Flood Risk Assessment

Land at Church Lane, Lydden, Dover CT15 7JP

Client

Quinn Estates
Highland Court Farm
Bridge
Canterbury
Kent CT4 5HW
Ref: 12626
Date: August 2023

Consulting Engineers

GTA Civils & Transport Ltd
Maple House
192 – 198 London Road
Burgess Hill
West Sussex
RH15 9RD
Tel: 01444 871444

Index

Schedule of Appendices

Issue	Issue date	Compiled	Checked
Preliminary Issue	31 July 2023	JP	MR
2nd Preliminary/First Issue	01 August 2023	JP	MR

1 Introduction

1.1 GTA Civils Ltd. was appointed by Quinn Estates to provide a Flood Risk Assessment (FRA) report in relation to the proposed development on the land at Church Lane, Lydden, Dover CT15 7JP. No responsibility is accepted to any third party for all or part of this study in connection with this or any other development.

1.2 GTA Civils & Transport Limited was appointed by the client to provide a Flood Risk Assessment (FRA) as requested by the Environment Agency and Dover District Council in order to achieve Planning Approval at said property.

1.3 This report will take the form of a formal Flood Risk Assessment in accordance with the 2021 National Planning Policy Framework (NPPF) and the 2022 Planning Practice Guidance (PPG).

2 Existing Site and Current Flood Conditions

2.1 The application site lies within the area administered by Dover District Council (DDC). It comprises a vacant, greenfield site with access via Church Lane to the west. A site location map and aerial photo are shown in Appendix A.

2.2 Hydrology: The site is located approximately 7.3km northwest of Dover Harbour and the English Channel. The River Dour's source lies approximately 2.2km to the southeast. It flows southeast, depositing into the English Channel at Dover Harbour. Local hydrology can be seen in the site location map and aerial photo in Appendix A.

2.3 Topography: a topographic survey was commissioned – see Appendix C. The site is fundamentally dished shaped with slopes from east to west with levels ranging from 69.35m AOD in the southeast corner to 62.30m AOD on the NE boundary.

2.4 Geology: the BGS's online geology map shows the bedrock is Lewes Nodular Chalk Formation. This is overlain by a T shaped band of Head (silt, sand and gravel) across the centre of the site from SW-NE that extends to the SE boundary. The remaining areas have no recorded drift deposits overlying.

2.5 Falling head tests, in accordance with BRE Digest 365, were undertaken in 4 locations, MS01 – MS04 inclusive. The tests are summarised in Appendix D. From the conclusion of this topic, it is clear that soakaways that encounter the Chalk - at depth, if need be – are viable here. The soakage rate at the low end of the calculated range was 0.134 x 10^{-3}m/s.

2.6 Public sewers: Southern Water's sewer records are shown in Appendix C. Foul sewers under Church Lane from the west and 160 Canterbury Road from the south converge at a manhole (ref 2403) close to the site's south boundary. The subsequent foul sewer runs from SW-NE across the centre of the site (manhole ref 2501), before exiting the site's northern boundary (manhole ref 3501).

2.7 Fluvial flooding: the Environment Agency's (EA) Rivers and Seas flood map in Appendix B indicates that the site lies within Flood Zone 1 (FZ1). Sites in FZ1 have an Annual Exceedance Probability (AEP) of less than 1 in 1000 years (<0.1%) of flooding.

2.8 Surface water flooding: this can occur when excess rainwater does not infiltrate into the ground, or is not intercepted by urban drainage systems, and instead flows across the surface. The EA's Online 'Surface Water Depth - Low Risk Scenario' (1 in 1000 years) Flood Map in Appendix B shows an overland flow route that bisects the site (along its channel). This is liable to flood to a depth of between 300mm and 900mm. In the absence of climate change data online, EA engineers treat the 1 in 1000 years scenario as equivalent to the 1 in 100 year + climate change event. This flooding is effectively

FZ3, therefore, now that the NPPF states that all sources of flooding must be considered equally.

