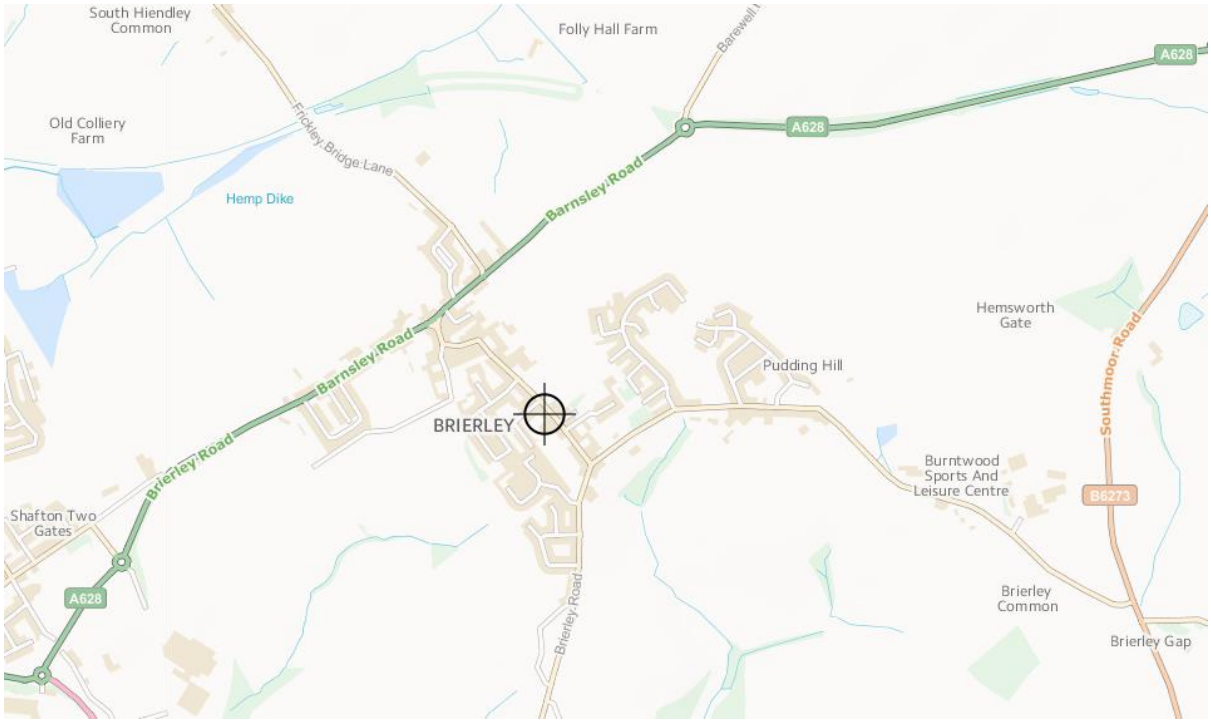
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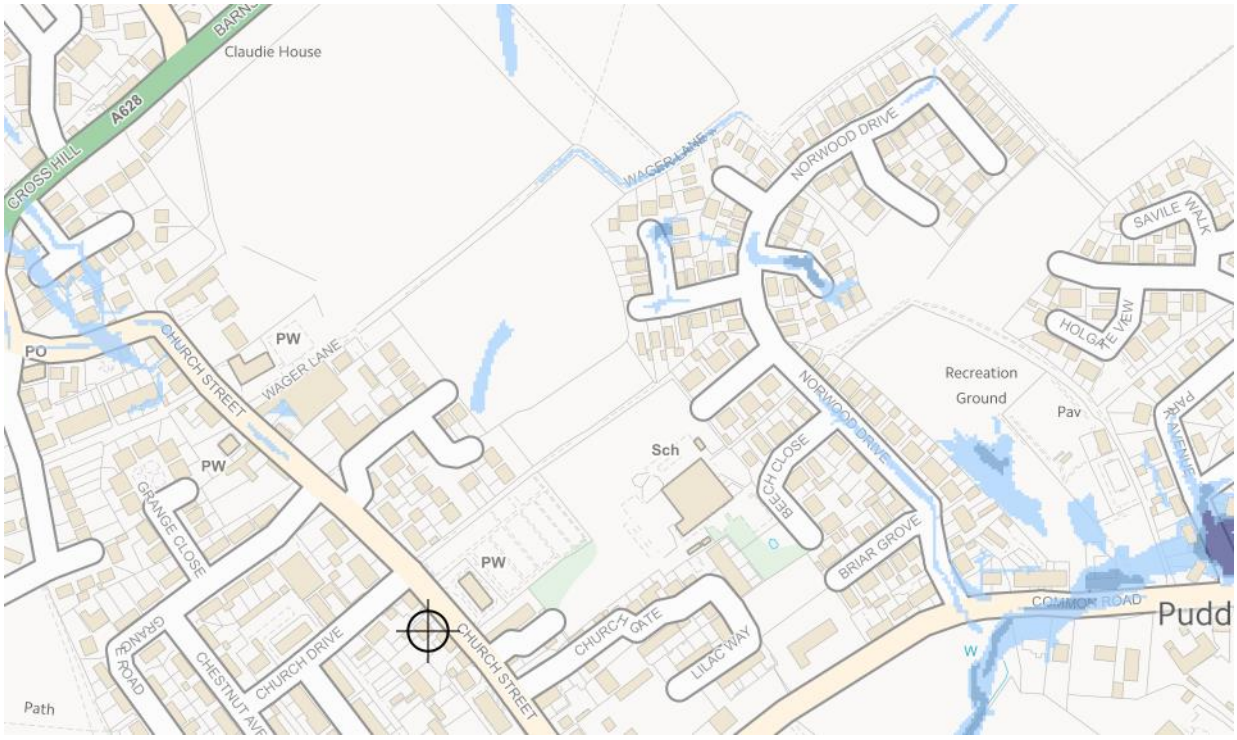
APPENDIX B
FLOOD RISK MAPS



