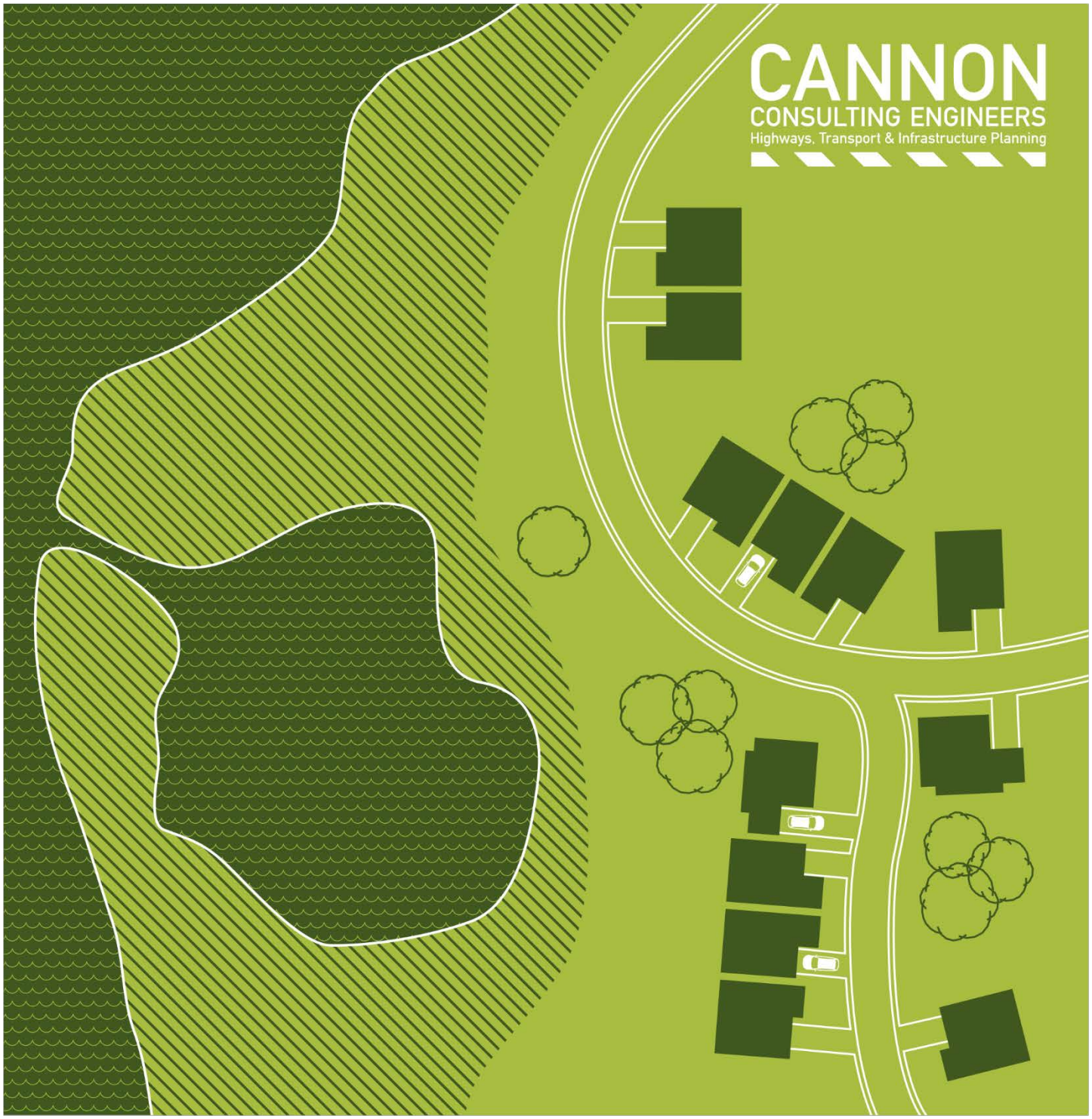

flood risk assessment

Land East of High Road, High Cross
Hertfordshire

CCE/U321/FRA-03

November 2023

For
M Scott Properties Ltd

Document Review Sheet

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Reference	Date	Author	Checked
CCE/U321/FRA-01	February 2018	RTW	RBT
CCE/U321/FRA-02	October 2023	JH	RT
CCE/U321/FRA-03	November 2023	JH	

Contents

Figures

Appendices

Summary Table

Site location	Land East of High Road, High Road, High Cross Hertfordshire SG11 1BE Grid reference- 536586, 218803
Planning application	Outline
Existing site	Greenfield, agricultural farmland
Site area	Approximately 7.75 ha
Proposed development	Residential, up to 95 units
Flood Zone	Zone 1
Surface Water Flooding	Some areas of Medium/Low
Reservoir Inundation Zone	None
Surface water management	Attenuation sized to manage the 1 in 100 annual probability storm inclusive of 40 % climate change. Discharge limited to the mean annual greenfield rate.

1.0 Introduction

1.1 This Flood Risk Assessment (FRA) has been prepared on behalf of M Scott Properties Ltd to support an outline planning application for the proposed development of land to the south of Sutes Farm, High Cross, Hertfordshire (refer to Figure 1 for a site location plan).

1.2 The proposals comprise the erection of up to 95 dwellings, with associated access, drainage, parking, landscaping and infrastructure (refer to Appendix B for an illustrative layout).

1.3 This assessment takes account of the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG) and the definitions of sources of flooding within the Flood and Water Management Act (FWMA) 2010.

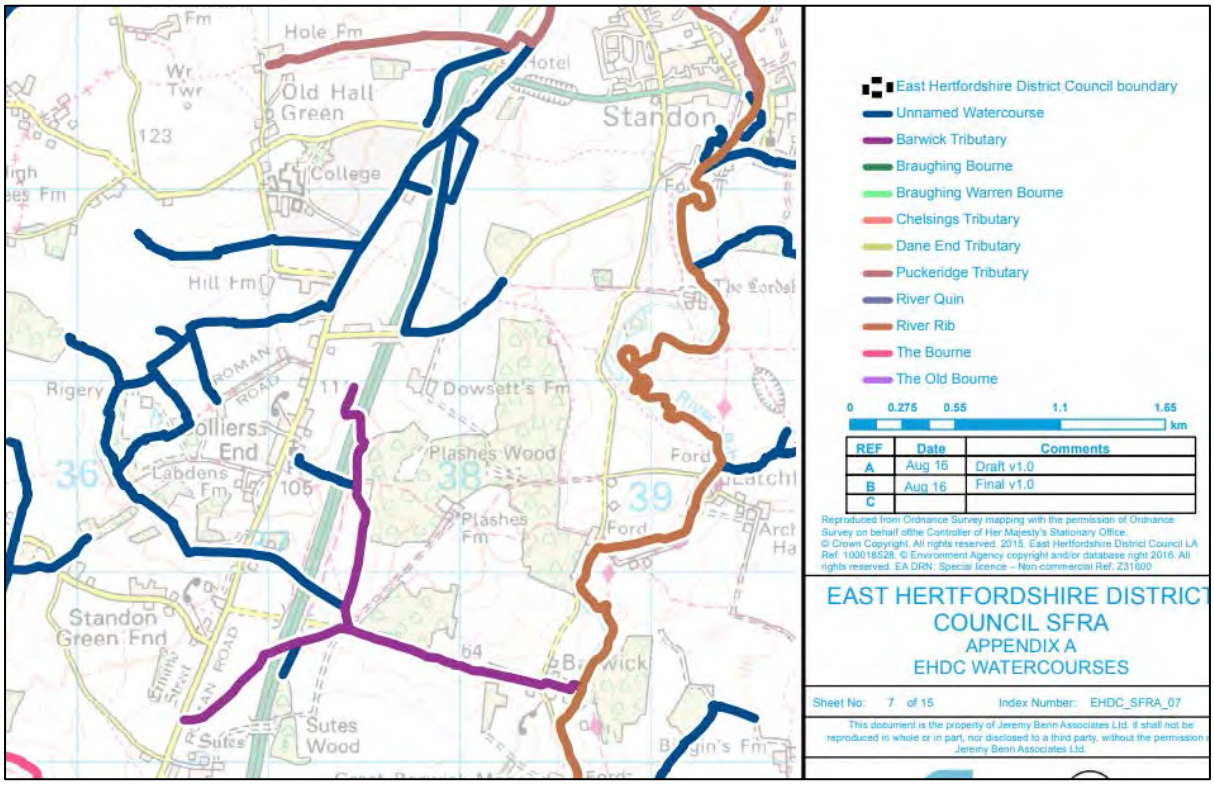
1.4 This assessment has been prepared following a review of the East Hertfordshire District Council Strategic Flood Risk Assessment (SFRA) and a site visit.

1.5 The site is approximately centred on Ordnance Survey grid reference 536586, 218803. The site is approximately 7.75 ha and is currently undeveloped agricultural land.

1.6 The site is located in the north of High Cross, to the east of High Road. Residential/agricultural buildings are located to the west, south and north of the site. Undeveloped, agricultural land is located to the east and further to the north beyond the farm buildings.

1.7 The site survey (refer to Appendix A) shows that the majority of the site slopes south-eastwards, with the low point being midway along the southern boundary. Levels fall from approximately 93.0 m AOD at the boundary with the existing farm buildings to approximately 89.0 m AOD on the southern boundary. The strip of land which will provide the spine access route to High Road slopes broadly northwards, falling from approximately 91.0 m AOD (adjacent the existing farm buildings) to approximately 88.0 m AOD where it meets High Road.

1.8 Some 130 m to the north of the proposed site access (shown on the illustrative layout in Appendix B) the Barwick Tributary (a part ordinary watercourse and part main river) runs north-eastwards from High Road to (and beneath) the A10. The watercourse is shown in a plum colour on the extract from Appendix A of the JBA SFRA overleaf. The watercourse goes on to drain into the River Rib.



Extract from Appendix A of the 2016 SFRA showing watercourses © Crown copyright and database rights 2023 Ordnance Survey 100047325

1.9 British Geological Survey (BGS) mapping shows that the site is underlain by superficial deposits of the Lowestoft Formation (Diamicton) and bedrock geology of the Lewes Nodular Chalk Formation and Seaford Chalk Formation.

1.10 The site lies within Groundwater Source Protection Zone 3 (refer to Figure 3).

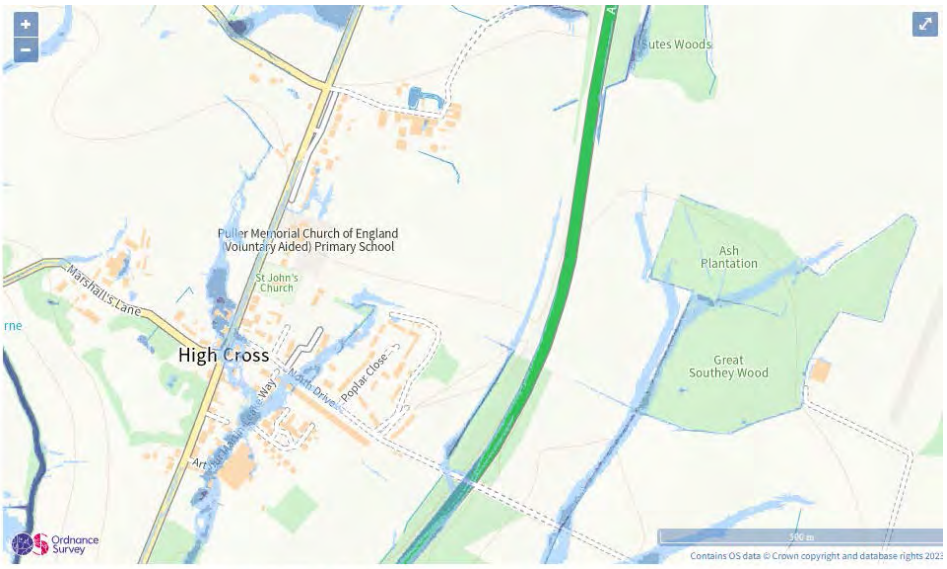
2.0 Forms of Flooding

Watercourses

2.1 The site lies in Flood Zone 1 (the low probability area) and is not therefore considered to be at risk of inundation from a tidal source, a named river, or other significantly sized watercourse (refer to Figure 2).

Surface Water

2.2 Surface water flood maps (refer to Figure 4 and the extract below) show that whilst the majority of the site is located in the very low flood risk area, there are localised areas of surface water flooding within the west and south of the site. These areas of medium and low risk are shown with a corresponding flood depth as below 300 mm and are therefore not considered to pose a significant or unmanageable risk to the development. The development of the site and the introduction of a formal surface water management strategy provides an opportunity to help reduce the predicted pooling along the southern boundary of the site with a view to reducing flows through the land to the south. This is discussed later in the surface water management section (Section 3).



Low risk surface water depths © Crown copyright and database rights 2023 Ordnance Survey 100047325

Surface Water Sewers

2.3 Thames Water plans (provided at Appendix A) show there are no surface water sewers in the immediate vicinity of the site and therefore flooding from this source is not considered a notable threat at the site.

Groundwater

2.4 The BGS Infiltration GeoReport (refer to Appendix A) indicates that groundwater is likely to be more than 5 m below the ground surface throughout the year. The site investigation (Appendix A) recorded a potential perched water table (approximately 1.5m below ground level) in the western area of the site. In the unlikely event that groundwater levels were to rise to a point where they met ground levels then the resulting flows would tend to follow the topography and exit the site as overland flow (as opposed to pooling within the site boundaries).

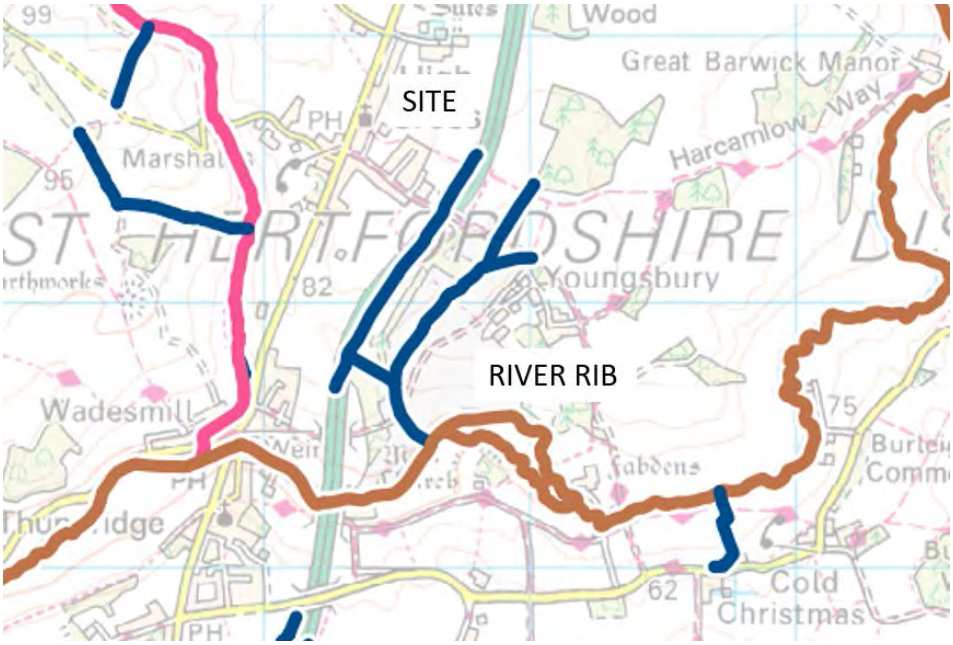
Reservoirs/Lakes/Canals

2.5 The site is not shown to lie within an area denoted as being at risk of flooding from a breach (failure) of a reservoir (refer to Figure 2). There are no lakes or canals in the vicinity of the site.

3.0 Surface Water Management

3.1 The topography of the site dictates that runoff from the majority of the site will flow south (as suggested by the flow routes and pooling shown on the surface water flood mapping) with the land on which the spine access road will be constructed draining broadly westwards.

3.2 Site infiltration testing (included in Appendix A) shows that conditions are not suitable to support the disposal of surface water runoff via infiltration. It is therefore proposed to discharge surface water runoff to the Barwick Tributary, the watercourse to the north within the landowners control. Although this represents a local redistribution of flows from the site which would ordinarily run overland southwards, the flows are simply entering the same watercourse (the River Rib) further upstream than they would currently do. This is demonstrated on the extract of Appendix A of the SFRA (showing the watercourse locations and connectivity).



Annotated extract from Appendix A of the 2016 SFRA showing the route of the River Rib relative to the site © Crown copyright and database rights 2023 Ordnance Survey 100047325

3.3 Sufficient on-site surface water storage will be provided in order to manage the 1 in 100 annual probability storm including the requisite 40 % allowance for climate change. The discharge rate will be limited to the mean annual greenfield rate of circa 3.0 l/s/ha.

3.4 It is proposed to attenuate flows in a one of three attenuation basins (refer to the surface water strategy drawing in Appendix B). It is proposed that sub-catchment A, C, and D will drain via swales, filter drains (or other roadside SuDS features) to the attenuation basin on the southern boundary. Sub-catchment B will drain to the smaller basin just to the north of the sub-catchment. The access road will drain (again via swales, roadside planters etc) to the basin just south of the proposed junction with High Road.

3.5 The greenfield discharge from the basins will be conveyed northwards to the receiving watercourse (discussed in paragraph 3.2, and shown on the surface water management strategy in Appendix B) with a shallow gradient pipe network. Total flow in the network would be minimal (less than circa 7.0 l/s).

3.6 Each of the three flow control structures will be suitably protected by debris filters at outlets from the basins, and in-chamber filters (perforated risers/boxes etc).

3.7 Causeway flow calculations showing the performance of each of the basins for the 1 in 2, 1 in 30, and 1 in 100 annual probability events are included in Appendix B. An urban creep rate of 5 % has been applied to the total proposed impermeable catchment area for the residential parcels to simulate a 10 % increase in roof/plot area.

3.8 Exceedance flows will be managed via overland routing along the roads and swales to open space and/or one of the attenuation basins.

3.9 All proposals and rates are subject to detailed design and the approval of relevant parties.

Treatment

3.10 The maximum pollution hazard level for the proposals can be considered as medium based on the assumption of the associated traffic movements for the development road are likely to be greater than 300 traffic movements per day (i.e. will likely fall outside of the low pollution hazard designation). CIRIA C753 (Table 26.2) presents an associated pollution score for medium pollution hazard of 0.7 for total suspended solids (TSS), 0.6 for metals (M), and 0.7 for hydrocarbons (HC).

3.11 The attenuation basins provide sufficient treatment for the lower trafficked roads and roof areas (i.e. both with a corresponding low pollution hazard designation). It is currently proposed that treatment and conveyance of runoff from the busier roads (those serving more than 50 properties) will be via roadside SuDS features (swales, filter drains, linked SuDS planters etc). These would however be determined by the later stage detailed layout and any restrictions re adoption imposed by third parties (Highways, Thames Water etc).

3.1 The combination of proposed roadside SuDS (analogous to bio-retention) for the busier roads and the proposed basins would provide a suitable level of treatment for the development runoff.

Treatment scores
TSS – swale 0.5 + basin (0.5/2) = 0.75
Metals – swale 0.6 + basin (0.5/2) = 0.85
Hydrocrabons – swale 0.6 + basin (0.6/2) = 0.9

Maintenance

3.12 Maintenance responsibilities would be established at the usual post planning stage. Suggested maintenance activities for are included on the maintenance plan in Appendix B.

4.0 Conclusions

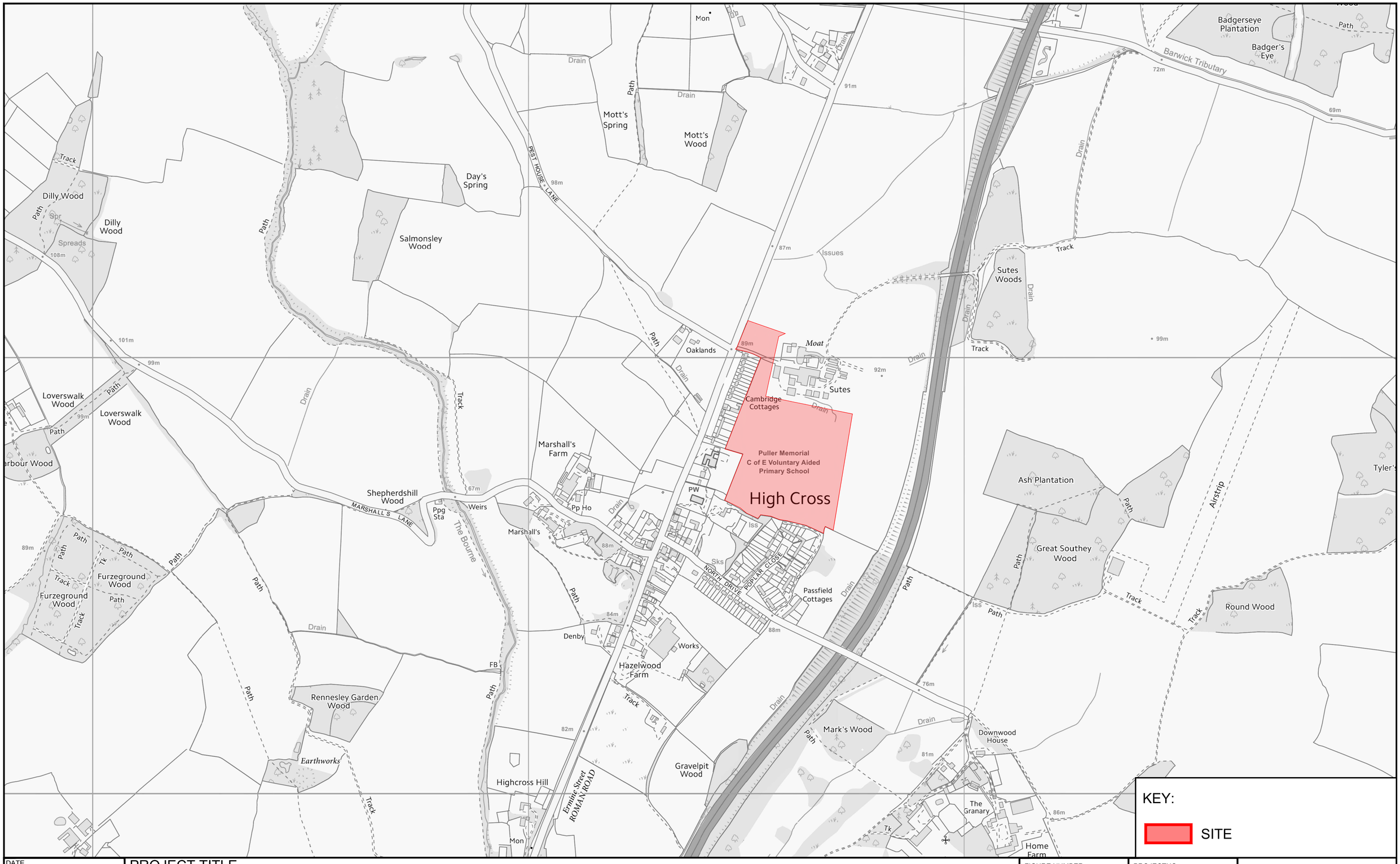
4.1 The site is not considered to be liable to significant or unmanageable flooding from the sources identified in the Flood and Water Management Act 2010 (FWMA).