2.9 Although a significant proportion of this site is at low risk of flooding, the overland flow through the site has meant further analysis of the existing stream flows was required. GIS, hydrological data and the topographic survey's digital surface were used to form a model in Site 3D – using data exported from the Scalgo.com online application. Watersheds were added, together with the overland flow route - plus 200mm of flash flooding over the wider vicinity. Refer to the 3 maps in Appendix B relating to Scalgo.com: the first shows the wider catchment to the SW of the site.

2.10 The 2nd and 3rd Scalgo maps in Appendix B show the effect of 200mm of flash flooding applied on to the pre-and post-development surfaces. This Scalgo model is simplified and assumes an impermeable surface with no drainage – and so does not truly represent the actual flood pattern. It has been used here to show where surface water would gather - and overland flow routes.

2.11 Artificial sources: flooding from reservoirs, canals and docks. The EA reservoir flooding map in Appendix B shows the site is not liable to flood from this source. There are no docks or canals nearby.

2.12 Historical Flooding: the EA's historical flood maps in Appendix B show the site has not been affected by flooding in the past.

2.13 Groundwater Flooding: this can occur when groundwater rises up from the underlying aquifer to flood subsurface infrastructure or to emerge at the ground surface. There is no indication in the SFRA that this site has flooded from this source. The EA's Groundwater Vulnerability (GWV) Zone map (in Appendix B) shows the majority of the site overlies a 'Medium-High' zone, while the north, east and south boundaries overlie a 'High' zone. According to the EA's Online Groundwater Source Protection Zones Map the site lies in Zone II – Outer Protection Zone.

2.14 In conclusion, a swathe of the site's flood risk profile is 'High,' due to the susceptibility to flooding from surface water. The remainder's profile is 'Low'.

3 Proposed Development, 'The Sequential Test' & Floodplain Volumes

3.1 Outline Planning Permission is being sought to build up to 23 dwelling houses on this vacant site. Refer to the proposed scheme drawings in Appendix E.

3.2 Sequential / Exception Tests: as summarised in section 2.11 above, the flood risk is ''Low' over a significant proportion – but a wide swathe is liable to flood from surface water in the 1 in 100yrs + CC event.

3.3 Vulnerability and the Sequential Test: the vulnerability classification of any new development should be considered. According to Table 2 of the NPPF's TG, dwellings are classed as 'More Vulnerable'.

3.4 The Sequential and Exception Tests are policy – ie legal - mechanisms created to discourage 'vulnerable use' developments in FZ2 and FZ3. Unless wider planning benefits exist that offset the flood risk issues, this process 'steers' higher vulnerability uses to sites in lower flood-risk zones (eg FZ1.)

3.5 Table 3 of the NPPF states that 'More Vulnerable' uses are appropriate development in Flood Zone 1 but are subject to passing the Sequential / Exception Tests in FZ3A. Figure 1 below shows this table.

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Notes to table 3:
This table does not show:
a. the application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2, and then Zone 3;
b. flood risk assessment requirements; or
c. the policy aims for each flood zone.

Figure 1: Table 3 of the NPPF

3.6 It is understood that this site has been earmarked in the Local Plan for possible future development – and so has effectively passed the Sequential Test. The site has been designed with a Sequential Approach – having engineered the ground levels, ie earmarking a large area over the west of the site to remain as water compatible.

3.7 As identified in section 2.9 above, the overland flow route (dry valley) that bisects the site shows exceedance areas of low and medium risk flooding. The new dwelling houses will be set above the estimated 1 in 1000yrs flood levels – refer to the "Existing Surface Water Flooding, Low Medium and High Risk Overlay to Proposed Layout" in Appendix E. The following table summarises the 1 in 1000yrs flood level over 3 zones within the site, which are in blue pink and grey zones on said layout. The lowest unit's floor level is also tabulated – for ease of reference – to show that the NPPF has been complied with (minimum 0.3m freeboard):

Zone	1 in 1000yrs flood level (mAOD)	Lowest FFL (mAOD)
Pink (Southwest)	63.40	63.80 (63.70 min)
Blue (Centre)	63.25	63.60 (63.55 min)
Grey (Northeast)	63.10	63.50 (63.40 min)

3.8 A new road/path has been set down into the landscape – thereby allowing levels over the eastern majority of the site to be raised. The dry valley will be re-routed to the west of its current path. A length of retaining wall is needed to ensure the new development's levels are sufficiently high – for the development to be viable.