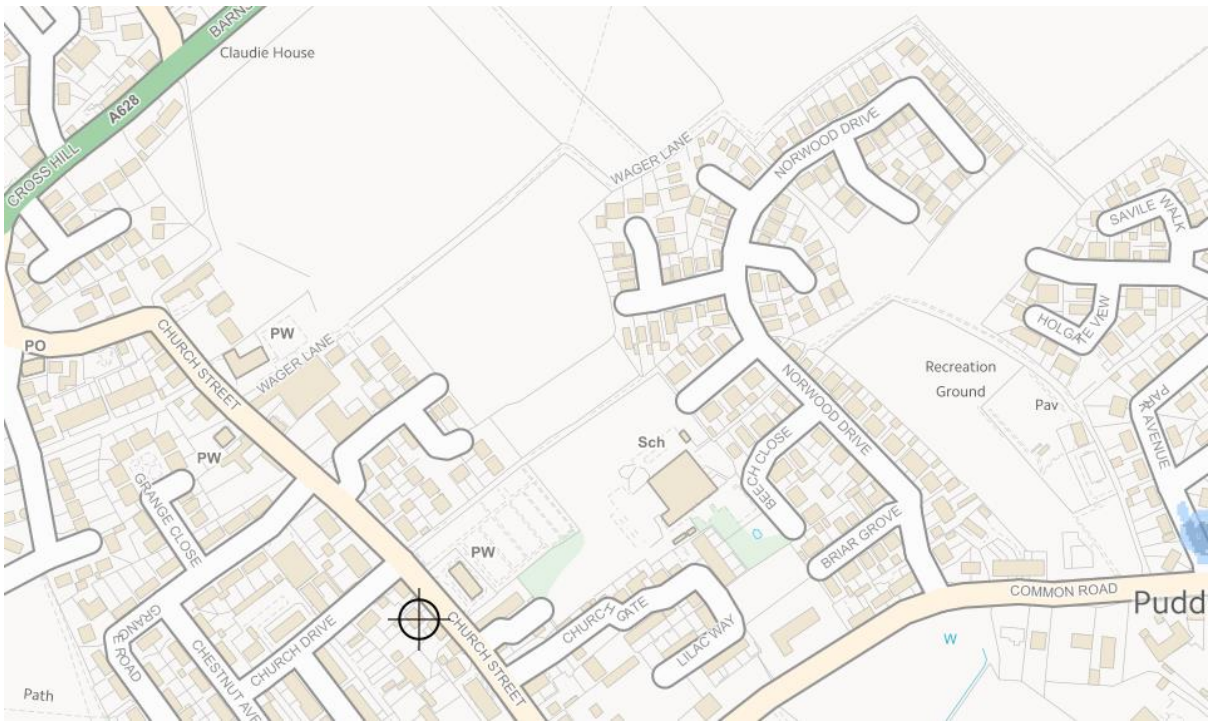
Flood map from Planning



Extent of Flooding Brierley



Surface Water Flood Risk – Low Risk Depth



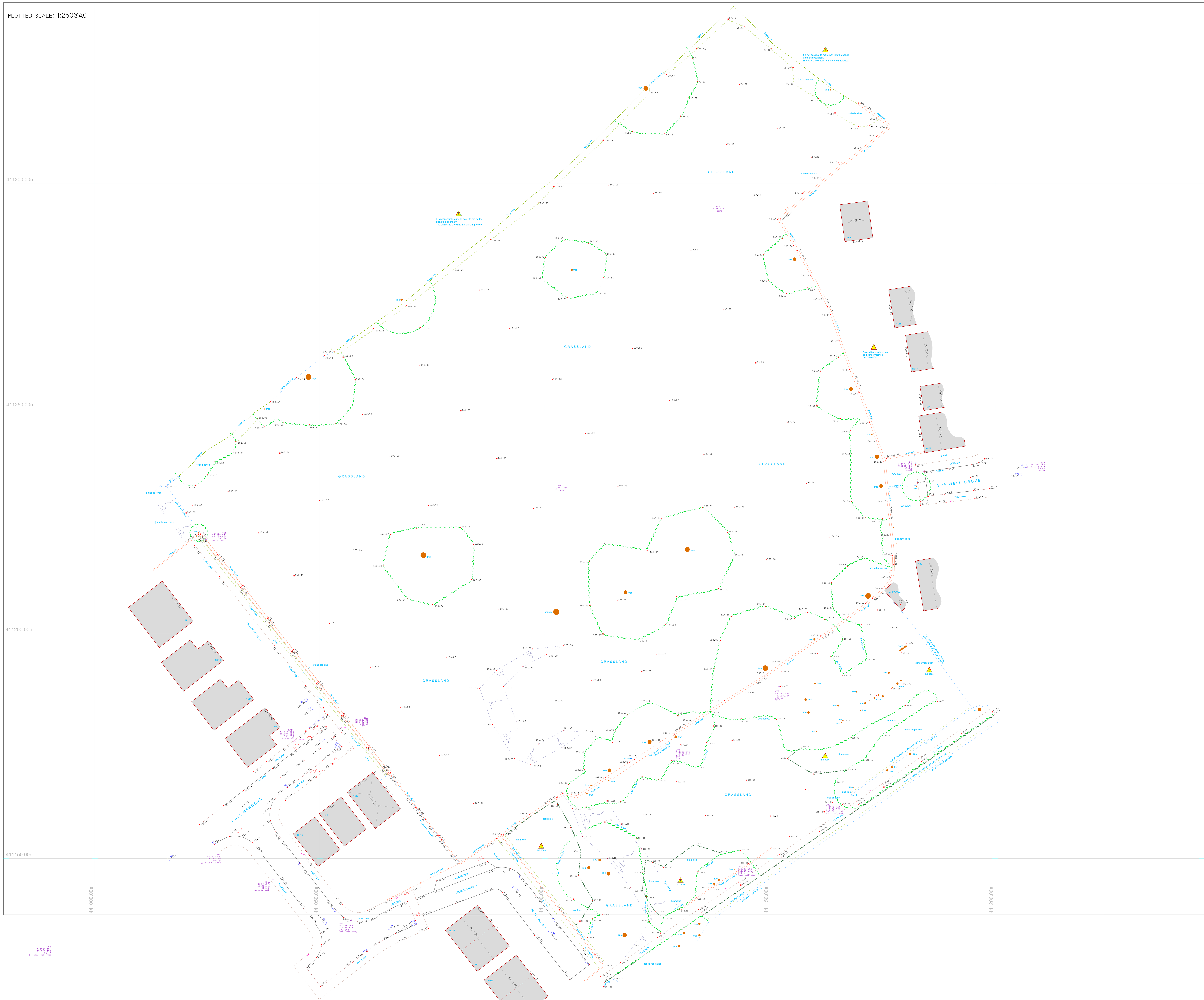
Surface Water Flood Risk – High Risk Depth

APPENDIX C

EXISITNG SITE SURVEY

PROPOSED PLANNING LAYOUT

PLOTTED SCALE: 1:250@A0



0m 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

1:250 SCALE @ A0

LEGEND :