4.2 Surface water runoff from the development will be discharged at greenfield rates to the watercourse located to the north of the site (within the same land ownership as the site). On-site attenuation will be provided in order to manage flows up to and including the 1 in 100 annual probability storm event inclusive of 40 % climate change allowance.

4.3 The proposed outline surface water management strategy allows for sufficient space within the layout to be set aside for water management. The strategy also allows for sufficient treatment of runoff prior to it leaving the proposed development.

4.4 It is envisaged that maintenance of the scheme will be undertaken by a private management company with some elements potentially adopted by Thames Water.

Figures



KEY:

SITE

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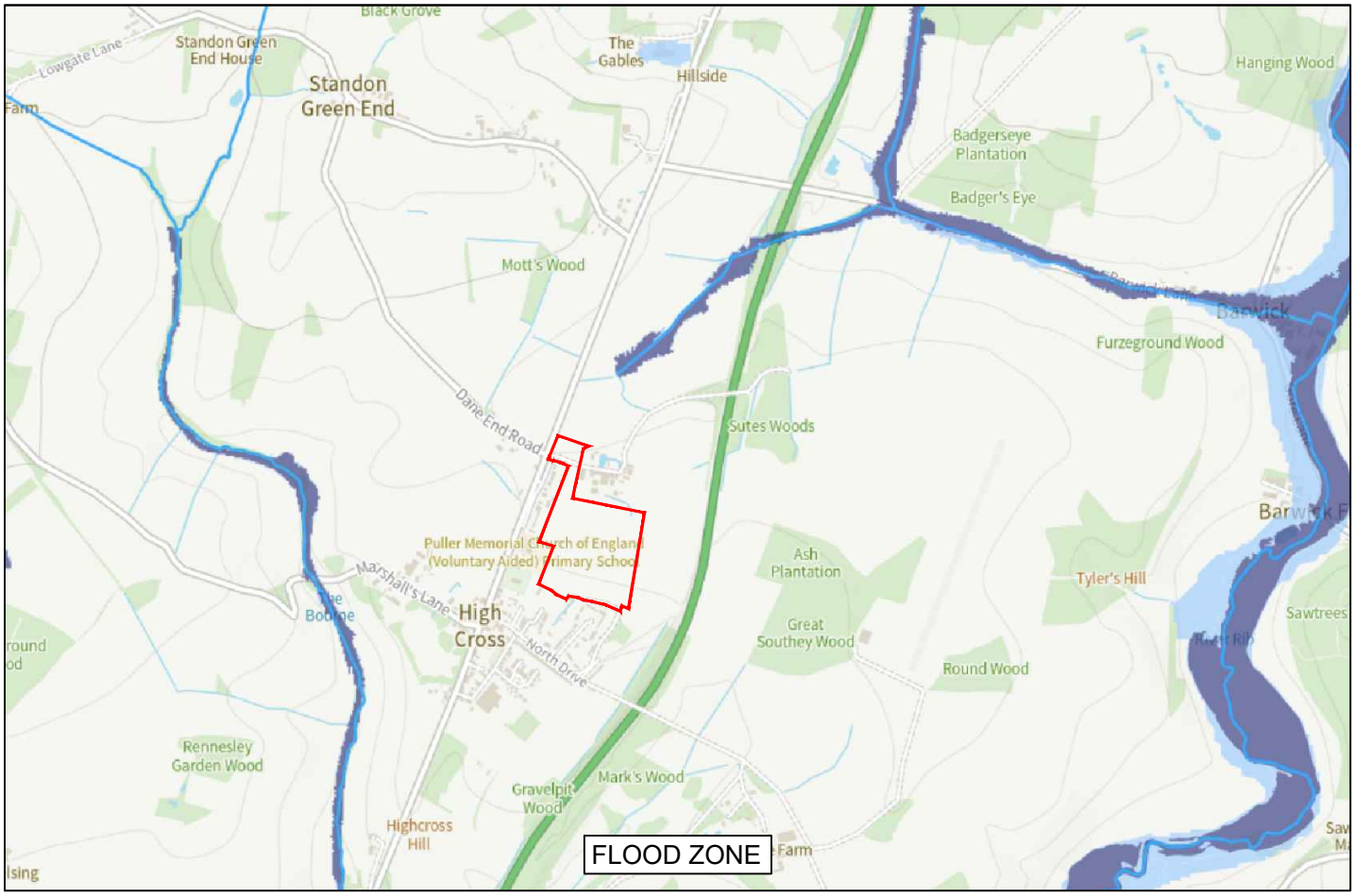
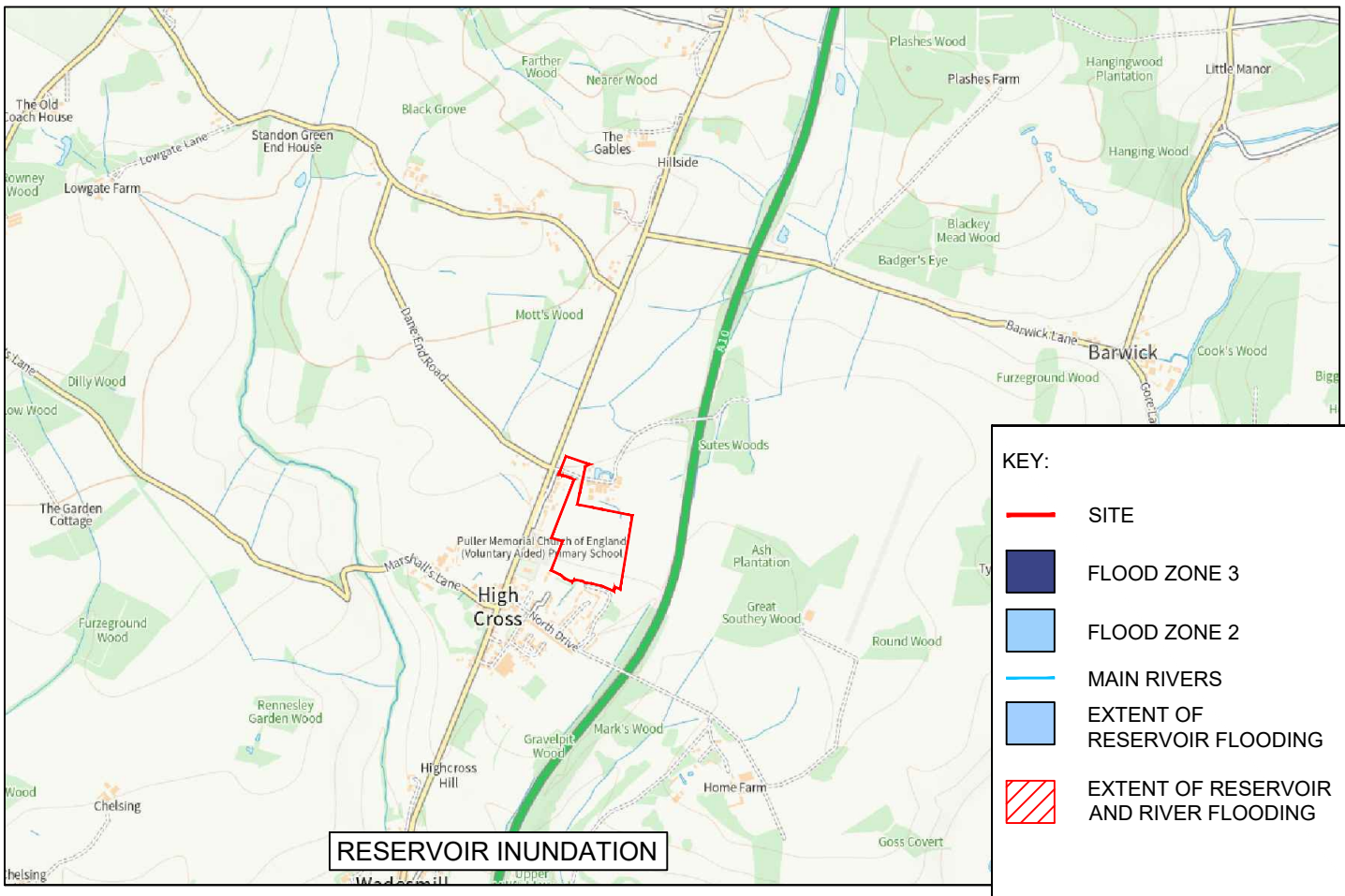
DRAWN BY JTH	FIGURE TITLE: SITE LOCATION PLAN		
SCALE @ A4 SIZE D.N.S.			

CANNON CONSULTING ENGINEERS
Highways, Transport & Infrastructure Planning

M:\U321 Sutes Farm High Cross, HERTS\DRAWINGS\AUTOCAD\CURRENT DRGS\FLOOD MAPS\SITE LOCATION AND GWSPZ





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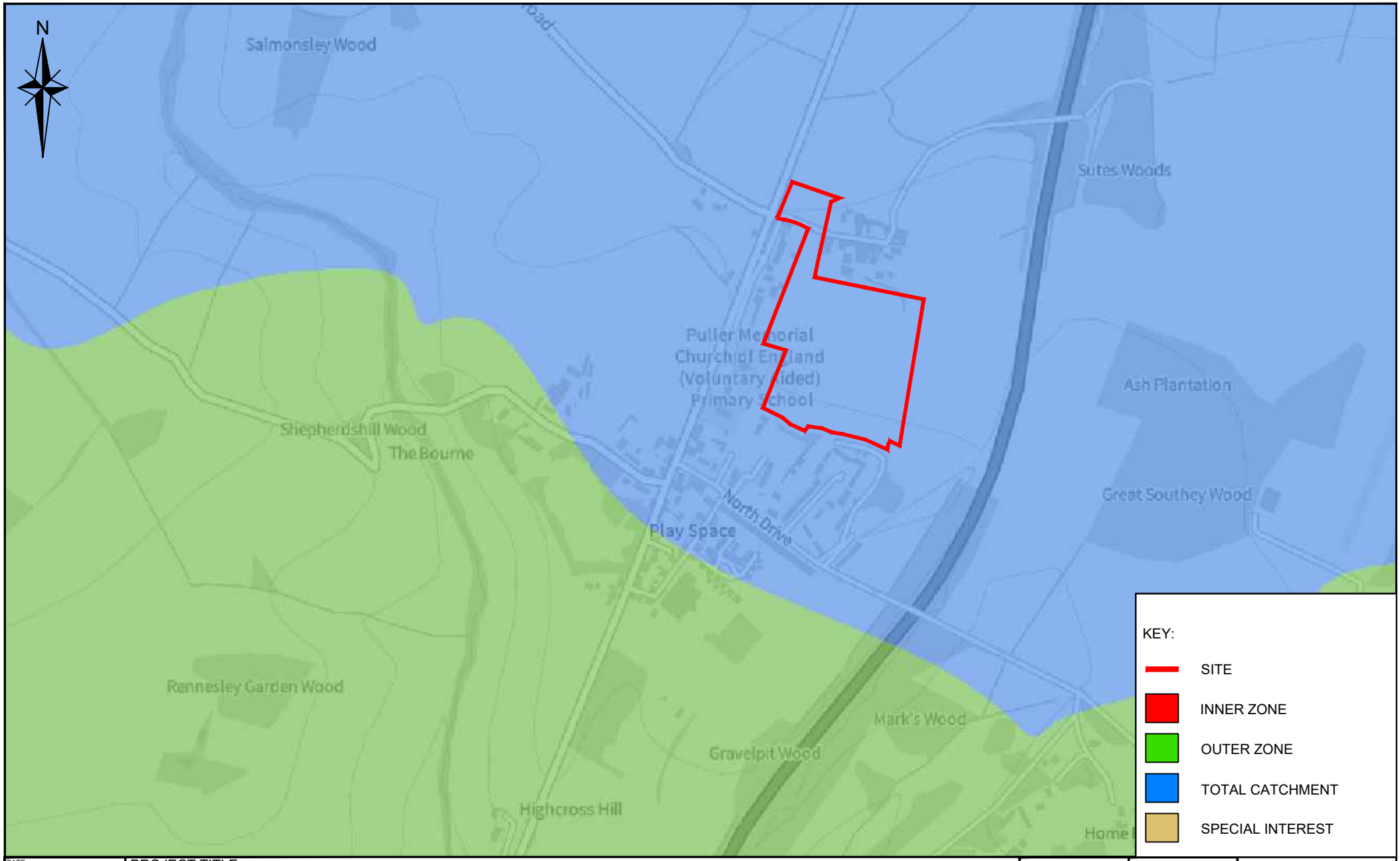

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DRAWN BY JTH	FIGURE TITLE: GROUNDWATER SOURCE PROTECTION ZONES PLAN		
SCALE @ A4 SIZE D.N.S.			

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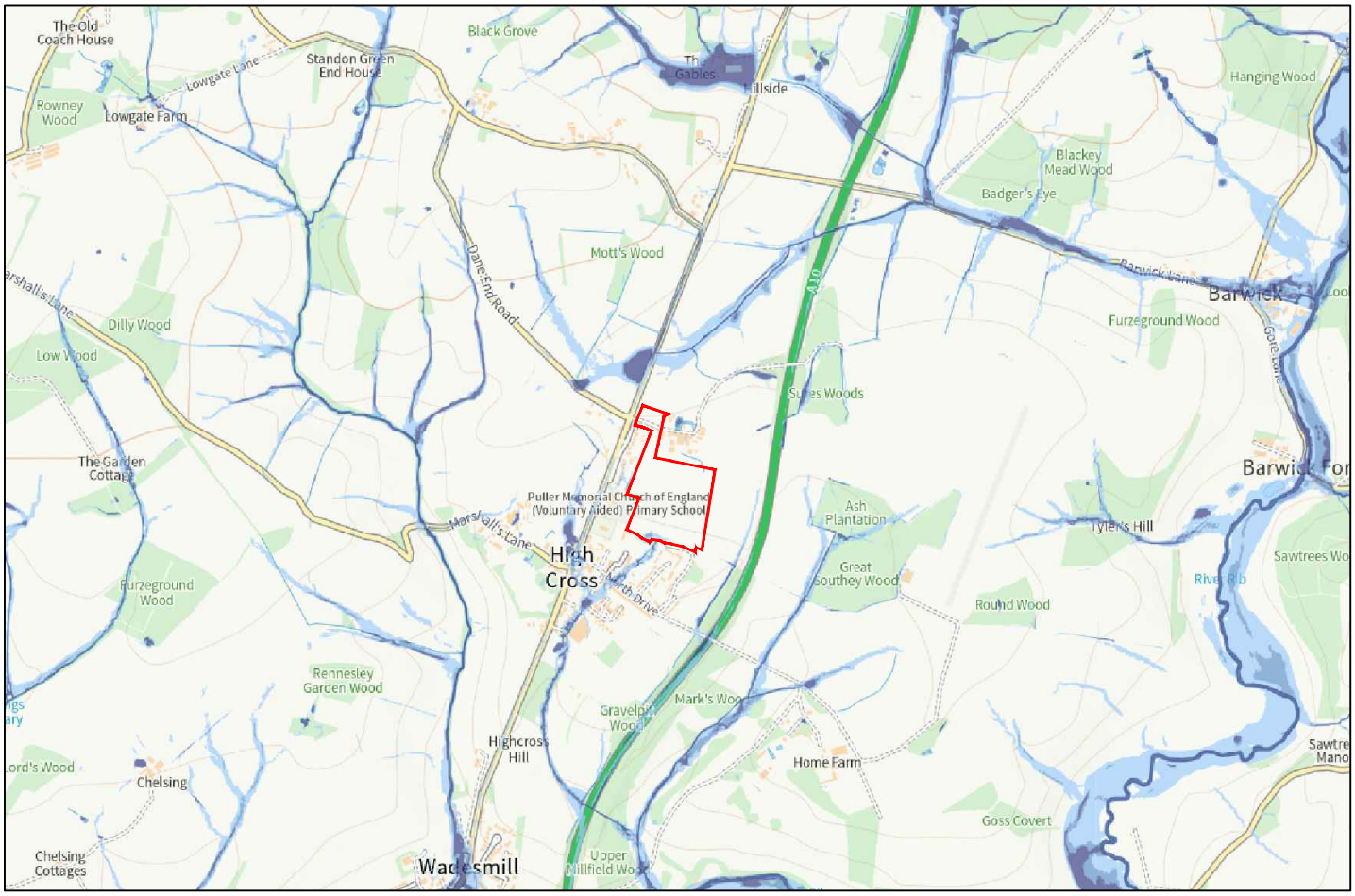

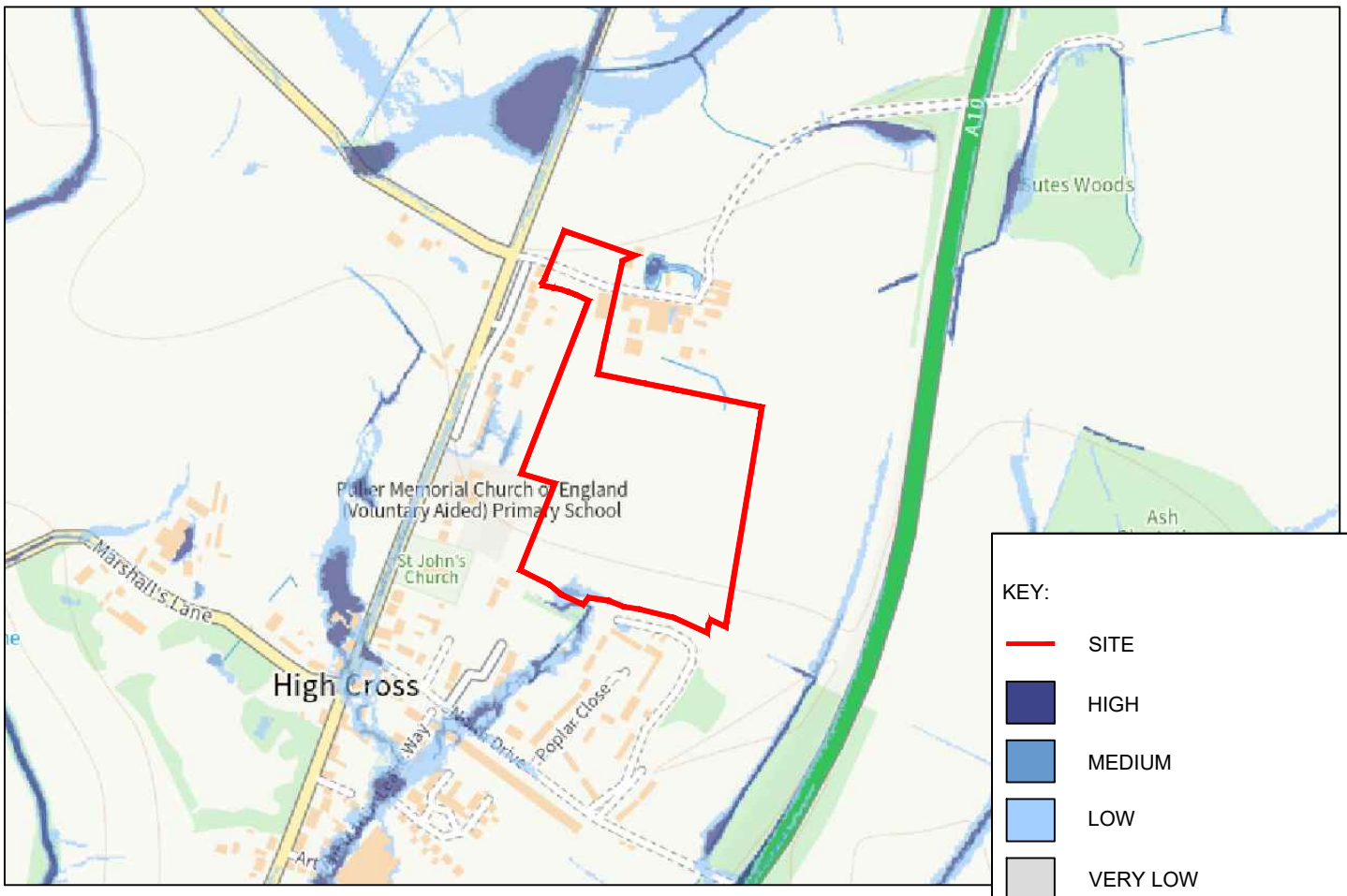

KEY:

- SITE
- HIGH
- MEDIUM
- LOW
- VERY LOW

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DRAWN BY JTH	FIGURE TITLE SURFACE WATER FLOOD MAP		4	U321
SCALE @ A4 SIZE D.N.S.				

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Appendix A – Existing Site

Topographical survey
Thames Water asset plans
BGS Infiltration GeoReport
Site Infiltration testing report

Revision	Number	Type	Detail	Initials	Originator
-	SU-	00	EGL-	BB-	BBS-

STATION TABLE				
Station Name	Easting	Northing	Height (m)	Station Identifier
STNBBS1	536559.116	219241.543	87.012	Mag Nail & Washer
STNBBS2	536518.197	219136.518	87.204	Mag Nail & Washer
STNBBS3	536474.787	219025.811	88.475	Mag Nail & Washer
STNBBS4	536446.972	218947.523	89.295	Mag Nail & Washer

Scale Custom 0 30 61 91 122 152

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
BB	Bottom Bank	FP	Footpath	STAY	Stay
BH	Bore Hole	G	Gully Grate	SV	Sluice Valve
BL	Lt Bollard	GV	Gas Valve	TAC	Tactile Paving
BOL	Bollard	Hedge	Hedge	TB	Top Bank
BIN	Bin	IC	Inspection Cover	TBOX	Telephone Box
BS	Bus Stop	IL	Invert Level	TL	Traffic Light
Bushes	Bush	KO	Kerb Outlet	TOK	Top Of Kerb
BT	BT Box	LP	Lamp Post	TP	Telegraph Pole
CAB	Cabinet	MH	Manhole	TRK	Track
CHNL	Channel	MP	Marker Post	TS	Traffic Sign MH
CL	Centreline	NB	Name Board	VENT	Vent
CONC	Concrete	P/W	Partition Wall	W	Water Cover
COL	Column	PB	Post Box	WL	White Line
DB	Ditch Bottom	PM	Parking Meter	WO	Wash Out
DCHNL	Drainage Channel	PO	Post	YL	Yellow Line
Door	Door	RE	Rodding Eye		
EEB	Electric MH Cover	Ridge	Ridge Level		
EP	Electric Pole	RP	Reflector Post		
ER	Earth Rod	RS	Road Sign		
ET	EP+Transformer	SETTS	Granite Setts		
Feeder	Feeder Pillar	SF	Safety Fence		

FCB	Close Boarded		Control Station
FCL	Chain Link		Column
FHD	Hoarding	X.XX	Floor to Ceiling Height
FHR	Heras Fence	X.XX FC	Floor to False Ceiling Height
FPL	Pallisade		
FPR	Post & Rail		
FPW	Post & Wire		
RAIL	Railings		

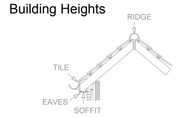
Features

Fences	FCB 1.8h	
Walls	Wall 1.2h	
Hedges	Hedge 1.3h	Average root line shown.
Overhead Line	OHL	Indicative position of cables.