3.9 A floodplain volumes balancing exercise has been carried out to show that a nett increase in floodplain volume is achievable – refer to the "Existing and Proposed Floodplain Volumes" layout in Appendix E. This shows a nett gain of 483m^3 of storage volume as a result of the levels being engineered thus. Not only are isopachytes shown, but also five sections have been produced - to show the variation between pre- and post-development floodplains.

4 Drainage Strategy

4.1 Surface water drainage: the order of the SuDS hierarchy was considered. The soil's soakage rate is likely to be too low for *shallow* infiltration features (refer to section 2.5 above and Appendix D) - and this will be confirmed at the next stage. The development's surface water will be routed to 3 deep bore soakaways - refer to the drainage strategy layout in Appendix F.

4.2 Various sustainable drainage systems were considered to store the excess storm water:

- Porous Pavings: private drives will be lined permeable paved and are shown indicatively on the outline drainage strategy layout in Appendix F.
- Ponds: due to the tight topography and overland flow route, a pond is not suitable here.
- Swales: short lengths of swale will be looked at during the next stage.
- Rainwater harvesting tanks: the use of rainwater harvesting tanks on a residential development where each householder would be required to maintain their own tank is not generally considered good practice or commercially viable.
- In addition, smart sponges and or deep pot gullies are likely to be needed in the estate roads – to be finalised at reserved matters stage.

4.3 A soakage rate of **3.1l/s** has been chosen – derived from the falling head test result of 1.34 x 10^{-4}m/s together with GTA's experience of similar sites where there is Chalk at 3m+ bgl. Full Site Investigation will be undertaken at the next stage, this to include compliant deep bore soakaway testing (to BS 5930).

4.4 Each deep bore soakaway will have an SDS attenuation tank upstream, which has been sized to hold the volume in the critical 1 in 100 years + 45% climate change event. SDS tanks are cellular storage tanks with 150mm deep filter drains over their bases.

4.5 Micro Drainage Source Control calculations are shown in Appendix F.

4.6 Runoff from the roads will be routed into the deep bore soakaways. Treatment shall be provided by either deep pot gullies or smart sponges.

4.7 The filters in each tank and the gullies (deep pot/smart sponges) will provide the necessary treatment. According to CIRIA guidelines Table 26.2 - Pollution Hazard Indices - shows that for a residential estate road the TSS, Metals and hydrocarbon indices are 0.5, 0.4 and 0.4 respectively – see table overleaf:

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

CIRIA SUDS manual table 26.2

4.8 Table 26.4 – mitigation indices - shows that a filtration layer (in the drives' porous pavings as well as the SDS tanks) will provide the necessary mitigation for this – as the 3 relevant indices are greater than the pollution equivalents:

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater

Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[5, 6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

4.9 The main roads will be impermeable, constructed to adoptable standards - and drain into a proposed Section 104 adopted surface water sewer network.

4.10 Maintenance of the SuDS network will remain the responsibility of the Applicant. Ownership and maintenance responsibilities for the proposed drainage system will be set out in a SuDS Management and Maintenance Plan – to be drafted at Reserved Matters stage. This Plan will be drafted with reference to the relevant sections in CIRIA's SuDS Manual (C753).

4.11 Exceedance flows: if the sub-base were to 'fail', ie get silted up, the resulting flow would go northeast – as the greenfield flow route does currently. Refer to the drainage strategy layout in Appendix E.

4.12 Foul drainage: it is proposed to discharge the development's foul water into the existing public foul sewer – via gravity - at a new lateral connection manhole to the north end of the site.

4.13 Permission to discharge into the sewer – by means of an application under Section 106 of the Water Industry Act 1991 - during the next stage will be sought from Southern Water, the owner of the sewerage network.

Conclusion:

This development will not increase the flood risk, either on this site or to neighbouring properties, and so complies fully with the 2021 NPPF and 2022 PPG.