SURVEY STATION	STN5
BANKING	TOP / BOTTOM
HEDGE SPREADS	
COPSE CANOPY	
MARSH / WATERLOGGED	
TREES	SPREAD & GIRTH SHOWN TO SCALE
GATE	
KERB CHANNEL	
ROAD UNKERBED	
FOOTPATH	
CHANGE IN SURFACE	
FENCE	
WALL	
OVERHEAD ELECTRIC	E
OVERHEAD TELECOM	T
FOUL SEWER	
SURFACE SEWER	
BUILDING	
OPEN SIDED BUILDING	
GLASSHOUSE / TEMP STRUCTURE	
CONTOUR	25.50
SPOT LEVEL	9.68
BORE HOLE	BH
TRIAL HOLE	TH
MONITORING WELL	MW

GENERAL ABBREVIATIONS

AIR CONDITIONING UNIT	ACU
AIR VALVE	AV
BACK DROP	BD
BRICK	BK
BOLLARD	B.
BUS STOP	BS
BT INSPECTION COVER	BT
CABLE TV COVER	CATV
CONTROL BOX	CB
COVER LEVEL	CL
CATCH PIT	C/PIT
DRAINAGE CHANNEL	DCH
ELECTRICITY COVER	EL
ELECTRICITY POLE	EP
EARTH ROD	ER
FLAG POLE	FP
FLOOR LEVEL	FL
FIRE HYDRANT	FH
FOUL WATER SEWER	FWS
GAS STOP VALVE	GSV
GATE POST	GP
GULLY	GY
INSPECTION COVER	IC
INVERT LEVEL	IL
KERB OUTLET	KO
LAMP POST	LP
LETTER BOX	LX
LITTER BIN	LB
MANHOLE	MH
MARKER POST	MK
METER	MT
ORDNANCE SURVEY BENCH MARK	OSBM
RODDING EYE	RE
ROAD SIGN	RS
RAIN WATER PIPE	RWP
RETAINING WALL	RW
ROAD NAME PLATE	RNP
STOP COCK	SC
STUMP	S.
SERVICE MARKER POST	SMP
STOP VALVE	SV
SOIL VENT PIPE	SVP
TACTILE PAVING	TAC
TELE.CALL BOX	TCB
TRAFFIC LIGHT	TL
TELECOM POLE	TP
UNABLE TO LIFT	UTL
VENT PIPE	VP
WATER STOP VALVE	WSV
WATER METER	WM
YORKSHIRE WATER COVER	YW

FENCE ABBREVIATIONS (where used)

BARBED WIRE FENCE	B/W
CLOSE BOARDED FENCE	C/B
CONCRETE PANEL FENCE	CPL
CORRUGATED IRON FENCE	C/I
CHAIN LINK FENCE	C/L
CHESTNUT PALING	CNP
IRON RAILINGS	I/R
POST AND RAIL FENCE	P/R
POST AND WIRE FENCE	P/W
WIRE MESH FENCE	W/M

HEIGHT ABBREVIATIONS (where used)

ROOF RIDGE LEVEL	RL
EAVES LEVEL	EL
FLOOR LEVEL	FL
DPC LEVEL	DPC
TOP of WALL	ToW
TOP of FENCE	ToF
DOOR THRESHOLD	TL
WINDOW HEAD	Wh
WINDOW CILL	Wc
SOFFIT BOARD	SB

TREE NOTATIONS

M	MULTIPLE TRUNK
D	DEAD TREE
F	FRUIT TREE
TBR	TO BE REMOVED
S	STUMP

NOTES :

- No control stations remain from the previous survey of the adjacent land / development carried out by 'Cadital Ltd.' This 2018 survey has been combined using overlay points of existing dwellings and other features jointly surveyed. Levels have been tied back to ironwork in the main road and floor levels of existing buildings jointly surveyed.

CONTROL DATA :

Control network related to topographical survey of adjacent land carried out by Cadital Ltd.