Services

Foul Sewers	0.225ØFW MH	Pipe position and alignment is indicative only.
Storm Sewers	0.375ØSW MH	

Building Heights



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REV	Date	Created By	Comments
-	06.09.23	BB	First Issue

Scale at A1: Custom

Project Number: 2219-4125

Drawing Status

- [X] Existing Topographic Survey
- [ ] As Built Survey
- [ ] For Information

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Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey Overview

BBS- BB- EGL- SU- 00 -
Originator | Initials | Detail | Type | Number | Revision

BBS- BB- EGL- SU- 01

Originator	Initials	Detail	Type	Number	Revision
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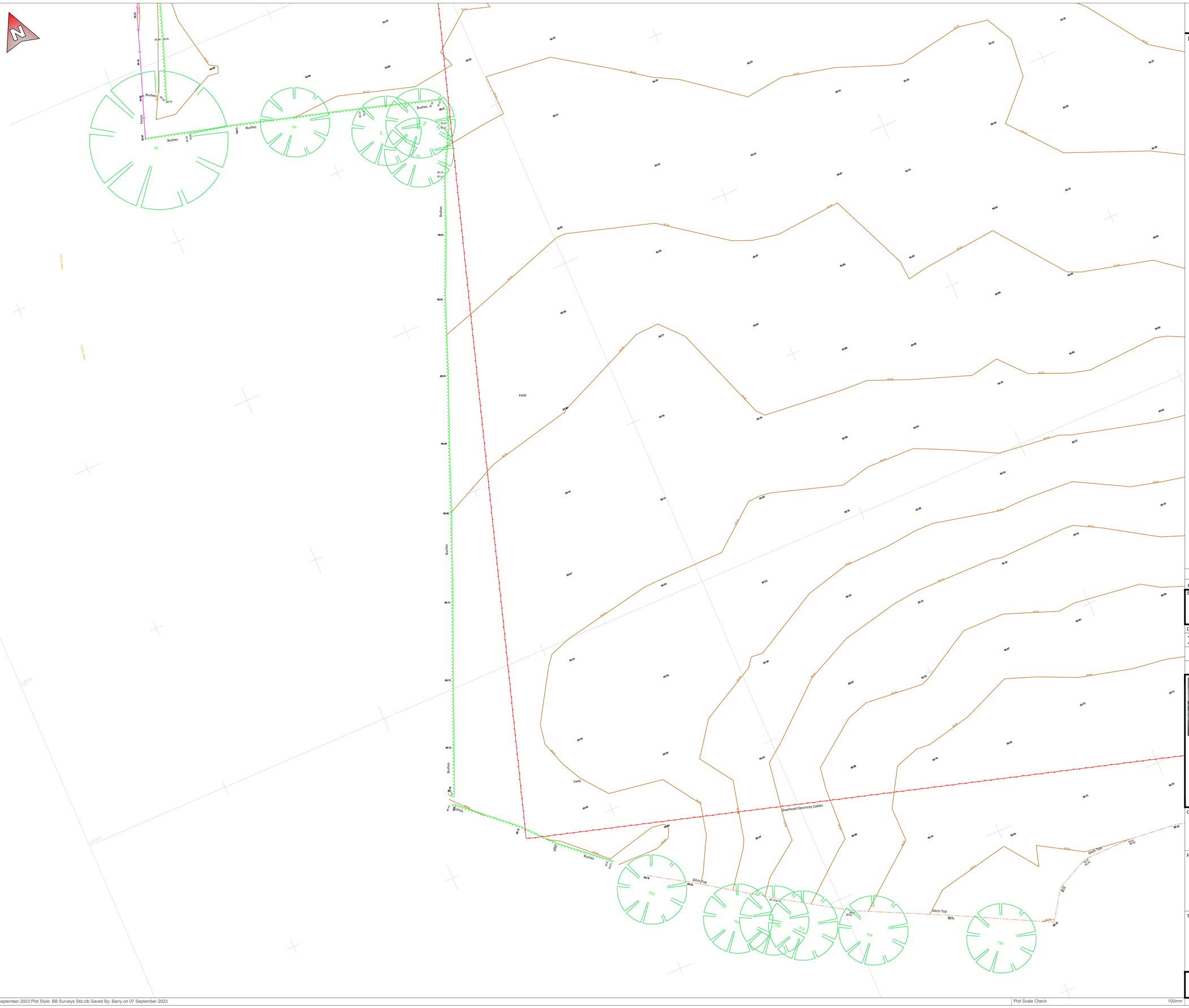

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Notes:

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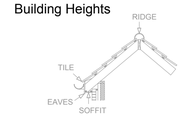

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Scale at A1	Project Number
1:250	2219-4125

Drawing Status

X	Existing Topographic Survey
	As Built Survey
	For Information

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Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 1

BBS- BB- EGL- SU- 01 | -

Originator	Initials	Detail	Type	Number	Revision

BBS- BB- EGL- SU- 02

Originator | Initials | Detail | Type | Number | Revision

-

Scale 1:250 (0, 5, 10, 15, 20, 25)

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
BB	Bottom Bank	FP	Footpath	STAY	Stay
BH	Bore Hole	G	Gully Grate	SV	Sluice Valve
BL	Lt Bollard	GV	Gas Valve	TAC	Tactile Paving
BOL	Bollard	Hedge	Hedge	TB	Top Bank
BIN	Bin	IC	Inspection Cover	TBOX	Telephone Box
BS	Bus Stop	IL	Invert Level	TL	Traffic Light
Bushes	Bush	KO	Kerb Outlet	TOK	Top Of Kerb
BT	BT Box	LP	Lamp Post	TP	Telegraph Pole
CAB	Cabinet	MH	Manhole	TRK	Track
CHNL	Channel	MP	Marker Post	TS	Traffic Sign MH
CL	Centreline	NB	Name Board	VENT	Vent
CONC	Concrete	P/W	Partition Wall	W	Water Cover
COL	Column	PB	Post Box	WL	White Line
DB	Ditch Bottom	PM	Parking Meter	WO	Wash Out
DCHNL	Drainage Channel	PO	Post	YL	Yellow Line
Door	Door	RE	Rodding Eye		
EEB	Electric MH Cover	Ridge	Ridge Level		
EP	Electric Pole	RP	Reflector Post		
ER	Earth Rod	RS	Road Sign		
ET	EP+Transformer	SETTS	Granite Setts		
Feeder	Feeder Pillar	SF	Safety Fence		

FCB	Close Boarded		Control Station
FCL	Chain Link		Column
FHD	Hoarding	X.XX	Floor to Ceiling Height
FHR	Heras Fence	X.XX F/C	Floor to False Ceiling Height
FPL	Pallisade		
FPR	Post & Rail		
FPW	Post & Wire		
RAIL	Railings		

Features

Fences — FCB 1.6h

Walls — Wall 1.2h

Hedges — Hedge 1.3h — Average root line shown.

Overhead Line — OHL — Indicative position of cables.

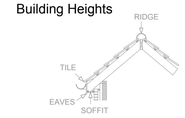
Services

Foul Sewers — 0.225ØFW MH

Storm Sewers — 0.375ØSW MH

Pipe position and alignment is indicative only.

Building Heights



SURVEY CARRIED OUT USING TRIMBLE S6 TOTAL STATION & TRIMBLE R10 GPS.

THE SURVEY HAS BEEN ACCURATELY POSITIONED ON THE ORDNANCE SURVEY NATIONAL GRID SYSTEM USING GPS OBSERVATIONS TO THE OS ACTIVE NETWORK AND AND THE LATEST ORDNANCE SURVEY TRANSFORMATION (OSTN15/OSGM15)

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REV	Date	Created By	Comments
-	06.09.23	BB	First Issue

Scale at A1: 1:250

Project Number: 2219-4125

Drawing Status

- [X] Existing Topographic Survey
- [ ] As Built Survey
- [ ] For Information

BB SURVEYS LTD
1 Chestnut Place, Cringleford
Norwich, Norfolk NR4 7BD
t: 01603 507917
m: 07786 388175
e: barry@bbsurveys.co.uk

Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 2

BBS- BB- EGL- SU- 02 | -
Originator | Initials | Detail | Type | Number | Revision

BBS- BB- EGL- SU- 03

Originator	Initials	Detail	Type	Number	Revision
BBS	BB	EGL	SU	03	-

Scale 1:250 (0, 5, 10, 15, 20, 25)

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
BB	Bottom Bank	FP	Footpath	STAY	Stay
BH	Bore Hole	G	Gully Grate	SV	Sluice Valve
BL	Lt Bollard	GV	Gas Valve	TAC	Tactile Paving
BOL	Bollard	Hedge	Hedge	TB	Top Bank
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Door	Door	RE	Rodding Eye		
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FCB	Close Boarded		Control Station
FCL	Chain Link		Column
FHD	Hoarding	X.XX	Floor to Ceiling Height
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Features

Fences — FCB 1.6h

Walls — Wall 1.2h

Hedges — Hedge 1.3h — Average root line shown.

Overhead Line — OHL — Indicative position of cables.

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Foul Sewers — 0.225ØFW MH

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Pipe position and alignment is indicative only.

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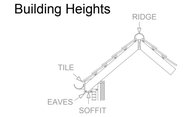

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Scale at A1: 1:250

Project Number: 2219-4125

Drawing Status

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- [ ] As Built Survey
- [ ] For Information

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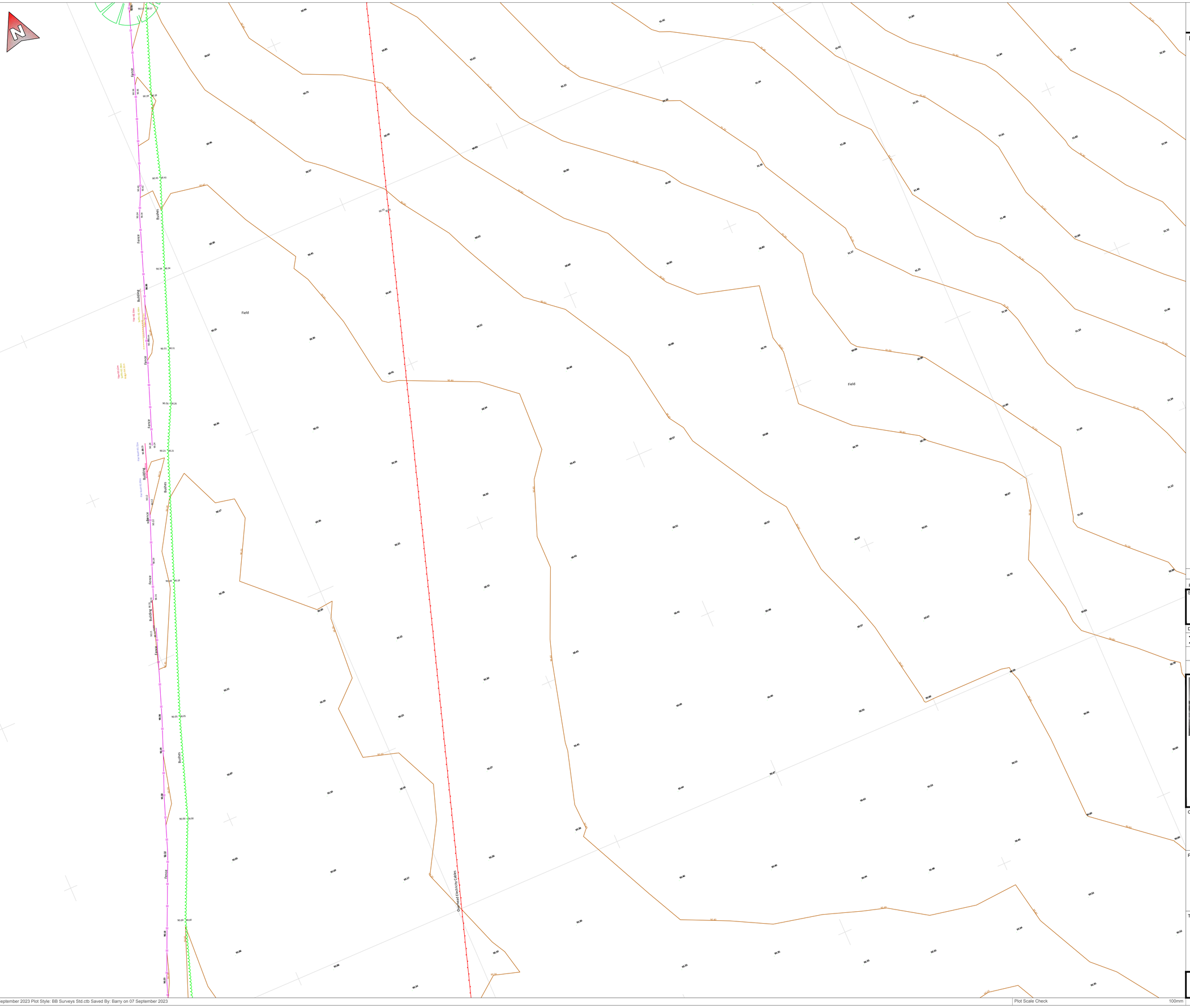
1 Chestnut Place, Cringleford
Norwich, Norfolk NR4 7BD
t: 01603 507917
m: 07786 388175
e: barry@bbsurveys.co.uk

Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 3

BBS- BB- EGL- SU- 03 | Originator | Initials | Detail | Type | Number | Revision -



Note: The Property Of This Drawing Is Vested In BB SURVEYS LTD And Must Not Be Copied Or Reproduced In Any Way Without Their Written Consent

File Path:E:\Workarea\Scott Properties\2219-4125 – Scott Properties - High Cross Ware Additional Topo\AutoCAD\2219-4125-SU01-15 – Scott Properties - High Cross Ware - Update 28_08_23.dwg

BBS- BB- EGL- SU- 04 | - (Originator | Initials | Detail | Type | Number | Revision)

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
BB	Bottom Bank	FP	Footpath	STAY	Stay
BH	Bore Hole	G	Gully Grate	SV	Sluice Valve
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FPL	Pallisade		
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RAIL	Railings		

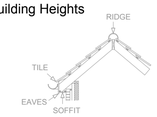
Features

Fences	FCB 1.6h	
Walls	Wall 1.2h	
Hedges	Hedge 1.3h	Average root line shown.
Overhead Line	OHL	Indicative position of cables.

Services

Foul Sewers	0.225Ø FW MH	Pipe position and alignment is indicative only.
Storm Sewers	0.375Ø SW MH	

Building Heights



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Scale at A1: 1:250

Project Number: 2219-4125

Drawing Status

- [X] Existing Topographic Survey
- [ ] As Built Survey
- [ ] For Information

BBS – BB SURVEYS LTD

1 Chestnut Place, Cringleford
Norwich, Norfolk NR4 7BD
t: 01603 507917
m: 07786 388175
e: barry@bbsurveys.co.uk

Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 4

BBS- BB- EGL- SU- 04 | - (Originator | Initials | Detail | Type | Number | Revision)

File Path:E:\Workarea\Scott Properties\2219-4125 – Scott Properties - High Cross Ware Additional Topo\AutoCAD\2219-4125-SU01-15 – Scott Properties - High Cross Ware - Update 28_08_23.dwg

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Notes:

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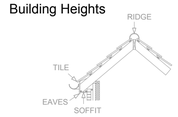

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Title: Existing Ground Level Survey
Sheet 5

BBS- BB- EGL- SU- 05 -
Originator | Initials | Detail | Type | Number | Revision

Scale 1:250 — 0 5 10 15 20 25

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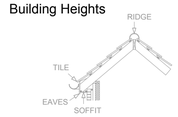

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REV	Date	Created By	Comments
-	06.09.23	BB	First Issue

Scale at A1: 1:250

Project Number: 2219-4125

Drawing Status

- [x] Existing Topographic Survey
- [ ] As Built Survey
- [ ] For Information

BBS BB SURVEYS LTD
1 Chestnut Place, Cringleford
Norwich, Norfolk NR4 7BD
t: 01603 507917
m: 07786 388175
e: barry@bbsurveys.co.uk

Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 6

Originator	Initials	Detail	Type	Number	Revision
BBS	BB	EGL	SU	06	-

File Path: E:\Workarea\Scott Properties\2219-4125 - Scott Properties - High Cross, Ware Additional Topo\AutoCAD\2219-4125-SU01-15 - Scott Properties - High Cross Ware - Update 28_08_23.dwg
Plot Date:07 September 2023 Plot Style: BB Surveys Std.ctb Saved By: Barry on 07 September 2023
Plot Scale Check 100mm
Sheet Size A1 841 x 594

BBS- BB- EGL- SU- 07 | - (Originator | Initials | Detail | Type | Number | Revision)

Scale 1:250 (0, 5, 10, 15, 20, 25)

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
BB	Bottom Bank	FP	Footpath	STAY	Stay
BH	Bore Hole	G	Gully Grate	SV	Sluice Valve
BL	Lt Bollard	GV	Gas Valve	TAC	Tactile Paving
BOL	Bollard	Hedge	Hedge	TB	Top Bank
BIN	Bin	IC	Inspection Cover	TBOX	Telephone Box
BS	Bus Stop	IL	Invert Level	TL	Traffic Light
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CAB	Cabinet	MH	Manhole	TRK	Track
CHNL	Channel	MP	Marker Post	TS	Traffic Sign MH
CL	Centreline	NB	Name Board	VENT	Vent
CONC	Concrete	P/W	Partition Wall	W	Water Cover
COL	Column	PB	Post Box	WL	White Line
DB	Ditch Bottom	PM	Parking Meter	WO	Wash Out
DCHNL	Drainage Channel	PO	Post	YL	Yellow Line
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Feeder	Feeder Pillar	SF	Safety Fence		

FCB	Close Boarded		Control Station
FCL	Chain Link		Column
FHD	Hoarding	X.XX	Floor to Ceiling Height
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FPL	Pallisade		
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RAIL	Railings		

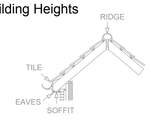
Features

Fences	FCB 1.6h	
Walls	Wall 1.2h	
Hedges	Hedge 1.3h	Average root line shown.
Overhead Line	OHL	Indicative position of cables.

Services

Foul Sewers	0.225Ø FW MH	Pipe position and alignment is indicative only.
Storm Sewers	0.375Ø SW MH	

Building Heights



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-	06.09.23	BB	First Issue

Scale at A1: 1:250

Project Number: 2219-4125

Drawing Status

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Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 7

BBS- BB- EGL- SU- 07 | - (Originator | Initials | Detail | Type | Number | Revision)

Note: The Property Of This Drawing Is Vested In BB SURVEYS LTD And Must Not Be Copied Or Reproduced In Any Way Without Their Written Consent

File Path:E:\Workarea\Scott Properties\2219-4125 - Scott Properties - High Cross Ware - Additional Topo\AutoCAD\2219-4125-SU01-15 - Scott Properties - High Cross Ware - Update 28_08_23.dwg

Plot Date:07 September 2023 Plot Style: BB Surveys Std.ctb Saved By: Barry on 07 September 2023

Plot Scale Check 100mm

Sheet Size A1 841 x 594

Originator	Initials	Detail	Type	Number	Revision
BBS	BB	EGL	SU	08	-

Scale 1:250 (0, 5, 10, 15, 20, 25)

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
BB	Bottom Bank	FP	Footpath	STAY	Stay
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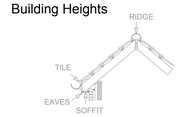

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Scale at A1: 1:250

Project Number: 2219-4125

Drawing Status

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- [ ] As Built Survey
- [ ] For Information

BB SURVEYS LTD

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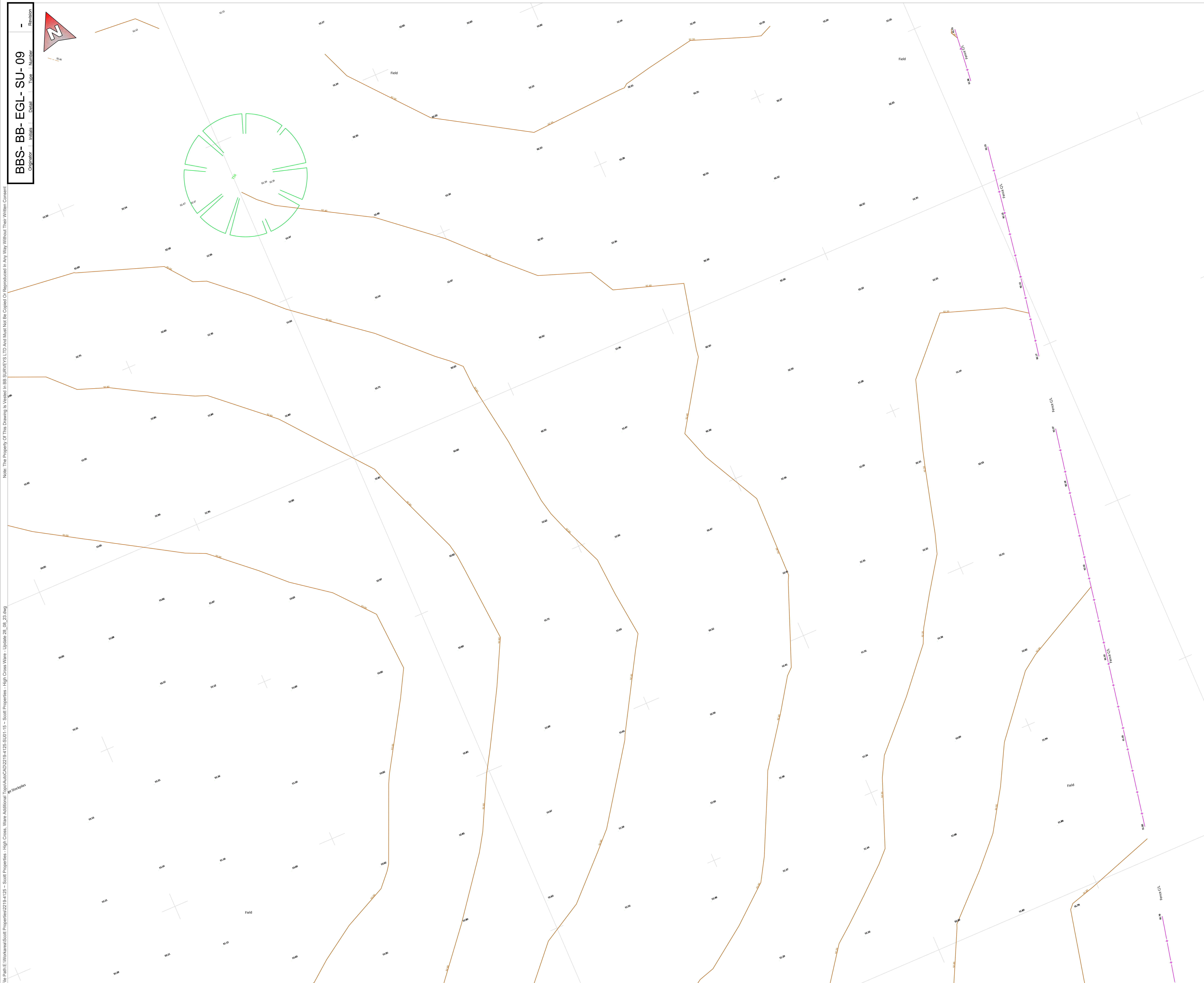
Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 8



Scale 1:250 — 0 5 10 15 20 25

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
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Control Station
Column
X.XX Floor to Ceiling Height
X.XX F/C Floor to False Ceiling Height

Features

Fences — FCB 1.6h
Walls — Wall 1.2h
Hedges — Hedge 1.3h — Average root line shown.
Overhead Line — OHL — Indicative position of cables.

Services

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Storm Sewers

Building Heights

RIDGE
TILE
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SOFFIT

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-	06.09.23	BB	First Issue

Scale at A1	Project Number
1:250	2219-4125

Drawing Status
X Existing Topographic Survey
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For Information

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1 Chestnut Place, Cringleford
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Client
SCOTT PROPERTIES

Project
High Cross Ware
Update 28/08/23

Title
Existing Ground Level Survey
Sheet 9

BBS- BB- EGL- SU- 09 — Revision -
Originator | Initials | Detail | Type | Number | Revision

Sheet Size A1 841 x 594

BBS- BB- EGL- SU- 09 — Originator, Initials, Detail, Type, Number, Revision -

File Path:E:\Workarea\Scott Properties\2219-4125 ~ Scott Properties - High Cross, Ware Additional Topo\AutoCAD\2219-4125-SU01-15 ~ Scott Properties - High Cross Ware - Update 28_08_23.dwg

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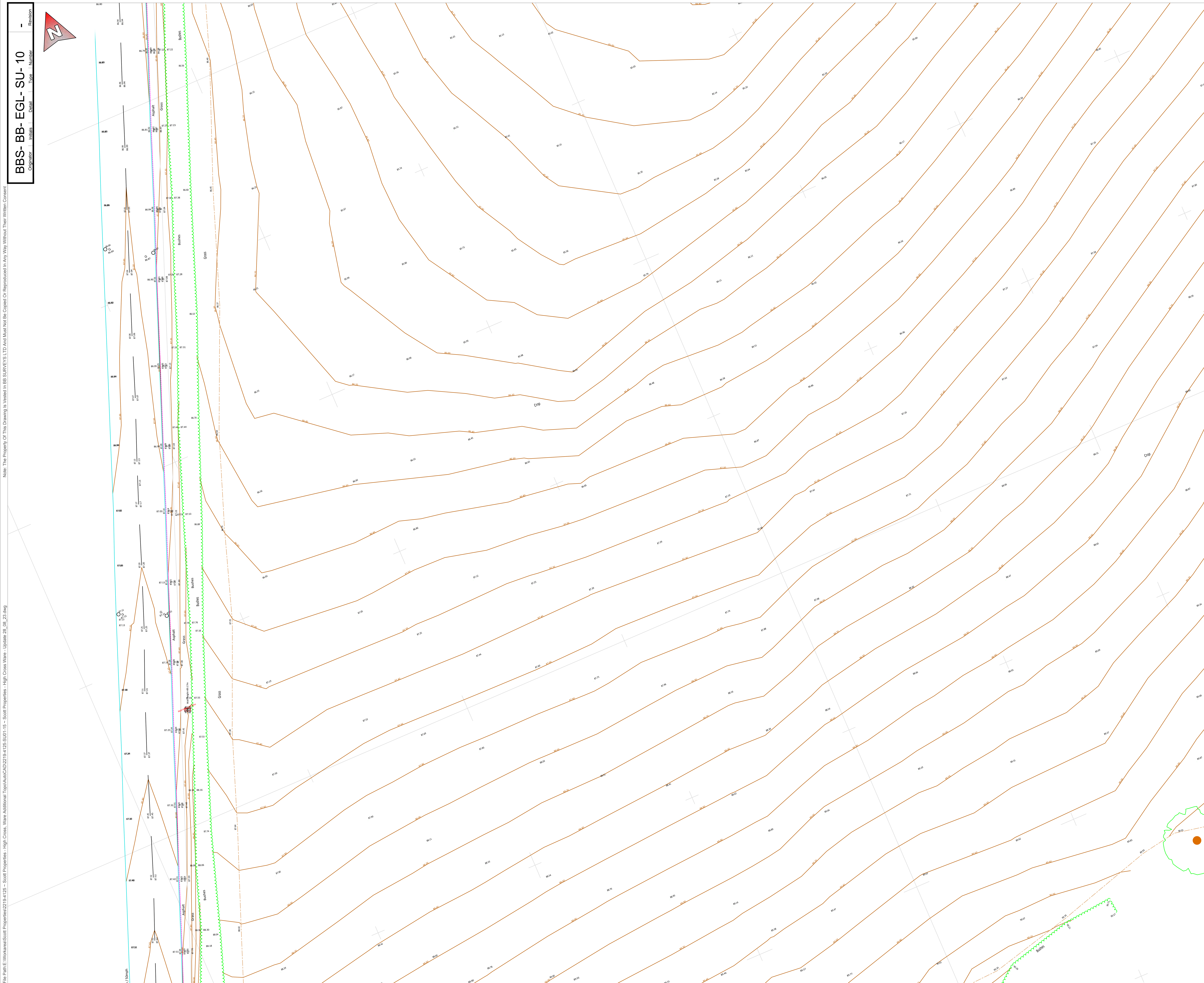

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Client

SCOTT PROPERTIES

Project

High Cross Ware
Update 28/08/23

Title

Existing Ground Level Survey
Sheet 10

BBS- BB- EGL- SU- 10 -
Originator Initials Detail Type Number Revision

BBS- BB- EGL- SU- 10 -
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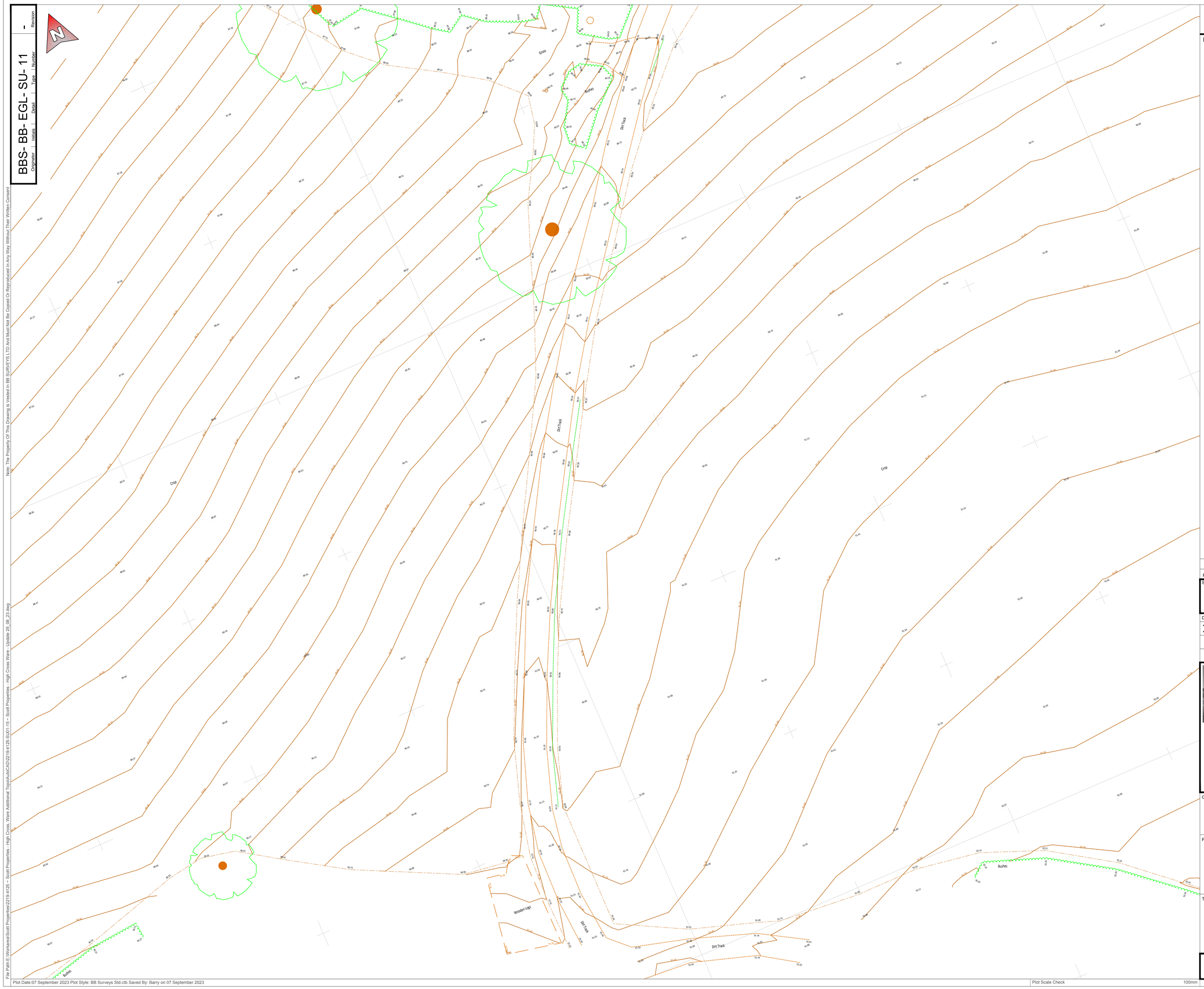

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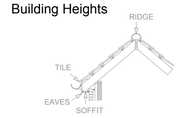

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REV	Date	Created By	Comments
-	06.09.23	BB	First Issue

Scale at A1: 1:250

Project Number: 2219-4125

Drawing Status

- [x] Existing Topographic Survey
- [ ] As Built Survey
- [ ] For Information

BB SURVEYS LTD

1 Chestnut Place, Cringleford
Norwich, Norfolk NR4 7BD
t: 01603 507917
m: 07786 388175
e: barry@bbsurveys.co.uk

Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 11

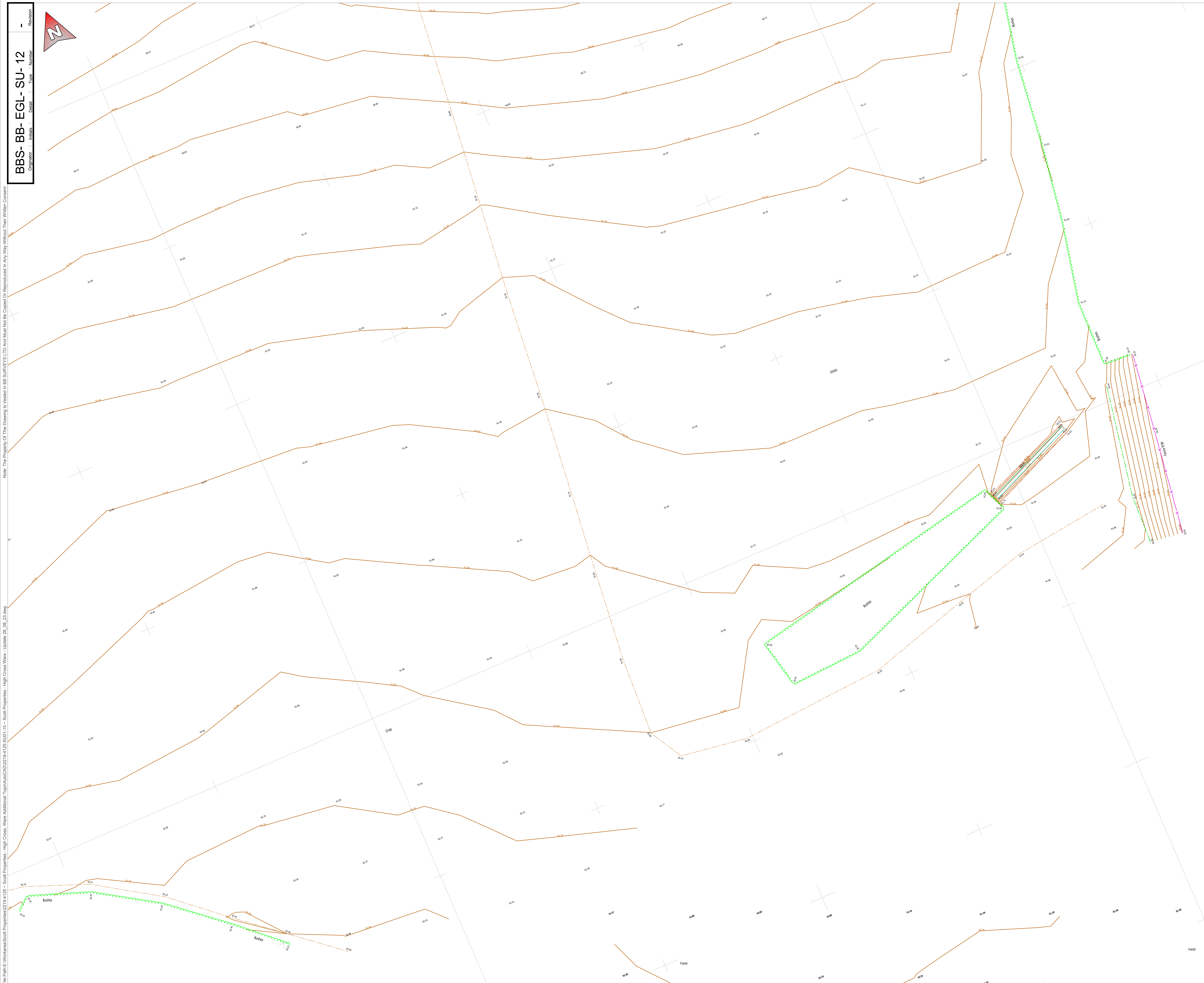
BBS- BB- EGL- SU- 11 — Originator | Initials | Detail | Type | Number — Revision: -

Sheet Size A1 841 x 594

Plot Scale Check 100mm

File Path: E:\Workarea\Scott Properties\2219-4125 - Scott Properties - High Cross, Ware Additional Topo\AutoCAD\2219-4125-SU01-15 - Scott Properties - High Cross Ware - Update 28_08_23.dwg

Plot Date:07 September 2023 Plot Style: BB Surveys Std.ctb Saved By: Barry on 07 September 2023



Scale 1:250 (0, 5, 10, 15, 20, 25)

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
BB	Bottom Bank	FP	Footpath	STAY	Stay
BH	Bore Hole	G	Gully Grate	SV	Sluice Valve
BL	Lit Bollard	GV	Gas Valve	TAC	Tactile Paving
BOL	Bollard	Hedge	Hedge	TB	Top Bank
BIN	Bin	IC	Inspection Cover	TBOX	Telephone Box
BS	Bus Stop	IL	Invert Level	TL	Traffic Light
Bushes	Bush	KO	Kerb Outlet	TOK	Top Of Kerb
BT	BT Box	LP	Lamp Post	TP	Telegraph Pole
CAB	Cabinet	MH	Manhole	TRK	Track
CHNL	Channel	MP	Marker Post	TS	Traffic Sign MH
CL	Centreline	NB	Name Board	VENT	Vent
CONC	Concrete	P/W	Partition Wall	W	Water Cover
COL	Column	PB	Post Box	WL	White Line
DB	Ditch Bottom	PM	Parking Meter	WO	Wash Out
DCHNL	Drainage Channel	PO	Post	YL	Yellow Line
Door	Door	RE	Rodding Eye		
EEB	Electric MH Cover	Ridge	Ridge Level		
EP	Electric Pole	RP	Reflector Post		
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Feeder	Feeder Pillar	SF	Safety Fence		

FCB	Close Boarded
FCL	Chain Link
FHD	Hoarding
FHR	Heras Fence
FPL	Pallisade
FPR	Post & Rail
FPW	Post & Wire
RAIL	Railings

Control Station
Column
X.XX Floor to Ceiling Height
X.XX F/C Floor to False Ceiling Height

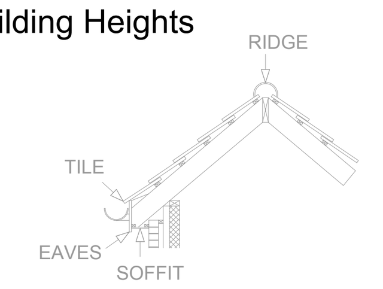
Features

Fences — FCB 1.6h
Walls — Wall 1.2h
Hedges — Hedge 1.3h — Average root line shown.
Overhead Line — OHL — Indicative position of cables.

Services

Foul Sewers
Storm Sewers
Pipe position and alignment is indicative only.

Building Heights



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-	06.09.23	BB	First Issue

Scale at A1	Project Number
1:250	2219-4125

Drawing Status

- X Existing Topographic Survey
- As Built Survey
- For Information

BBS BB SURVEYS LTD
1 Chestnut Place, Cringleford
Norwich, Norfolk NR4 7BD
t: 01603 507917
m: 07786 388175
e: barry@bbsurveys.co.uk

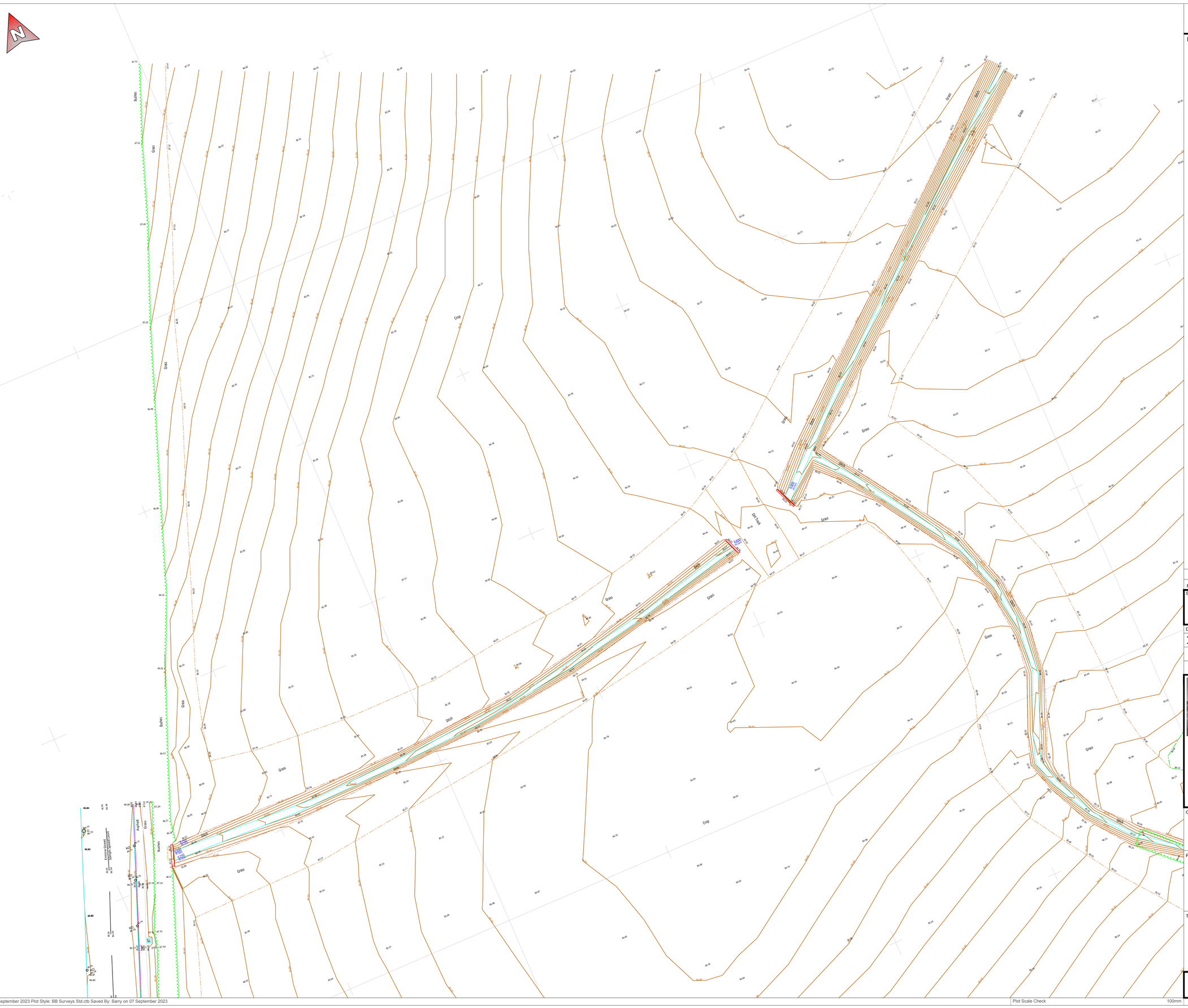
Client
SCOTT PROPERTIES

Project
High Cross Ware
Update 28/08/23

Title
Existing Ground Level Survey Sheet 12

BBS- BB- EGL- SU- 12 | Revision: -
Originator | Initials | Detail | Type | Number

File Path:E:\Workarea\Scott Properties\2219-4125 - Scott Properties - High Cross, Ware Additional Topo\AutoCAD\2219-4125-SU01-15 ~ Scott Properties - High Cross Ware - Update 28_08_23.dwg


Scale 1:250
0 5 10 15 20 25
Notes:
AV Air Valve
BB Bottom Bank
BH Bore Hole
BL Lt Bollard
BOL Bollard
BIN Bin
BS Bus Stop
Bushes Bush
BT BT Box
CAB Cabinet
CHNL Channel
CL Centreline
CONC Concrete
COL Column
DB Ditch Bottom
DCHNL Drainage Channel
Door Door
EEB Electric MH Cover
EP Electric Pole
ER Earth Rod
ET EP+Transformer
Feeder Feeder Pillar
FH Fire Hydrant
FP Footpath
G Gully Grate
GV Gas Valve
Hedge Hedge
IC Inspection Cover
IL Invert Level
KO Kerb Outlet
LP Lamp Post
MH Manhole
MP Marker Post
NB Name Board
P/W Partition Wall
PB Post Box
PM Parking Meter
PO Post
RE Rodding Eye
Ridge Ridge Level
RP Reflector Post
RS Road Sign
SETTS Granite Setts
SF Safety Fence
SP Sign Post
STAY Stay
SV Sluice Valve
TAC Tactile Paving
TB Top Bank
TBOX Telephone Box
TL Traffic Light
TOK Top Of Kerb
TP Telegraph Pole
TRK Track
TS Traffic Sign MH
VENT Vent
W Water Cover
WL White Line
WO Wash Out
YL Yellow Line
FCB Close Boarded
FCL Chain Link
FHD Hoarding
FHR Heras Fence
FPL Pallisade
FPR Post & Rail
FPW Post & Wire
RAIL Railings
Control Station
Column
X.XX Floor to Ceiling Height
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Features
Fences
FCB 1.8h
Walls
Wall 1.2h
Hedges
Hedge 1.3h
Average root line shown.
Overhead Line
OHL
Indicative position of cables.
Services
Foul Sewers
0.225ØFW MH
Storm Sewers
0.375ØSW MH
Pipe position and alignment is indicative only.
Building Heights
RIDGE
TILE
EAVES
SOFFIT
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- 06.09.23 BB First Issue
REV Date Created By Comments
Scale at A1 1:250
Project Number 2219-4125
Drawing Status
Existing Topographic Survey
As Built Survey
For Information
BBS BB SURVEYS LTD
1 Chestnut Place, Cringleford
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t: 01603 507917
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Client
SCOTT PROPERTIES
Project
High Cross Ware
Update 28/08/23
Title
Existing Ground Level Survey
Sheet 13
BBS- BB- EGL- SU- 13 -
Originator Initials Detail Type Number Revision
Plot Scale Check 100mm
Sheet Size A1 841 x 594
Plot Date:07 September 2023 Plot Style: BB Surveys Std.ctb Saved By: Barry on 07 September 2023
File Path: E:\Workarea\Scott Properties\2219-4125 - Scott Properties - High Cross, Ware Additional Topo\AutoCAD\2219-4125-SU01-15 - Scott Properties - High Cross Ware - Update 28_08_23.dwg
Note: The Property Of This Drawing Is Vested In BB SURVEYS LTD And Must Not Be Copied Or Reproduced In Any Way Without Their Written Consent

File Path:E:\Workarea\Scott Properties\2219-4125 – Scott Properties - High Cross, Ware Additional Topo\AutoCAD\21.04.125-SU01-15 - Scott Properties - High Cross Ware - Update 28_08_23.dwg

Originator	Initials	Detail	Type	Number	Revision
BBS-	BB-	EGL-	SU-	14	-

Scale 1:250 (0, 5, 10, 15, 20, 25)

Notes:

AV	Air Valve	FH	Fire Hydrant	SP	Sign Post
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FCB	Close Boarded		Control Station
FCL	Chain Link		Column
FHD	Hoarding	X.XX	Floor to Ceiling Height
FHR	Heras Fence	X.XX FC	Floor to False Ceiling Height
FPL	Pallisade		
FPR	Post & Rail		
FPW	Post & Wire		
RAIL	Railings		

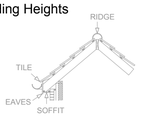
Features

Fences	FCB 1.8h	
Walls	Wall 1.2h	
Hedges	Hedge 1.3h	Average root line shown.
Overhead Line	OHL	Indicative position of cables.