Grid Orientation : OSGB36
Level Datum: OS Orthometric Hts

REV	DATE	AMENDMENT	BY
A	02-11-20	Former bowling green land added to survey	MS

MS LAND & CONSTRUCTION SERVICES LTD.
LAND SURVEY | BUILDING SURVEY | SITE SETTING OUT
msmith.co@btinternet.com
07842 462903
01757 617020

TITLE:
TOPOGRAPHICAL SURVEY

PROJECT:
LAND AT HALL GARDENS
BRIERLEY
BARNSLEY

CLIENT:
SH-LOGO.png

PLOTTED SCALE: 1:250@A0	SURVEYED: M.SMITH	DATE: 17/09/18
DRG ID: TS-001	REV: A	MSMITH.CO @ BTINTERNET.COM

SCHEDULE OF ACCOMMODATION
HALL GARDENS, BRIERLEY

Quantity	Drawing No.	House Types	Details	Sqm	Sq ft
6	6	Aspen	3 Bedroom 2 storey house	88.3	950.9
4	10	Chestnut	4 Bedroom 2 storey house with integral garage	118.0	1269.7
2	12	Collingwood	2 Bedroom 2 storey house	79.7	858.1
1	36	Hemlock	3 Bedroom 2 storey house	85.0	914.5
1	46	Holly	3 Bedroom 2 storey house	85.1	916.3
1	36	Laurel	2 Bedroom 2 storey house	66.9	720.3
4	38	Maple	4 Bedroom 2 storey house	123.6	1330.6
3	16	Mountain Ash	3 Bedroom 2 1/2 storey house	129.1	1389.5
2	40	Mulberry	4 Bedroom 2 storey house with integral garage	147.1	1583.0
0	22	Rowan	3 Bedroom 2 storey house with garage	88.3	950.9
1	24	Swaine	3 Bedroom 2 storey house	128.4	1382.09
4	26	Willows	3 Bedroom 2 storey house	96.0	1033.3
			Bungalows		
4	28	Marlowe	2 Bedroom bungalow	76.9	827.3
2	30	Hawthorne	3 Bedroom bungalow	100.5	1081.6
1	42	Rosewood	3 Bedroom bungalow with integral garage	93.8	1010.0

33 No. Plots — Areas listed above exclude integral or detached garages

Site Area	**2.021 Ha**	**4.99 Acres**
Green Space	**0.4526 Ha**	**1.118 Acres**
Developable Area	**1.5684 Ha**	**3.88 Acres**
Density	**22.92 Units per Hectare**	



Site Layout

NOTES

- All rear gardens are a minimum of 10m long.
- All pedestrian routes and paths to be 900mm, 1000mm where possible, minimum width. Maximum gradients 5m at 1 in 12, 10m at 1 in 15.
- Secure gates to rear gardens to have minimum 850mm width. Gates with high quality locking mechanisms are proposed for access from public spaces to the rear of dwellings.
- Surface water drainage proposals to Haigh Huddleston's design - refer to separate drawings.
- All site boundaries to be agreed on site prior to construction.
- Building and road levels provisional pending detail drawings.
- Roads to be to Highway's approval and adopted under a Section 38 Agreement.
- This drawing is based on topographical survey by MS Land & Construction Services Ltd, drawing ref: TS-001
  All to be checked on site prior to construction.

Boundary treatments to dwellings to further details, but are generally as follows:

- Rear boundaries where properties are back to back - 1.8 m high hit and miss timber fence with concrete posts.
- Boundaries between adjacent gardens - 1.8 m high hit and miss timber
- fence with concrete posts.
- Side boundaries abutting public areas and rear boundaries abutting highways - 1.0 m high brick walls with brick piers and fence panels over to a total height of 1.8m.
  Fence panels positioned to the front edge of the brick wall (public side) to eliminate, where possible, footholds used for climbing.
- Gates with high quality locking mechanisms are proposed for accesses from public spaces to the rear of dwellings.
- Gas and electric meters to be positioned appropriately to the front of dwellings in an effort to deter bogus officials.

N
W E
S

KEY

Private Drives

Raised plateau to aid traffic calming and indicate shared surface residential access

Existing Trees to be retained.

Existing Trees to be removed as shown dotted.

Proposed tree locations.

Reb B 13th Nov '20 Layout updated following comments from planning. Additional area included with enlarged green space.
Rev A 7th July '20 Layout redesigned following comments from planning. Stand off distances increased to existing trees. Overall development reduced from 38 No. to 33 No. plots.

Project:
Development of Land at
Hall Gardens, Brierley
Barnsley, S72 9HT

Title:
Site Layout

Scales: 1:500@A2 | Drawn: PJ | Date: 11 / 19 | Checked:

Drawing no: SH / HG / 01 | Rev: B

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SAUL HOMES

Residential Development at Hall Gardens, Barnsley

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