Services

Foul Sewers	0.225Ø FW MH	Pipe position and alignment is indicative only.
Storm Sewers	0.375Ø SW MH	

Building Heights



SURVEY CARRIED OUT USING TRIMBLE S6 TOTAL STATION & TRIMBLE R10 GPS.

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Scale at A1	Project Number
1:250	2219-4125

Drawing Status

X	Existing Topographic Survey
	As Built Survey
	For Information

BBS
BB SURVEYS LTD
1 Chestnut Place, Cringleford
Norwich, Norfolk NR4 7BD
t: 01603 507917
m: 07786 388175
e: barry@bbsurveys.co.uk

Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 14

Originator	Initials	Detail	Type	Number	Revision
BBS-	BB-	EGL-	SU-	14	-

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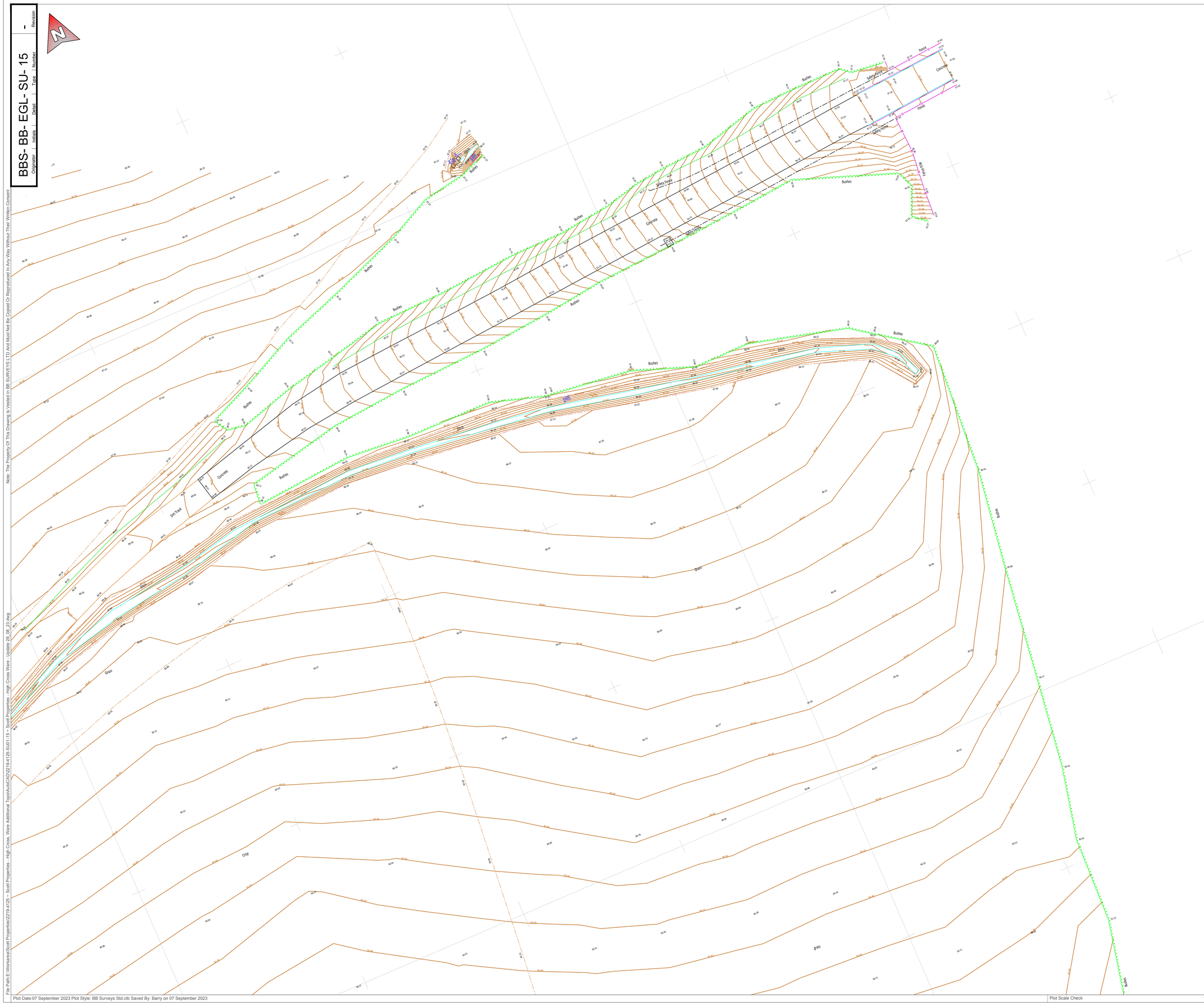

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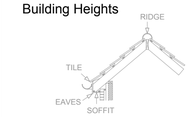

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Scale at A1: 1:250

Project Number: 2219-4125

Drawing Status

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- [ ] As Built Survey
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BB SURVEYS LTD
1 Chestnut Place, Cringleford
Norwich, Norfolk NR4 7BD
t: 01603 507917
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Client: SCOTT PROPERTIES

Project: High Cross Ware
Update 28/08/23

Title: Existing Ground Level Survey
Sheet 15

BBS- BB- EGL- SU- 15 | Originator | Initials | Detail | Type | Number | - Revision

Plot Date:07 September 2023 Plot Style: BB Surveys Std.ctb Saved By: Barry on 07 September 2023
Plot Scale Check 100mm
Sheet Size A1 841 x 594

Asset location search

Property Searches

Cannon Consulting Engineers
Cambridge House
Lanwades Business Park
NEWMARKET
CB8 7PN

Search address supplied High Road
Ware
Hertfordshire
SG11 1BE

Your reference JA-M/U321/TW2018.01.18

Our reference ALS/ALS Standard/2018_3723604

Search date 18 January 2018

Keeping you up-to-date

Knowledge of features below the surface is essential in every development. The benefits of this not only include ensuring due diligence and avoiding risk, but also being able to ascertain the feasibility for any commercial or residential project.

An asset location search provides information on the location of known Thames Water clean and/or wastewater assets, including details of pipe sizes, direction of flow and depth. Please note that information on cover and invert levels will only be provided where the data is available.

Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13

searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk

0845 070 9148

Asset location search

Property Searches

Search address supplied: High Road, Ware, Hertfordshire, SG11 1BE

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This searchprovides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk
Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

The following quartiles have been printed as they fall within Thames' sewerage area:

TL3618NE
TL3618NW

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

The following quartiles have not been printed as they contain no assets:

TL3619SE
TL3619SW

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an ‘as constructed’ record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Following examination of our statutory maps, Thames Water has been unable to find

any plans of water mains within this area. If you require a connection to the public water supply system, please write to:

New Connections / Diversions
Thames Water
Network Services Business Centre
Brentford
Middlesex
TW8 0EE

Tel: 0845 850 2777
Fax: 0207 713 3858
Email: developer.services@thameswater.co.uk

The following quartiles have not been printed as they are out of Thames' water catchment area. For details of the assets requested please contact the water company indicated below:

TL3618NE	Affinity Water
TL3618NW	Affinity Water
TL3619SE	Affinity Water
TL3619SW	Affinity Water

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ

Tel: 0845 7823333

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3723604

TL3618NE

The width of the displayed area is 500m and the centre of the map is located at OS coordinates 536750,218750

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

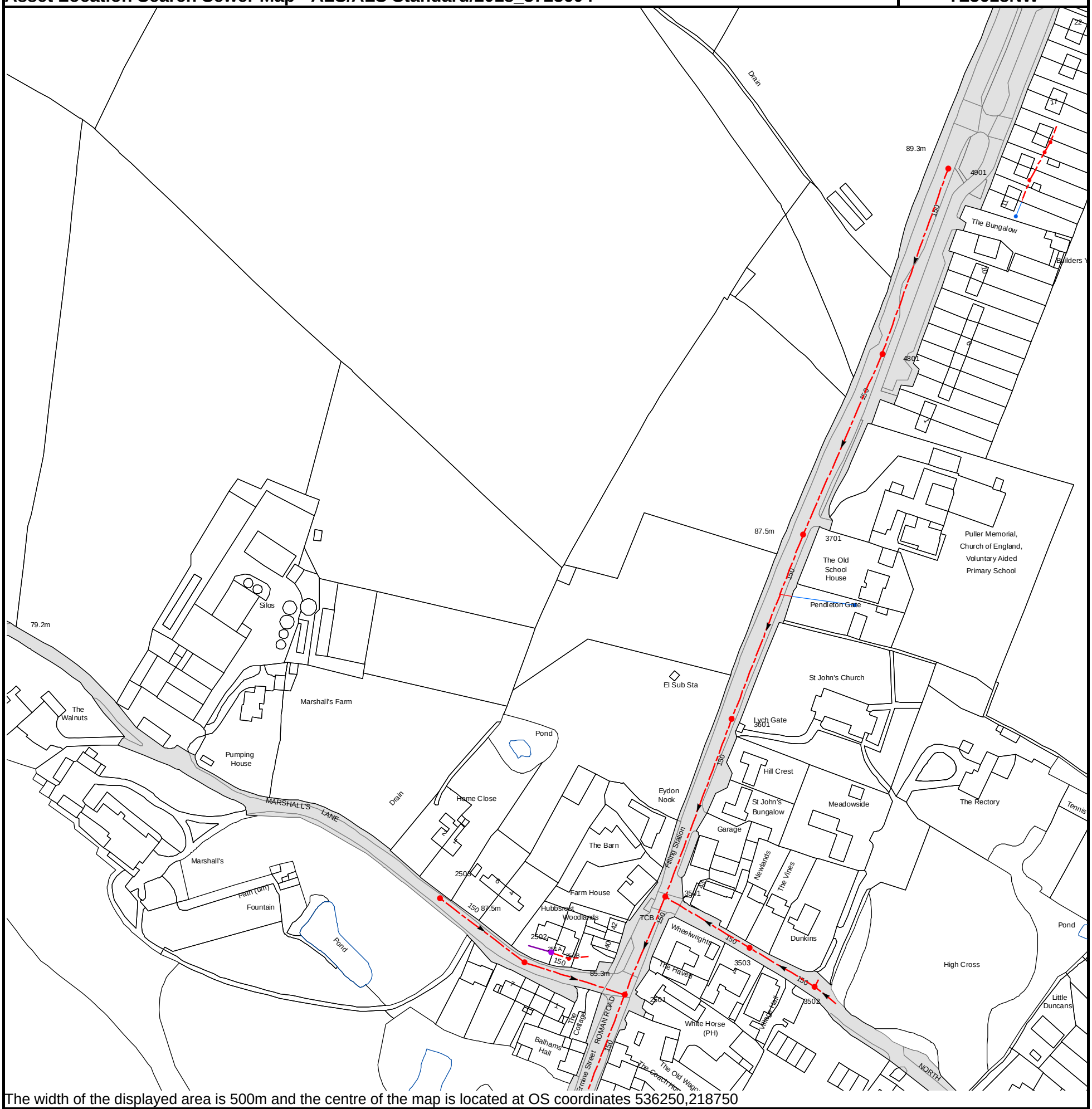
NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
551C	n/a	n/a
551B	n/a	n/a
551A	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search Sewer Map - ALS/ALS Standard/2018_3723604

TL3618NW



The width of the displayed area is 500m and the centre of the map is located at OS coordinates 536250,218750

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
371A	n/a	n/a
491A	n/a	n/a
491B	n/a	n/a
491C	n/a	n/a
491D	n/a	n/a
2501	85.663	82.463
3502	86.417	83.857
2502	86.68	83.23
251B	n/a	n/a
251A	n/a	n/a
3503	85.934	83.534
2503	87.59	83.54
3501	85.72	82.7
3601	86.59	n/a
3701	87.76	n/a
4801	88.8	n/a
4901	89.31	86.24

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the sanction of the Controller of H.M Stationary Office License Number 10019345

ALS/ALS Standard/2018_3723604

0 45 90 180 270 360
Meters

Scale:	1:7159
Width:	2000m
Printed By:	Vkumar1
Print Date:	18/01/2018
Map Centre:	536590,218808
Grid Reference:	TL3618NE

Comments:

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Trunk Surface Water
- Trunk Foul
- Storm Relief
- Trunk Combined
- Vent Pipe
- Bio-solids (Sludge)
- Proposed Thames Surface Water Sewer
- Proposed Thames Water Foul Sewer
- Gallery
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Sludge Rising Main
- Proposed Thames Water Rising Main
- Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Dam Chase
- Fitting
- Meter
- Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Control Valve
- Drop Pipe
- Ancillary
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Outfall
- Undefined End
- Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

- Public/Private Pumping Station
- Change of characteristic indicator (C.O.C.I.)
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Operational Site
- Chamber
- Tunnel
- Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

- Foul Sewer
- Surface Water Sewer
- Combined Sewer
- Gulley
- Culverted Watercourse
- Proposed
- Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL`s terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	**BACS Payment**	**Telephone Banking**	**Cheque**
Call **0845 070 9148** quoting your invoice number starting CBA or ADS / OSS	Account number **90478703** Sort code **60-00-01** A remittance advice must be sent to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW.** or email **ps.billing@thameswater.co.uk**	By calling your bank and quoting: Account number **90478703** Sort code **60-00-01** and your invoice number	Made payable to '**Thames Water Utilities Ltd**' Write your Thames Water account number on the back. Send to: **Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW** or by DX to **151280 Slough 13**

Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

GeoReports

J H
Cambridge House
CB8 7PN

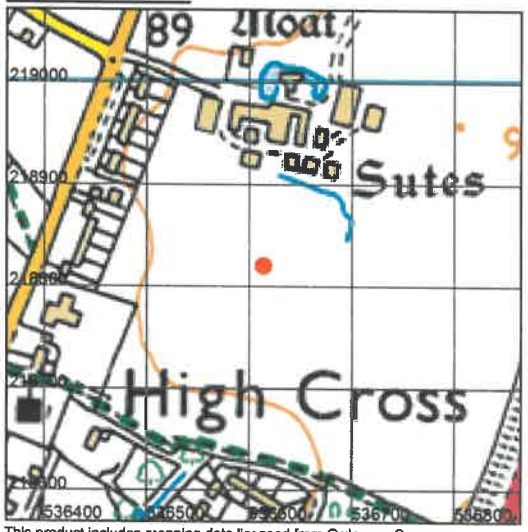
Infiltration SuDS GeoReport:

This report provides information on the suitability of the subsurface for the installation of infiltration sustainable drainage systems (SuDS). It provides information on the properties of the subsurface with respect to significant constraints, drainage, ground stability and groundwater quality protection.

Report Id: *GR_216718/1*

Client reference: U321 BGS

Search location



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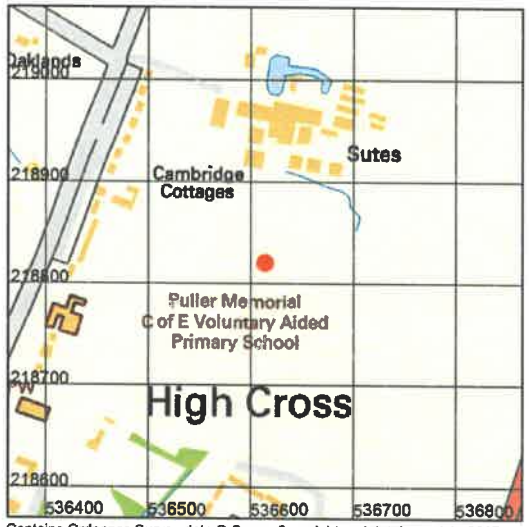
Scale: 1:5 000 (1cm = 50 m)

Point centred at:
536614,218820

Search location indicated in red



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OS Street View: Scale: 1:5 000 (1cm = 50 m)

Date: 25 August 2017

Assessment for an infiltration sustainable drainage system

Introduction

Sustainable drainage systems (SuDS) are drainage solutions that manage the volume and quality of surface water close to where it falls as rain. They aim to reduce flow rates to rivers, increase local water storage capacity and reduce the transport of pollutants to the water environment. There are four main types of SuDS, which are often designed to be used in sequence. They comprise:

- **source control:** systems that control the rate of runoff
- **pre-treatment:** systems that remove sediments and pollutants
- **retention:** systems that delay the discharge of water by providing surface storage
- **infiltration:** systems that mimic natural recharge to the ground.

This report focuses on infiltration SuDS. It provides subsurface information on the properties of the ground with respect to drainage, ground stability and groundwater quality protection. It is intended principally for those involved in the preliminary assessment of the suitability of the ground for infiltration SuDS, and those involved in assessing proposals from others for sustainable drainage, but it may also be useful to help house-holders judge whether or not further professional advice should be sought. If in doubt, users should consult a suitably-qualified professional about the results in this report before making any decisions based upon it.

This GeoReport is structured in two parts:

- **Part 1. Summary data.**

  Comprises three maps that summarise the data contained within Part 2.

- **Part 2. Detailed data.**

  Comprises a further 24 maps in four thematic sections:

  - **Very significant constraints.** Maps highlight areas where infiltration may result in adverse impacts due to factors including: ground instability (soluble rocks, non-coal shallow mining and landslide hazards); persistent shallow groundwater, or the presence of made ground, which may represent a ground stability or contamination hazard.
  - **Drainage potential.** Maps indicate the drainage potential of the ground, by considering subsurface permeability, depth to groundwater and the presence of floodplain deposits.
  - **Ground stability.** Maps indicate the presence of hazards that have the potential to cause ground instability resulting in damage to some buildings and structures, if water is infiltrated to the ground.
  - **Groundwater protection.** Maps provide key indicators to help determine whether the groundwater may be susceptible to deterioration in quality as a result of infiltration.

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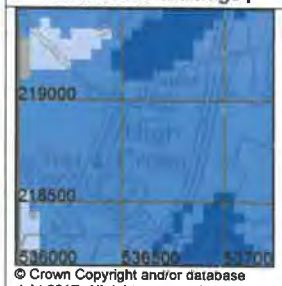
This report considers the suitability of the subsurface for the installation of infiltration SuDS, such as soakaways, infiltration basins or permeable pavements. It provides subsurface data to indicate whether, and which type of infiltration system may be appropriate. It does not state that infiltration SuDS are, or are not, appropriate as this is highly dependent on the design of the individual system. This report therefore describes the subsurface conditions at the site, allowing the reader to determine the suitability of the site for infiltration SuDS.

The map and text data in this report is similar to that provided in the '*Infiltration SuDS Map: Detailed*' national map product. For further information about the data, consult the '*User Guide for the Infiltration SuDS Map: Detailed*', available from http://nora.nerc.ac.uk/16618/.

PART 1: SUMMARY DATA

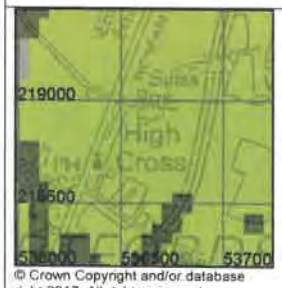
This section provides a summary of the data on the following pages.

In terms of the drainage potential, is the ground suitable for infiltration SuDS?



- Highly compatible for infiltration SuDS.
  The subsurface is likely to be suitable for free-draining infiltration SuDS.
- Probably compatible for infiltration SuDS.
  The subsurface is probably suitable although the design may be influenced by the ground conditions.
- Opportunities for bespoke infiltration SuDS.
  The subsurface is potentially suitable although the design will be influenced by the ground conditions.
- Very significant constraints are indicated.
  There is a very significant potential for one or more hazards associated with infiltration.

Is ground instability likely to be a problem?



- Increased infiltration is very unlikely to result in ground instability.
- Ground instability problems may be present or anticipated, but increased infiltration is unlikely to result in ground instability
- Ground instability problems are probably present. Increased infiltration may result in ground instability.
- There is a very significant potential for one or more geohazards associated with infiltration.

Is the groundwater susceptible to deterioration in quality?

- The groundwater is not expected to be especially vulnerable to contamination.
- The groundwater may be vulnerable to contamination.
- The groundwater is likely to be vulnerable to contaminants.
- Made ground is present at the surface. Infiltration may increase the possibility of remobilising pollutants.

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PART 2: DETAILED DATA

This section provides further information about the properties of the ground and will help assess the suitability of the ground for infiltration SuDS.

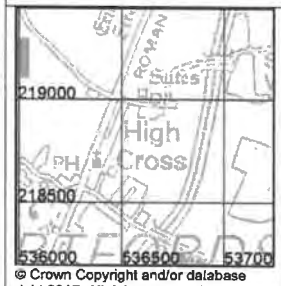
Section 1. Very significant constraints

Where maps are overlain by grey polygons, geological or hydrogeological hazards may exist that could be made worse by infiltration. The following hazards are considered:

- soluble rocks
- landslides
- shallow mining
- shallow groundwater
- made ground

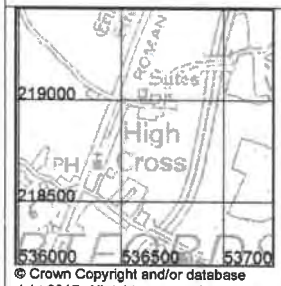
For more information read 'Explanation of terms' at the end of this report.

Soluble rock hazard



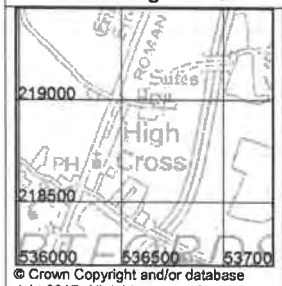
- Very significant soluble rock hazard.
  Soluble rocks are present with a very significant possibility of localised subsidence that could be initiated or made worse by infiltration. The site investigation should consider whether the potential for or the consequences of subsidence as a result of infiltration are significant.
- Very significant soluble rock hazards are not present; however this hazard may still need to be considered. See Part 3.

Landslide hazard



- Very significant landslide hazard.
  Slope instability problems are almost certainly present and may be active. An increase in moisture content as a result of infiltration may cause the slope to fail. The site investigation should consider whether the potential for or the consequences of landslide as a result of infiltration are significant.
- Very significant landslide hazards are not present; however this hazard may still need to be considered. See Part 3.

Shallow mining hazard

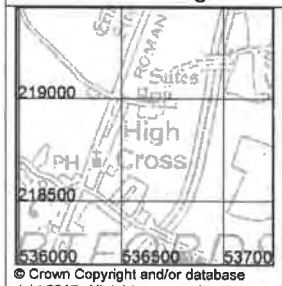


■ Very significant mining hazard.

Shallow mining is likely to be present with a very significant possibility of localised subsidence that could be initiated or made worse by increased infiltration. Also, infiltration may increase the possibility of remobilising pollutants. The site investigation should consider whether the potential for or consequences of subsidence and/or remobilisation of pollutants as a result of infiltration are significant.

☐ Very significant mining hazards are not present; however this hazard may still need to be considered. See Part 3.

Persistent shallow groundwater

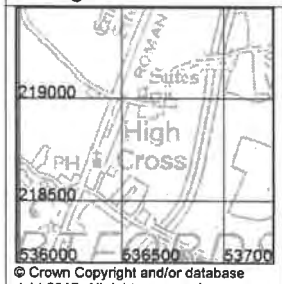


■ Very high likelihood of persistent or seasonally shallow groundwater.

Persistent or seasonally shallow groundwater is likely to be present. Infiltration may increase the likelihood of soakaway inundation, or groundwater emergence at the surface. The site investigation should consider whether the potential for or the consequences of groundwater level rise as a result of infiltration are significant.

☐ See Part 2 for the likely depth to water table.

Made ground



■ Made ground present.

Made ground is present at the surface. Infiltration may affect ground stability or increase the possibility of remobilising pollutants. The site investigation should consider whether the potential for or consequences of ground instability and/or pollutant leaching as a result of infiltration are significant.

☐ None recorded

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Section 2. Drainage potential

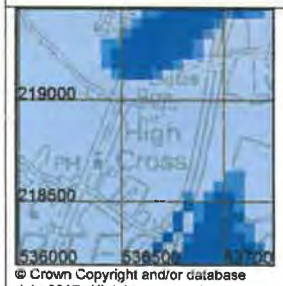
The following pages contain maps that will help you assess the drainage potential of the ground by considering the:

- depth to water table
- permeability of the superficial deposits
- thickness of the superficial deposits
- permeability of the bedrock
- presence of floodplains

Superficial deposits are not present everywhere and therefore some areas of the *superficial deposit permeability* map may not be coloured. Where this is the case, the *bedrock permeability* map shows the likely permeability of the ground. Superficial deposits in some places are very thin and hence in these places you may wish to consider both the permeability of the superficial deposits and the permeability of the bedrock. The *superficial thickness* map will tell you whether the superficial deposits are thin (< 3 m thick) or thick (>3 m). Where they are over 3 m thick, the permeability of the bedrock may not be relevant.

For more information read 'Explanation of terms' at the end of this report.

Depth to groundwater table



■ Groundwater is likely to be **more than 5 m** below the ground surface throughout the year.

■ Groundwater is likely to be between **3 and 5 m** below the ground surface for at least part of the year.

■ Groundwater is likely to be **less than 3 m** below the ground surface for at least part of the year.

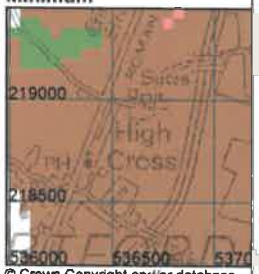
Superficial deposit permeability

- Superficial deposits are likely to be **free-draining**.
- The superficial deposit permeability is **spatially variable**, but likely to permit moderate infiltration.
- Superficial deposits are likely to be **poorly draining**.

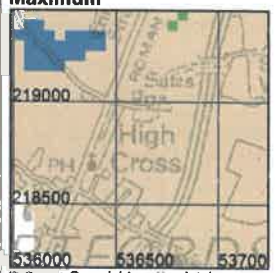
These maps show the permeability range that is summarised above.

- Very Low
- Low
- Moderate
- High
- Very High

Minimum



Maximum



Superficial deposit thickness

- The thickness of superficial deposits is **< 3 m** and hence the permeability of the ground may be dependent on both the superficial deposits (where present) and underlying bedrock (see below).
- The thickness of superficial deposits is **> 3 m** and hence the permeability of the superficial deposits is likely to determine the permeability of the ground.

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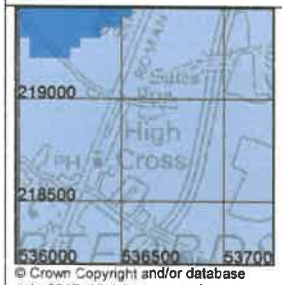
Bedrock permeability



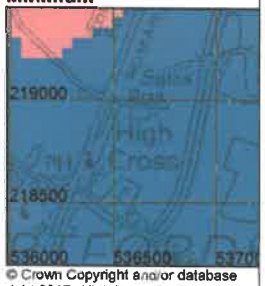
- Bedrock deposits are likely to be **free-draining**.
- The bedrock permeability is **spatially variable**, but likely to permit moderate infiltration.
- Bedrock deposits are likely to be **poorly draining**.

These maps show the permeability range that is summarised above.

Key

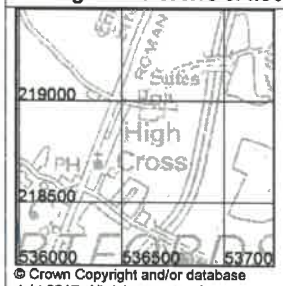
- Very Low
- Low
- Moderate
- High
- Very High

Minimum



Maximum

Geological indicators of flooding



- Superficial floodplain deposits or low-lying coastal areas have been identified. Groundwater levels may rise in response to high river or tide levels, potentially causing inundation of subsurface infiltration SuDS.

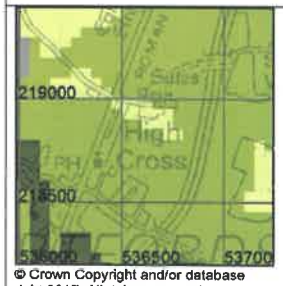
Section 3. Ground stability

The following pages contain maps that will help you assess whether infiltration may impact the stability of the ground. They consider hazards associated with:

- soluble rocks
- landslides
- shallow mining
- running sands
- swelling clays
- compressible ground, and
- collapsible ground

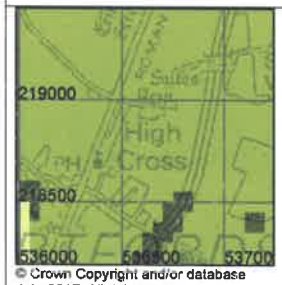
In the following maps, geohazards that are identified in green are unlikely to prevent infiltration SuDS from being installed, but they should be considered during design. For more information read 'Explanation of terms' at the end of this report.

Soluble rocks



- Increased infiltration is unlikely to result in subsidence.
- Increased infiltration is unlikely to cause localised subsidence, but potential impacts should be considered.
- Increased infiltration may result in localised subsidence. The potential for or the consequences of subsidence associated with soluble rocks should be considered.
- Very significant possibility of localised subsidence that could be initiated or made worse by infiltration.

Landslides

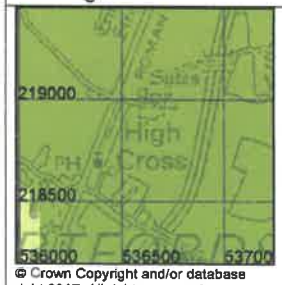


- Increased infiltration is unlikely to lead to slope instability.
- Slope instability problems may be present or anticipated, but increased infiltration is unlikely to cause instability
- Slope instability problems are probably present or have occurred in the past, and increased infiltration may result in slope instability.
- Slope instability problems are almost certainly present and may be active. An increase in moisture content as a result of infiltration may cause the slope to fail.

Shallow mining

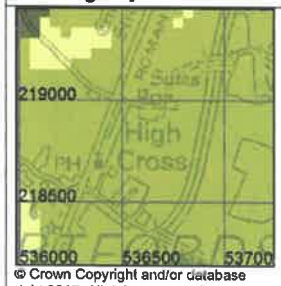
- Increased infiltration is unlikely to lead to subsidence.
- Shallow mining is possibly present. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Shallow mining could be present with a significant possibility that localised subsidence could be initiated or made worse by increased infiltration.
- Shallow mining is likely to be present, with a very significant possibility that localised subsidence may be initiated or made worse by increased infiltration.

Running sand



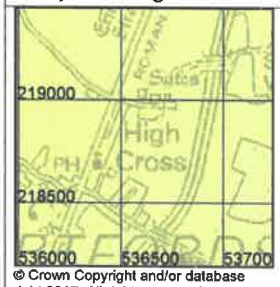
- Increased infiltration is unlikely to cause ground collapse associated with running sands.
- Running sand is possibly present. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Significant possibility for running sand problems. Increased infiltration may result in a geohazard.

Swelling clays



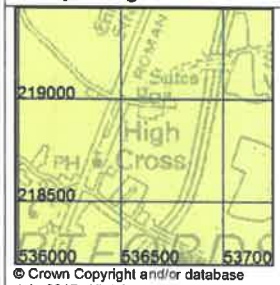
- Increased infiltration is unlikely to cause shrink-swell ground movement.
- Ground is susceptible to shrink-swell ground movement. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Ground is susceptible to shrink-swell ground movement. Increased infiltration may result in a geohazard.

Compressible ground



- Increased infiltration is unlikely to lead to ground compression.
- Compressibility and uneven settlement hazards are probably present. Increased infiltration may result in a geohazard.

Collapsible ground



- Increased infiltration is unlikely to result in subsidence.
- Deposits with potential to collapse when loaded and saturated are possibly present in places. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Deposits with potential to collapse when loaded and saturated are probably present in places. Increased infiltration may result in a geohazard.

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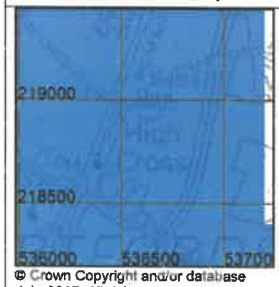
Section 4. Groundwater quality protection

The following pages contain maps showing some of the information required to ensure the protection of groundwater quality. Data presented includes:

- groundwater source protection zones (Environment Agency data)
- predominant flow mechanism
- made ground

For more information read 'Explanation of terms' at the end of this report.

Groundwater source protection zones

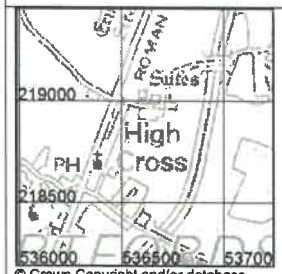


Derived in part from Source Protection Zone data provided under licence from the Environment Agency © Environment Agency 2017.

- Groundwater is not within a source protection zone.
- Source protection zone IV
- Source protection zone III
- Source protection zone II
- Source protection zone I.

Predominant flow mechanism

- Water is likely to percolate through the unsaturated zone to the groundwater through either the pore space in granular media or through porespace and fractures; these processes have some potential for contaminant removal and breakdown.
- Water is likely to percolate through the unsaturated zone to the groundwater through fractures, a process which has little potential for contaminant removal and breakdown.

Made ground	
	Made ground is present at the surface. Infiltration may increase the possibility of remobilising pollutants.

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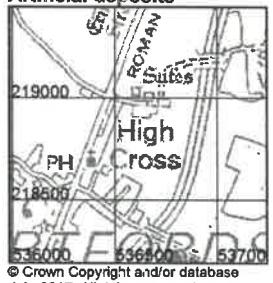
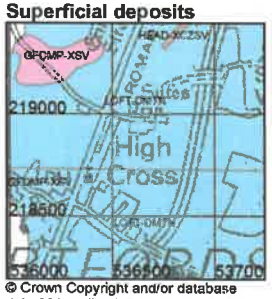
Section 5. Geological Maps

The following maps show the artificial, superficial and bedrock geology within the area of interest.

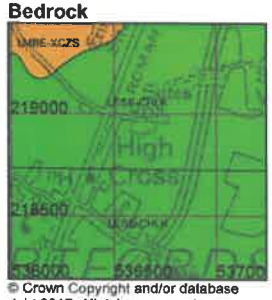
Artificial deposits



Superficial deposits



Bedrock



Fault

Coal, ironstone or mineral vein

Note: Faults and Coals, ironstone & mineral veins are shown for illustration and to aid interpretation of the map. Not all such features are shown and their absence on the map face does not necessarily mean that none are present

Key to Artificial deposits:
No deposits recorded by BGS in the search area

Key to Superficial deposits:

Map colour	Computer Code	Rock name	Rock type
	LOFT-DMTN	LOWESTOFT FORMATION	DIAMICTON
	GFDMP-XSV	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE	SAND AND GRAVEL
	HEAD-XCZSV	HEAD	CLAY, SILT, SAND AND GRAVEL

Key to Bedrock geology:

Map colour	Computer Code	Rock name	Rock type
	LMBE-XCZS	LAMBETH GROUP	CLAY, SILT AND SAND
	LESE-CHLK	LEWES NODULAR CHALK FORMATION AND SEAFORD CHALK FORMATION (UNDIFFERENTIATED)	CHALK

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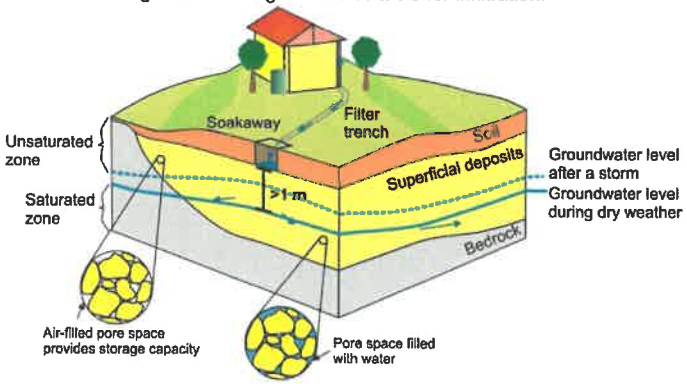
Limitations of this report:

- This report is concerned with the potential for infiltration-to-the-ground to be used as a SuDS technique at the site described. It only considers the subsurface beneath the search area and does NOT consider potential surface or subsurface impacts outside of that area.
- This report is NOT an alternative for an on-site investigation or soakaway test, which might reach a different conclusion.
- This report must NOT be used to justify disposal of foul waste or grey water.
- This report is based on and limited to an interpretation of the records held by the British Geological Survey (BGS) at the time the search is performed. The datasets used (with the exception of that showing depth to water table) are based on 1:50 000 digital geological maps and not site-specific data.
- Other more specific and detailed ground instability information for the site may be held by BGS, and an assessment of this could result in a modified assessment.
- To interpret the maps correctly, the report must be viewed and printed in colour.
- The search does NOT consider the suitability of sites with regard to:
    - previous land use,
    - potential for, or presence of contaminated land
    - presence of perched water tables
    - shallow mining hazards relating to coal mining. Searches of coal mining should be carried out via The Coal Authority Mine Reports Service: www.coalminingreports.co.uk.
    - made ground, where not recorded
    - proximity to landfill sites (searches for landfill sites or contaminated land should be carried out through consultation with local authorities/Environment Agency)
    - zones around private water supply boreholes that are susceptible to groundwater contamination.
- This report is supplied in accordance with the GeoReports Terms & Conditions available separately, and the copyright restrictions described at the end of this report

Explanation of terms

Depth to groundwater

In the shallow subsurface, the ground is commonly unsaturated with respect to water. Air fills the spaces within the soil and the underlying superficial deposits and bedrock. At some depth below the ground surface, there is a level below which these spaces are full of water. This level is known as the groundwater level, and the water below it is termed the groundwater. When water is infiltrated, the groundwater level may rise temporarily. To ensure that there is space in the unsaturated zone to accommodate this, there should be a minimum thickness of 1 m between the base of the infiltration system and the water table. An estimate of the *depth to groundwater* is therefore useful in determining whether the ground is suitable for infiltration.



Groundwater flooding

Groundwater flooding occurs when a rise in groundwater level results in very shallow groundwater or the emergence of groundwater at the surface. If infiltration systems are installed in areas that are susceptible to groundwater flooding, it is possible that the system could become inundated. The susceptibility map seeks to identify areas where the geological conditions and water tables indicate that groundwater level rise could occur under certain circumstances. A high susceptibility to groundwater flooding classification does not mean that groundwater flooding has ever occurred in the past, or will do so in the future as the susceptibility maps do not contain information on how often flooding may occur. The susceptibility maps are designed for planning; identifying areas where groundwater flooding might be an issue that needs to be taken into account.

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Geological indicators of flooding

In floodplain deposits, groundwater level can be influenced by the water level in the adjacent river. Groundwater level may increase during periods of fluvial flood and therefore this should be taken into account when designing infiltration systems on such deposits. The *geological indicators of flooding* dataset shows where there is geological evidence (floodplain deposits) that flooding has occurred in the past.

For further information on flood-risk, the likely frequency of its recurrence in relation to any proposed development of the site, and the status of any flood prevention measures in place, you are advised to contact the local office of the Environment Agency (England and Wales) at www.environment-agency.gov.uk/ or the Scottish Environment Protection Agency (Scotland) at www.sepa.org.uk.

Artificial ground

Artificial ground comprises deposits and excavations that have been created or modified by human activity. It includes ground that is worked (quarries and road cuttings), infilled (back-filled quarries), landscaped (surface re-shaping), disturbed (near surface mineral workings) or classified as made ground (embankments and spoil heaps). The composition and properties of artificial ground are often unknown. In particular, the permeability and chemical composition of the artificial ground should be determined to ensure that the ground will drain and that any contaminants present will not be remobilised.

Superficial permeability

Superficial deposits are those geological deposits that were formed during the most recent period of geological time (as old as 2.6 million years before present). They generally comprise relatively thin deposits of gravel, sand, silt and clay and are present beneath the pedological soil in patches or larger spreads over much of Britain. The ease with which water can percolate through these deposits is controlled by their permeability and varies widely depending on their composition. Those deposits comprising clays and silts are less permeable and thus infiltration is likely to be slow, such that water may pool on the surface. In comparison, deposits comprising sands and gravels are more permeable allowing water to percolate freely.

Bedrock permeability

Bedrock forms the main mass of rock forming the Earth. It is present everywhere, commonly beneath superficial deposits. Where the superficial deposits are thin or absent, the ease with which water will percolate into the ground depends on the permeability of the bedrock.

Natural ground instability
Natural ground instability refers to the propensity for upward, lateral or downward movement of the ground that can be caused by a number of natural geological hazards (e.g. ground dissolution/compressible ground). Some movements associated with particular hazards may be gradual and of millimetre or centimetre scale, whilst others may be sudden and of metre or tens of metres scale. Significant natural ground instability has the potential to cause damage to buildings and structures, especially when the drainage characteristics of a site are altered. It should be noted, however, that many buildings, particularly more modern ones, are built to such a standard that they can remain unaffected in areas of significant ground movement.

Shrink-swell
A shrinking and swelling clay changes volume significantly according to how much water it contains. All clay deposits change volume as their water content varies, typically swelling in winter and shrinking in summer, but some do so to a greater extent than others. Contributory circumstances could include drought, leaking service pipes, tree roots drying-out the ground or changes to local drainage patterns, such as the creation of soakaways. Shrinkage may remove support from the foundations of buildings and structures, whereas clay expansion may lead to uplift (heave) or lateral stress on part or all of a structure; any such movements may cause cracking and distortion.

Landslides (slope stability)
A landslide is a relatively rapid outward and downward movement of a mass of ground on a slope, due to the force of gravity. A slope is under stress from gravity but will not move if its strength is greater than this stress. If the balance is altered so that the stress exceeds the strength, then movement will occur. The stability of a slope can be reduced by removing ground at the base of the slope, by placing material on the slope, especially at the top, or by increasing the water content of the materials forming the slope. Increase in subsurface water content beneath a soakaway could increase susceptibility to landslide hazards. The assessment of landslide hazard refers to the stability of the present land surface. It does not encompass a consideration of the stability of excavations.

Soluble rocks (dissolution)
Some rocks are soluble in water and can be progressively removed by the flow of water through the ground. This process tends to create cavities, potentially leading to the collapse of overlying materials and possibly subsidence at the surface. The release of water into the subsurface from infiltration systems may increase the dissolution of rock or destabilise material above or within a cavity. Dissolution cavities may create a pathway for rapid transport of contaminated water to an aquifer or water course.

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Compressible ground
Many ground materials contain water-filled pores (the spaces between solid particles). Ground is compressible if a building (or other load) can cause the water in the pore space to be squeezed out, causing the ground to decrease in thickness. If ground is extremely compressible the building may sink. If the ground is not uniformly compressible, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. The compressibility of the ground may alter as a result of changes in subsurface water content caused by the release of water from soakaways.

Collapsible deposits
Collapsible ground comprises certain fine-grained materials with large pore spaces (the spaces between solid particles). It can collapse when it becomes saturated by water and/or a building (or other structure) places too great a load on it. If the material below a building collapses it may cause the building to sink. If the collapsible ground is variable in thickness or distribution, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. The subsurface underlying a soakaway will experience an increase in water content that may affect the stability of the ground. This hazard is most likely to be encountered only in parts of southern England.

Running sand
Running sand conditions occur when loosely-packed sand, saturated with water, flows into an excavation, borehole or other type of void. The pressure of the water filling the spaces between the sand grains reduces the contact between the grains and they are carried along by the flow. This can lead to subsidence of the surrounding ground. Running sand is potentially hazardous during the drainage system installation. During installation, excavation of the ground may create a space into which sand can flow, potentially causing subsidence of surrounding ground.

Shallow mining hazards (non coal)
Current or past underground mining for coal or for other commodities can give rise to cavities at shallow or intermediate depths, which may cause fracturing, general settlement, or the formation of crown-holes in the ground above. Spoil from mineral workings may also present a pollution hazard. The release of water into the subsurface from soakaways may destabilise material above or within a cavity. Cavities arising as a consequence of mining may also create a pathway for rapid transport of contaminated water to an aquifer or watercourse. The mining hazards map is derived from the geological map and considers the potential for subsidence associated with mining on the basis of geology type. Therefore if mining is known to occur within a certain rock, the map will highlight the potential for a hazard within the area covered by that geology.

For more information regarding underground and opencast **coal mining**, the location of mine entries (shafts and adits) and matters relating to subsidence or other ground movement induced by **coal mining** please contact the Coal Authority, Mining Reports, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG; telephone 0845 762 6848 or at www.coal.gov.uk. For more information regarding other types of mining (i.e. non-coal), please contact the British Geological Survey.

Groundwater source protection zones

In England and Wales, the Environment Agency has defined areas around wells, boreholes and springs that are used for the abstraction of public drinking water as source protection zones. In conjunction with Groundwater Protection Policy the zones are used to restrict activities that may impact groundwater quality, thereby preventing pollution of underlying aquifers, such that drinking water quality is upheld. The Environment Agency can provide advice on the location and implications of source protection zones in your area (www.environment-agency.gov.uk/)

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Date: 25 August 2017
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- The data, information and related records supplied in this Report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
- If a report or other output is produced for you on the basis of data you have provided to BGS, or your own data input into a BGS system, please do not rely on it as a source of information about other areas or geological features, as the report may omit important details.
- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be quite historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

Report issued by
BGS Enquiry Service

Geosphere Environmental Ltd

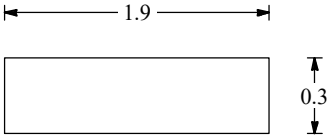
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land at Sutes Farm, High Cross	M Scott Properties Ltd	**TP1**

Job No	Date	Ground Level (m)	Grid Reference ()
2895,SK	25-01-18 25-01-18		

Fieldwork By	Logged By	Sheet
GEL	EP	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown clay with occasional gravel of fine and medium subangular and subrounded flint, chalk and quartzite)				
0.30-1.50	Orange/pale brown gravelly CLAY. Gravel is fine to coarse subangular and subrounded flint and chalk (LOWESTOFT FORMATION)				
	1.10 Becoming sandy and friable with depth				



Shoring/Support: None
Stability: Stable

All dimensions in metres Scale 1:15	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By

Geosphere Environmental Ltd

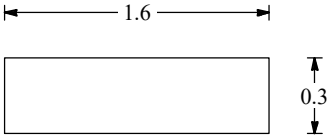
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land at Sutes Farm, High Cross	M Scott Properties Ltd	**TP2**

Job No	Date	Ground Level (m)	Grid Reference ()
2895,SK	25-01-18 25-01-18		

Fieldwork By	Logged By	Sheet
GEL	EP	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.35	TOPSOIL (Dark brown slightly gravelly clay. Gravel is fine and medium subangular flint and chalk)				
0.35-1.50	Orange/pale brown gravelly CLAY. Gravel is fine to coarse subangular and subrounded chalk and flint (LOWESTOFT FORMATION)				
	1.00 Becoming friable with depth				



Shoring/Support: None
Stability: Stable

All dimensions in metres Scale 1:15	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By

Geosphere Environmental Ltd

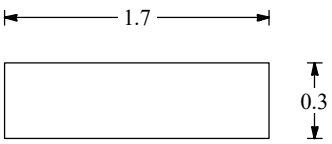
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land at Sutes Farm, High Cross	M Scott Properties Ltd	**TP3**

Job No	Date	Ground Level (m)	Grid Reference ()
2895,SK	25-01-18 25-01-18		

Fieldwork By	Logged By	Sheet
GEL	EP	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown slightly gravelly clay. Gravel is fine to medium subangular flint and chalk)				
0.30-1.50	Pale brown/orange/grey gravelly friable CLAY. Gravel is fine to coarse subangular flint and subrounded chalk (LOWESTOFT FORMATION)				



Shoring/Support: None
Stability: Stable

All dimensions in metres Scale 1:15	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By

GEL AGS TP BETA 2895,SK HIGH CROSS, 29-01-18.GPJ GINT STD AGS 3_1.GDT 31/1/18

Geosphere Environmental Ltd

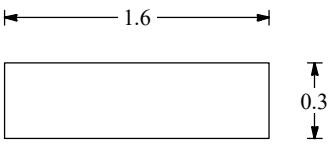
TRIAL PIT LOG

Project	Client	TRIAL PIT No
Land at Sutes Farm, High Cross	M Scott Properties Ltd	**TP4**

Job No	Date	Ground Level (m)	Grid Reference ()
2895,SK	25-01-18 25-01-18		

Fieldwork By	Logged By	Sheet
GEL	EP	1 of 1

Depth	DESCRIPTION	Legend	Depth	No	Remarks/Tests
0.00-0.30	TOPSOIL (Dark brown slightly gravelly clay. Gravel is fine and medium subangular flint and chalk)				
0.30-1.50	Pale brown/orange/grey gravelly CLAY. Gravel is fine to coarse subangular and subrounded chalk and flint (LOWESTOFT FORMATION)				



Shoring/Support: None
Stability: Stable

All dimensions in metres Scale 1:15	Method Trial Pit/trench	Plant Used MECHANICAL EXCAVATOR	Checked By

TRIAL PIT INFILTRATION TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Pit Size [m]		
Length	**Width**	**Depth**
1.60	0.30	1.50

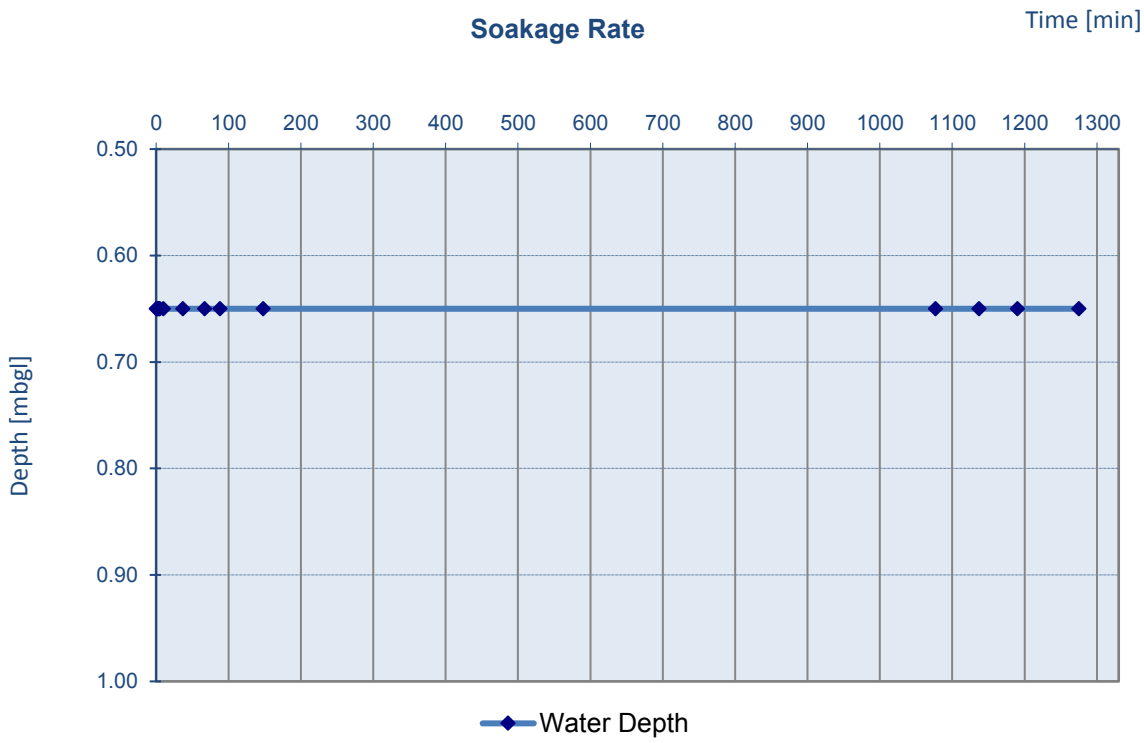
Time [min]	Depth to Water [mbgl]	
0.0	0.65	
1.0	0.65	
2.0	0.65	
3.0	0.65	
4.0	0.65	
5.0	0.65	
10.0	0.65	
37.0	0.65	
67.0	0.65	
88.0	0.65	
148.0	0.65	
1077.0	0.65	
1137.0	0.65	
1190.0	0.65	
1275.0	0.65	

Pit TP2 **Run** 1 of 1

Test Date 25/01/2018

Groundwater Encountered at: n/a

Remarks: Maximum water depth achieved in the test = 0.65mbgl



mbgl - meters below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CHECKED BY	DATE
Land at Stutes Farm, High Road, High Cross, Ware, SG11 1AZ	M Scott Properties Limited	2895, SK	EP	TP	29 January 2018

C:\Egnyte\Shared\GeoCloud\Reports\2895,SK, High Cross, Scott Properties, 15-12-17\GEL Reports\Soak\TP2 Soak, Test 1 - No calcs.

TRIAL PIT INFILTRATION TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Pit Size [m]		
Length	**Width**	**Depth**
1.70	0.30	1.50

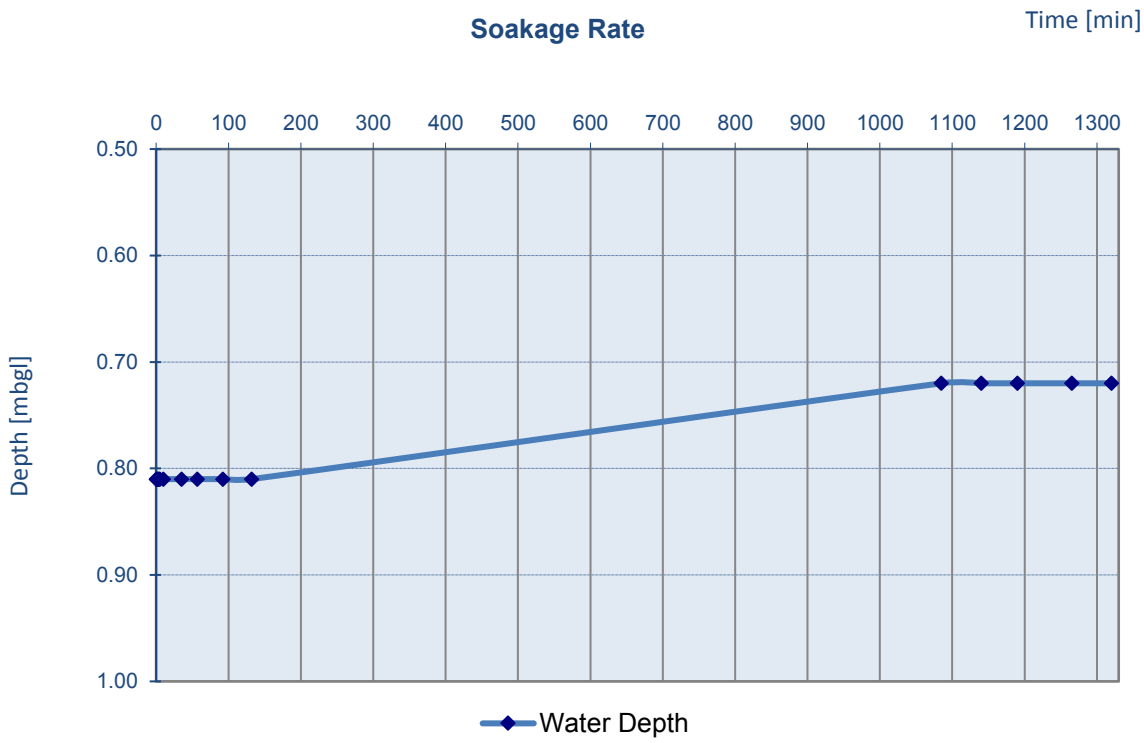
Time [min]	Depth to Water [mbgl]	
0.0	0.81	
1.0	0.81	
2.0	0.81	
3.0	0.81	
4.0	0.81	
5.0	0.81	
10.0	0.81	
35.0	0.81	
57.0	0.81	
92.0	0.81	
132.0	0.81	
1085.0	0.72	
1140.0	0.72	
1190.0	0.72	
1265.0	0.72	
1320	0.72	

Pit TP3 **Run** 1 of 1

Test Date 25/01/2018

Groundwater Encountered at: n/a

Remarks: Water within the pit increased overnight.



mbgl - meters below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CHECKED BY	DATE
Land at Stutes Farm, High Road, High Cross, Ware, SG11 1AZ	M Scott Properties Limited	2895, SK	EP		29 January 2018

C:\Egnyte\Shared\GeoCloud\Reports\2895,SK, High Cross, Scott Properties, 15-12-17\GEL Reports\Soak\TP3 Soak, Test 1 - No calcs.

TRIAL PIT INFILTRATION TEST - BRE DIGEST 365

geosphere environmental ltd
Geosphere Environmental Ltd, Brightwell Barns, Ipswich Road, Brightwell, Suffolk, IP10 0BJ
T 01603 298 076 E info@geosphere-environmental.co.uk

Pit Size [m]		
Length	**Width**	**Depth**
1.60	0.30	1.50

Time [min]	Depth to Water [mbgl]	
0.0	0.71	
1.0	0.71	
2.0	0.71	
3.0	0.71	
4.0	0.71	
5.0	0.71	
10.0	0.71	
21.0	0.71	
30.0	0.71	
51.0	0.71	
103.0	0.71	
163.0	0.71	
223.0	0.71	

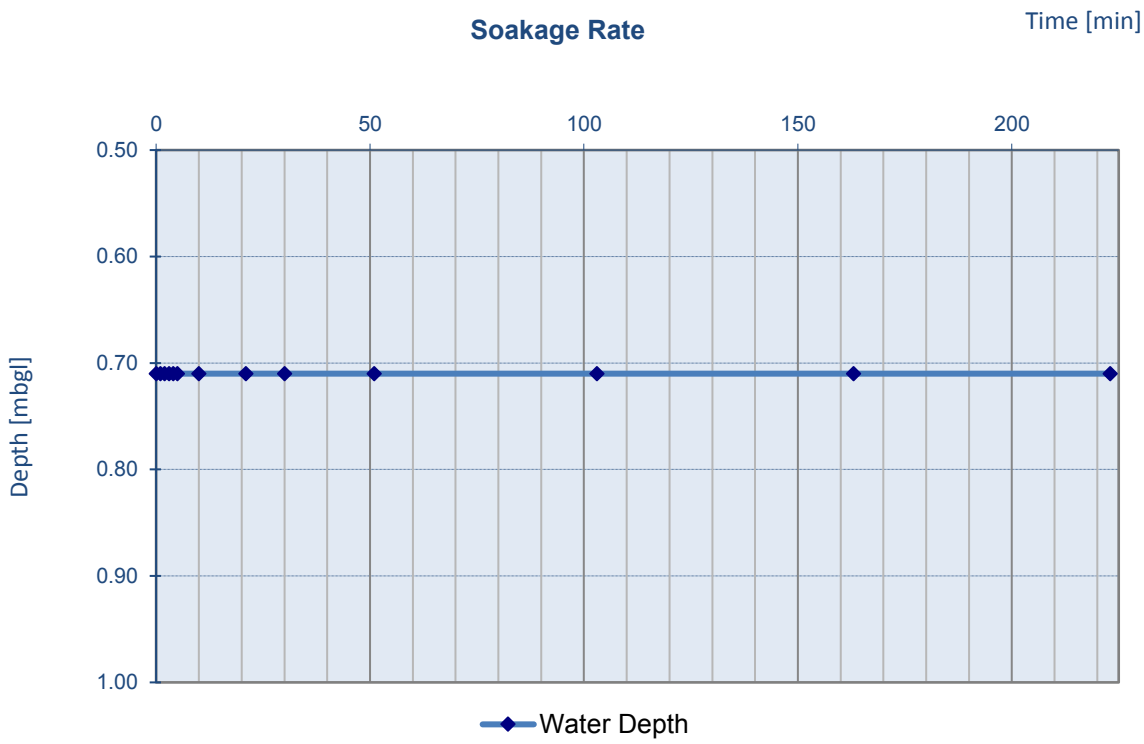
Pit TP4 **Run** 1 of 1

Test Date 26/01/2018

Groundwater Encountered at: n/a

Remarks:

It was not possible to undertake full-depth soakaway test. Maximum water depth achieved in the test = 0.71mbgl



mbgl - meters below ground level

SITE	CLIENT	REPORT NO	SITE SUPERVISION	CHECKED BY	DATE
Land at Stutes Farm, High Road, High Cross, Ware, SG11 1AZ	M Scott Properties Limited	2895, SK	EP		29 January 2018

C:\Egnyte\Shared\GeoCloud\Reports\2895,SK, High Cross, Scott Properties, 15-12-17\GEL Reports\Soak\TP4 Soak, Test 1 - No calcs.

LEGEND:

Trial pit locations

N

geosphere environmental ltd

Brightwell Barn, Ipswich Road, Brightwell, Suffolk, IP10 0BJ T 01603 298 076 F 01603 289 075 E info@geosphere-environmental.co.uk

SITE	TITLE	REPORT NO.	DRAWING NO.	DATE
Land at Stutes Farm, High Road, High Cross, Ware, SG11 1AZ.	Exploratory Hole Location Plan	2895, SK	001 / Rev 0	January 2018
	CLIENT	DRAWN BY	CHECKED	SCALE
	M Scott Properties Limited	FS		Not to scale

geosphere environmental ltd

Photograph 1

Saturated ground conditions – Centre of the site.

Photograph 2

Saturated ground conditions in the centre of the site.

Photograph 3

Saturated ground conditions to the south of the site, alongside the footpath.

Photograph 4

Perched water infiltration into TP1.

Photograph 5

Saturated conditions located near to TP1.

Photograph 6

Saturated conditions located south of the site.

Appendix B – Proposed Site

Illustrative development layout
Surface water management plan
Impermeable catchment plan
Surface water maintenance plan
Surface water calculations

Romsey
T: 01794 367703
F: 01794 367276

Portishead
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F: 01794 367276

Camberley
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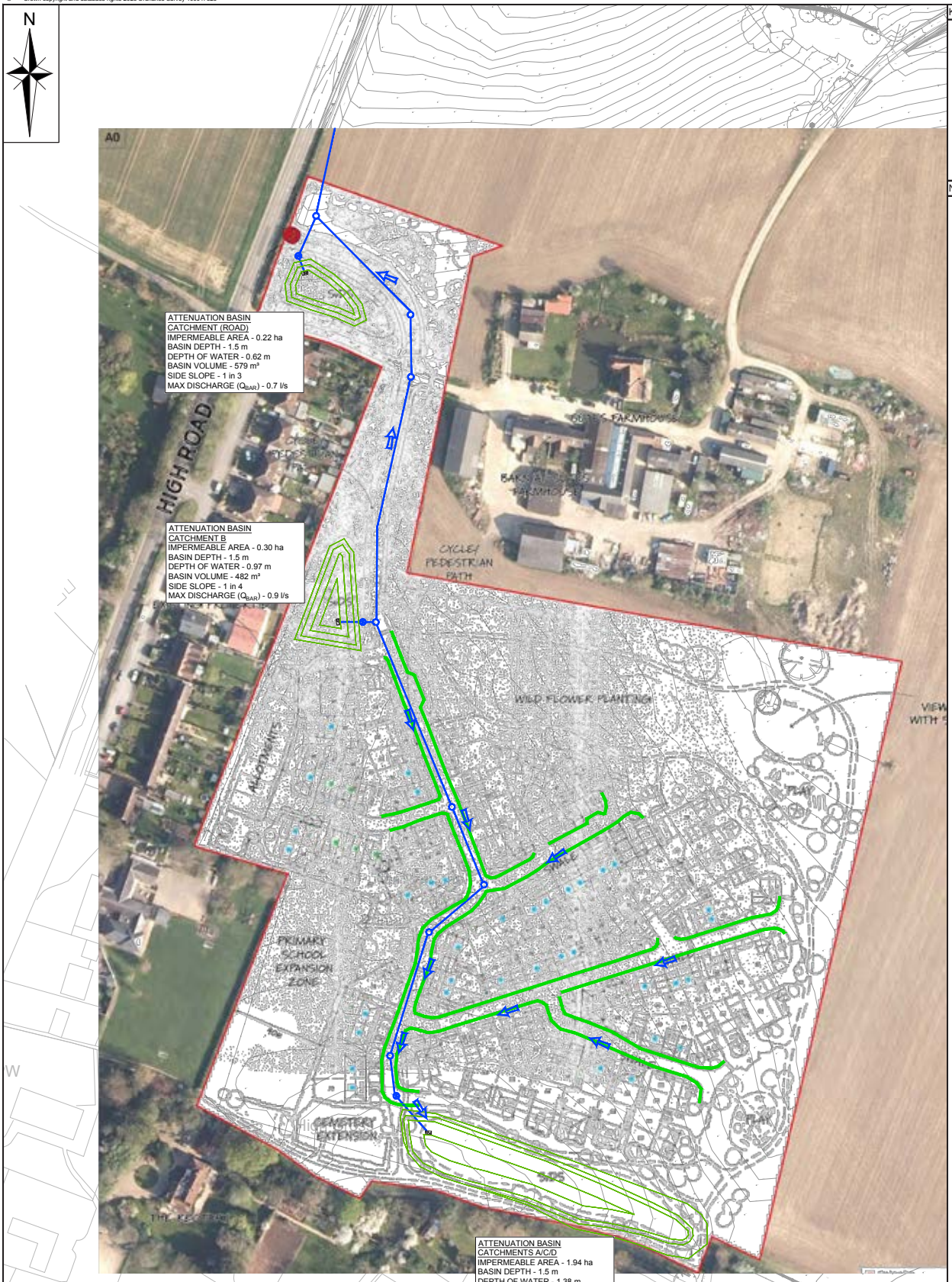
F: 01794 367276

www.thrivearchitects.co.uk

Rev	Description	Date	Au	Ch
P1	Re-Issue with Amended Drawing Name	20.11.23	AA/--	--/--

Project	Land East of High Road, High Cross
Drawing	Illustrative Concept Master Plan - 01
Client	SCOTT PROPERTIES
Job no.	SCOT230616
Dwg no.	ICMP-01
Date	20.11.23
Rev.	P1
Author	AA/--
Checked	--/--
Scale	1:1000@A0
Status	PRELIMINARY
Office	Romsey
Client ref.	-

thrive. architects



KEY

- SURFACE WATER NETWORK SERVING BASINS
- FLOW CONTROL
- SWALE (INDICATIVE) CONVEYING SURFACE WATER TO BASINS
- DEBRIS FILTER
- EXCEEDANCE/OVERLAND FLOW

NOTES

REV	DESCRIPTION	DE	DR	CH	DATE

DESIGNED BY	DRAWN BY	CHECKED BY
-	JTH	-

SCALE @ A1 SIZE	DATE
D.N.S	29.11.2023

PROJECT TITLE
LAND EAST OF HIGH ROAD,
HIGH CROSS, HERTFORDSHIRE

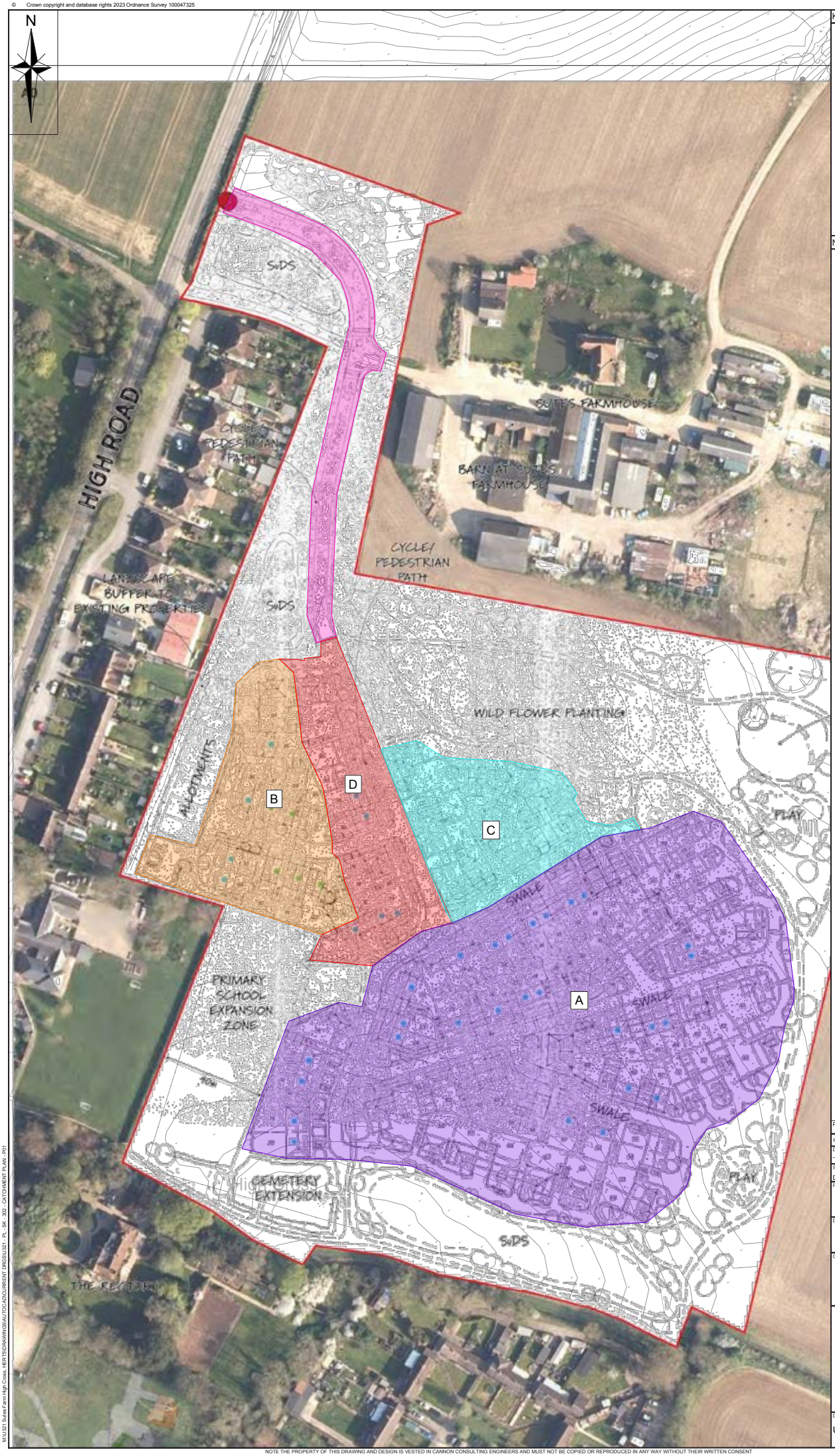
DRAWING TITLE
SURFACE WATER
STRATEGY PLAN

CLIENT
M SCOTT PROPERTIES LTD

CANNON CONSULTING ENGINEERS
Highways, Transport & Infrastructure Planning
Cambridge House, Lanwades Business Park,
Kentford, Newmarket, CB8 7PN
Tel: 01638 555107
www.cannonce.co.uk
info@cannonce.co.uk

DRAWING NUMBER	REV.
U321 - PL - SK - 304	-

M:\U321 Sutes Farm High Cross, HERTS\DRAWINGS\AUTOCAD\CURRENT DWGS\U321 - PL - SK - 304 - SW STRATEGY PLAN



KEY

- PARCEL AREA (A) 2.24 ha
- PARCEL AREA (B) 0.46 ha
- PARCEL AREA (C) 0.36 ha
- PARCEL AREA (D) 0.38 ha
- IMPERMEABLE AREA (ROAD) 0.22 ha

NOTES

REV	DESCRIPTION	DE	DR	CH	DATE
P01	PARCEL AREA AMENDED FOR NEW LAYOUT	-	JTH	-	29.11.2023

DESIGNED BY	DRAWN BY	CHECKED BY
-	JTH	-

SCALE @ A1 SIZE	DATE
D.N.S	11.10.23

PROJECT TITLE
LAND EAST OF HIGH ROAD,
HIGH CROSS, HERTFORDSHIRE

DRAWING TITLE
CATCHMENT PLAN

CLIENT
M SCOTT PROPERTIES LTD

CANNON CONSULTING ENGINEERS
Highways, Transport & Infrastructure Planning
Cambridge House, Lanwades Business Park,
Kentford, Newmarket, CB8 7PN
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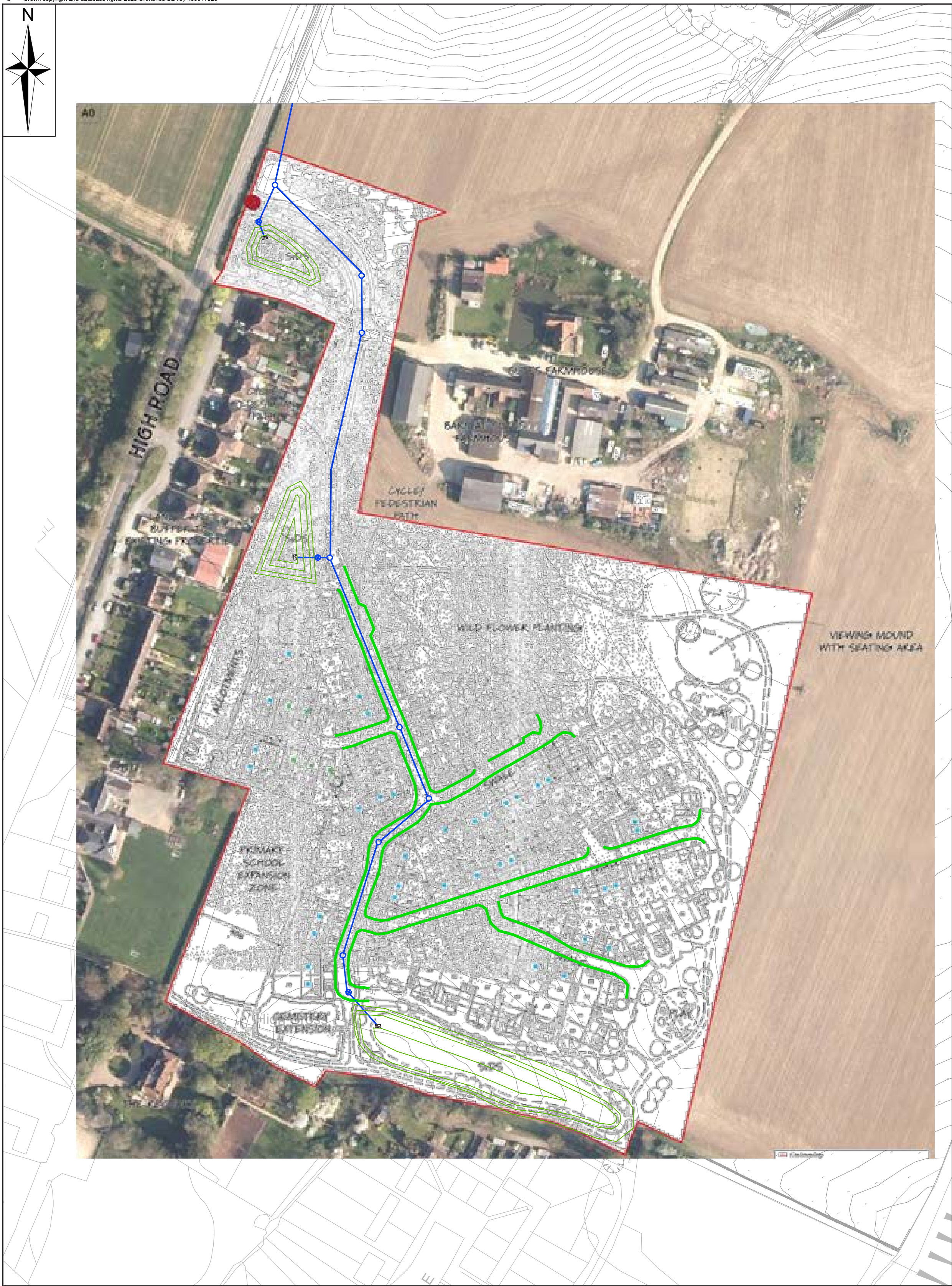
DRAWING NUMBER	REV.
U321 - PL - SK - 302	P01

M:\U321 Sutes Farm High Cross, HERTS\DRAWINGS\AUTOCAD\CURRENT DWGS\U321 - PL - SK - 302 - CATCHMENT PLAN - P01



KEY

- SURFACE WATER NETWORK SERVING BASINS
- FLOW CONTROL
- SWALE (INDICATIVE) CONVEYING SURFACE WATER TO BASINS
- DEBRIS FILTER

NOTES

SWALE / GRASSED FILTER DRAIN MAINTENANCE

MAINTENANCE SCHEDULE	REQUIRED ACTION	FREQUENCY
REGULAR MAINTENANCE	LITTER AND DEBRIS REMOVAL	MONTHLY, AS REQUIRED
	GRASS CUTTING	MONTHLY, AS REQUIRED BY SEASON
	UPKEEP OF ANY OTHER PLANTING	MONTHLY, THEN DECREASING IN FREQUENCY, AS REQUIRED BY SEASON
	INSPECT THE SWALE BED FOR ANY PONDING (A POSSIBLE INDICATION OF REDUCED INFILTRATION)	MONTHLY, AS REQUIRED
	INSPECT INLETS, OUTLETS, OVERFLOWS FOR DEBRIS AND CONDITION	MONTHLY
	INSPECT SYSTEM FOR SILT (TRAPS, CHAMBERS AND SURFACES)	HALF YEARLY
OCCASIONAL MAINTENANCE	RESEED AND REPLANT BARE AREAS, CONSIDER REASONS FOR POOR GROWTH AND FAILURE OF PLANTS TO ESTABLISH AND AMEND PLANTING, IMPROVE SOIL ETC.	AS REQUIRED
REMEDIAL ACTIONS	REPAIR EROSION OR OTHER DAMAGE (RESEED OR RE-TURF)	AS REQUIRED
	RE-LEVEL UNEVEN SURFACES	AS REQUIRED
	SCARIFY TOPSOIL, REMEDIATE SOIL TO IMPROVE ANY REDUCTION IN INFILTRATION	AS REQUIRED
	REMOVE NOTABLE ACCUMULATIONS OF SEDIMENT	AS REQUIRED
	REMOVE AND SAFELY DISPOSE OF ANY OILS OR PETROL RESIDUES	AS REQUIRED

BASED ON ADVICE IN CIRIA C753

BASIN MAINTENANCE

MAINTENANCE SCHEDULE	REQUIRED ACTION	FREQUENCY
REGULAR MAINTENANCE	REMOVAL OF LITTER AND DEBRIS	MONTHLY
	CUT GRASS	HALF YEARLY
	MANAGE OTHER VEGETATION	MONTHLY THEN AS REQUIRED
	INSPECT AND CLEAR INLETS, OUTLETS, OVERFLOWS ETC.	MONTHLY
	INSPECT AND REPAIR BANKS, PIPES, HEADWALLS ETC.	MONTHLY
	INSPECT INLETS AND BASIN FOR SILT ACCUMULATION	MONTHLY UNTIL ABLE TO ESTABLISH THE REQUIRED SILT REMOVAL FREQUENCY, THEN IN ACCORDANCE WITH ESTABLISHED FREQUENCY
	MANAGE VEGETATION IN WETTER AREAS (MICRO-POOLS ETC)	ANNUALLY OR AS ESTABLISHED BY ECOLOGIST/LANDSCAPE ARCHITECT
	TIDY DEAD GROWTH	ANNUALLY (AS PER GROWING SEASON)
	REMOVE SEDIMENT FROM TRAPS, FOREBAYS ETC.	ANNUALLY
OCCASIONAL MAINTENANCE	RESEED	AS REQUIRED
	PRUNE ADJACENT TREES	EVERY 2 YEARS, OR AS OTHERWISE ADVISED
	SILT REMOVAL	EVERY 5 YEARS (DEPENDING ON THE REQUIREMENT FOR REGUALR MAINTENANCE)
REMEDIAL ACTIONS	REPAIR EROSION OR OTHER DAMAGE	AS REQUIRED
	REPAIR INLETS, OUTLETS AND OVERFLOWS	AS REQUIRED

BASED ON ADVICE IN CIRIA C753

ORIFICE MAINTENANCE

MAINTENANCE SCHEDULE	REQUIRE ACTION	FREQUENCY
REMEDIAL ACTIONS	REPAIR/REPLACE INLETS, OUTLETS, OVERFLOWS.	AS REQUIRED
MONITORING	CHECK THAT CONTROLS, PROTECTION, OUTLETS, INLETS AND OVERFLOWS ARE IN GOOD CONDITION AND WORKING AS INTENDED	HALF YEARLY

BASED ON ADVICE IN CIRIA C753

REV	DESCRIPTION	DE	DR	CH	DATE

DESIGNED BY	DRAWN BY	CHECKED BY
-	JTH	-

SCALE @ A1 SIZE	DATE
D.N.S	29.11.2023

PROJECT TITLE
LAND EAST OF HIGH ROAD, HIGH CROSS, HERTFORDSHIRE

DRAWING TITLE
MAINTENANCE PLAN

CLIENT
M SCOTT PROPERTIES LTD

CANNON CONSULTING ENGINEERS
Highways, Transport & Infrastructure Planning
Cambridge House, Lanwades Business Park,
Kentford, Newmarket, CB8 7PN
Tel: 01638 555107
www.cannonce.co.uk
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DRAWING NUMBER	REV.
U321 - PL - SK - 303	-

M:\U321 Sutes Farm High Cross, HERTS\DRAWINGS\AUTOCAD\CURRENT DRGS\U321 - PL - SK - 303 - Maintenance plan

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)		Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	500.0		

Nodes

Name	Area (ha)	Cover Level (m)	Depth (m)
Basin A,C,D	1.940	89.000	1.500

Simulation Settings

Rainfall Methodology	FEH-22	Drain Down Time (mins)	240	30 year (l/s)	13.8
Summer CV	0.950	Additional Storage (m³/ha)	20.0	100 year (l/s)	18.4
Winter CV	0.950	Check Discharge Rate(s)	✓	Check Discharge Volume	✓
Analysis Speed	Normal	1 year (l/s)	4.9	100 year 360 minute (m³)	427
Skip Steady State	x	2 year (l/s)	5.1		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0
100	40	5	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	1.940	Betterment (%)	0
SAAR (mm)	623	QBar	5.8
Soil Index	3	Q 1 year (l/s)	4.9
SPR	0.40	Q 2 year (l/s)	5.1
Region	6	Q 30 year (l/s)	13.8
Growth Factor 1 year	0.85	Q 100 year (l/s)	18.4
Growth Factor 2 year	0.88		

Pre-development Discharge Volume

Site Makeup	Greenfield	CWI	93.778
Greenfield Method	FSR/FEH	Return Period (years)	100
Positively Drained Area (ha)	1.940	Climate Change (%)	0
Soil Index	3	Storm Duration (mins)	360
SPR	0.40	Betterment (%)	0

Pre-development Discharge Volume

PR 0.360 | Runoff Volume (m³) 427

Node Basin A,C,D Online Orifice Control

Flap Valve	x	Design Depth (m)	1.300	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	4.8		
Invert Level (m)	87.500	Diameter (m)	0.045		

Node Basin A,C,D Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	87.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	543.0	0.0	1.500	2045.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Basin A,C,D	930	88.028	0.528	24.0	439.6241	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Basin A,C,D	Orifice	3.0	154.2

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Basin A,C,D	945	88.395	0.895	46.4	910.7439	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Basin A,C,D	Orifice	4.0	206.9

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Basin A,C,D	1410	88.619	1.119	44.1	1262.6960	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Basin A,C,D	Orifice	4.4	319.8

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Basin A,C,D	945	88.548	1.048	57.2	1145.7350	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Basin A,C,D	Orifice	4.3	225.7

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Basin A,C,D	1410	88.835	1.335	56.2	1651.6410	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Basin A,C,D	Orifice	4.8	352.1

Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 99.99%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Basin A,C,D	1410	88.881	1.381	59.0	1742.5690	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Basin A,C,D	Orifice	4.9	358.7

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	500.0		

Nodes

Name	Area (ha)	Cover Level (m)	Depth (m)
Basin B	0.300	90.300	1.500

Simulation Settings

Rainfall Methodology	FEH-22	Drain Down Time (mins)	240	30 year (l/s)	2.1
Summer CV	0.950	Additional Storage (m³/ha)	20.0	100 year (l/s)	2.8
Winter CV	0.950	Check Discharge Rate(s)	✓	Check Discharge Volume	✓
Analysis Speed	Normal	1 year (l/s)	0.8	100 year 360 minute (m³)	66
Skip Steady State	x	2 year (l/s)	0.8		

Storm Durations

600	720	960	1440	2160	2880	4320	5760	7200	8640	10080

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0
100	40	5	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.300	Betterment (%)	0
SAAR (mm)	623	QBar	0.9
Soil Index	3	Q 1 year (l/s)	0.8
SPR	0.40	Q 2 year (l/s)	0.8
Region	6	Q 30 year (l/s)	2.1
Growth Factor 1 year	0.85	Q 100 year (l/s)	2.8
Growth Factor 2 year	0.88		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	0.300	Storm Duration (mins)	360
Soil Index	3	Betterment (%)	0
SPR	0.40	PR	0.360
CWI	93.778	Runoff Volume (m³)	66

Node Basin B Online Orifice Control

Flap Valve	x	Design Depth (m)	1.300	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.8		
Invert Level (m)	88.800	Diameter (m)	0.020		

Node Basin B Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	88.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	100.0	0.0	1.500	628.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Basin B	705	89.184	0.384	4.7	65.8927	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
720 minute winter	Basin B	Orifice	0.5	21.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Basin B	930	89.439	0.639	7.2	138.2475	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Basin B	Orifice	0.7	35.3

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Basin B	945	89.592	0.792	9.7	192.6304	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Basin B	Orifice	0.7	39.6

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Basin B	945	89.543	0.743	8.8	174.4584	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Basin B	Orifice	0.7	38.3

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Basin B	945	89.736	0.936	12.4	251.7195	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Basin B	Orifice	0.8	43.4

Results for 100 year +40% CC +5% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	Basin B	1410	89.768	0.968	9.1	265.7810	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
1440 minute winter	Basin B	Orifice	0.8	60.4

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	500.0		

Nodes

Name	Area (ha)	Cover Level (m)	Depth (m)
Road	0.220	89.000	1.500

Simulation Settings

Rainfall Methodology	FEH-22	Drain Down Time (mins)	240	30 year (l/s)	1.6
Summer CV	0.950	Additional Storage (m³/ha)	20.0	100 year (l/s)	2.1
Winter CV	0.950	Check Discharge Rate(s)	✓	Check Discharge Volume	✓
Analysis Speed	Normal	1 year (l/s)	0.6	100 year 360 minute (m³)	66
Skip Steady State	x	2 year (l/s)	0.6		

Storm Durations

600	720	960	1440	2160	2880	4320	5760	7200	8640	10080

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.220	Betterment (%)	0
SAAR (mm)	623	QBar	0.7
Soil Index	3	Q 1 year (l/s)	0.6
SPR	0.40	Q 2 year (l/s)	0.6
Region	6	Q 30 year (l/s)	1.6
Growth Factor 1 year	0.85	Q 100 year (l/s)	2.1
Growth Factor 2 year	0.88		

Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)	0.220	Storm Duration (mins)	360
Soil Index	3	Betterment (%)	0
SPR	0.40	PR	0.360
CWI	93.778	Runoff Volume (m³)	48

Node Road Online Orifice Control

Flap Valve	x	Invert Level (m)	87.500	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.020		

Node Road Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	87.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	0

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	214.0	0.0	1.500	593.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Road	915	87.704	0.204	2.7	49.4997	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Road	Orifice	0.4	18.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	Road	705	87.883	0.383	6.7	101.7468	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
720 minute winter	Road	Orifice	0.5	21.1

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Road	945	88.003	0.503	7.1	140.9217	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Road	Orifice	0.6	30.0

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Road	945	87.965	0.465	6.5	128.1925	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Road	Orifice	0.6	28.8

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	Road	945	88.121	0.621	9.1	183.5923	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
960 minute winter	Road	Orifice	0.7	33.6