- End of Report -

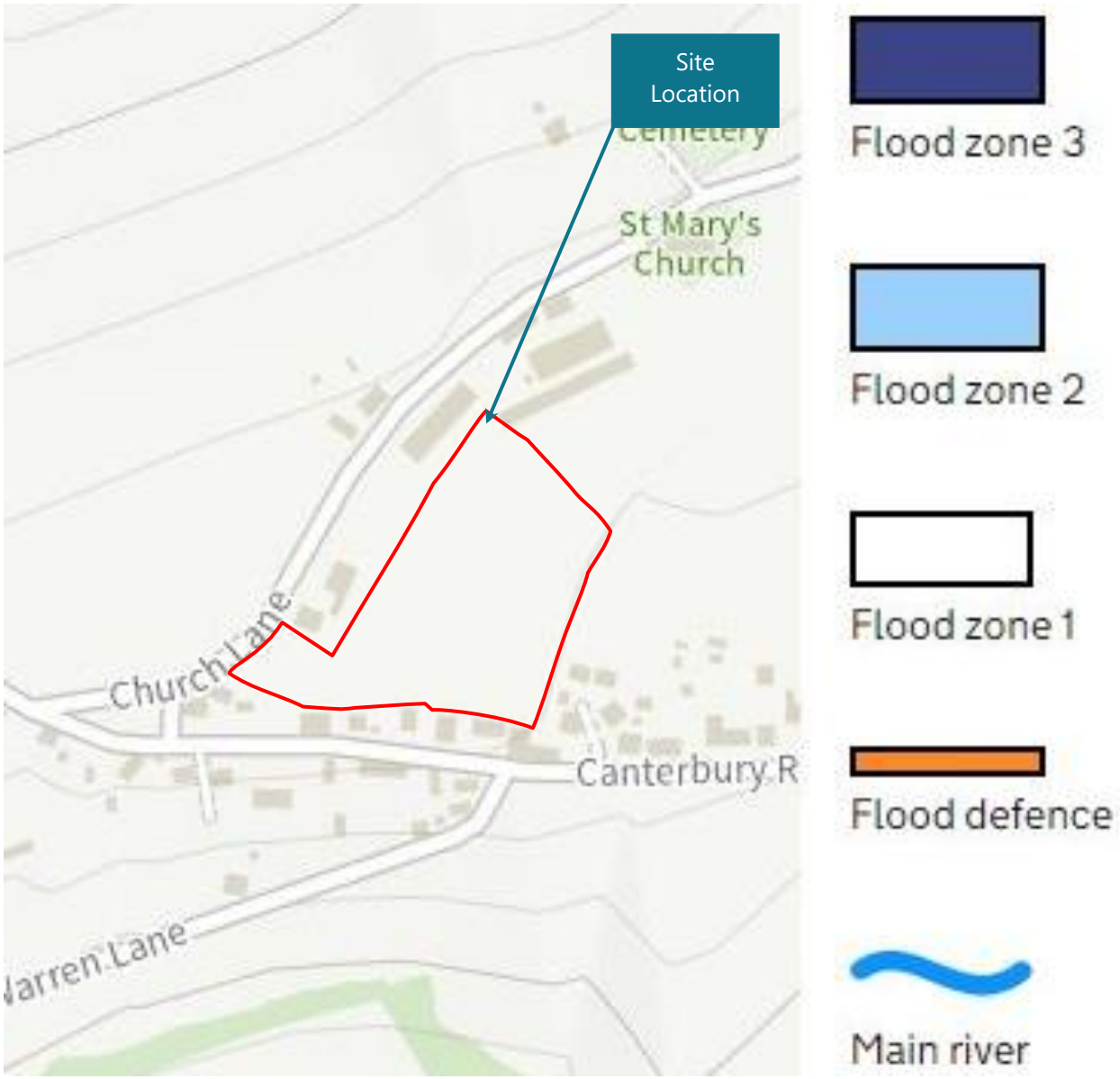
Appendix A

Site Location Map & Aerial Photo


Site
Location

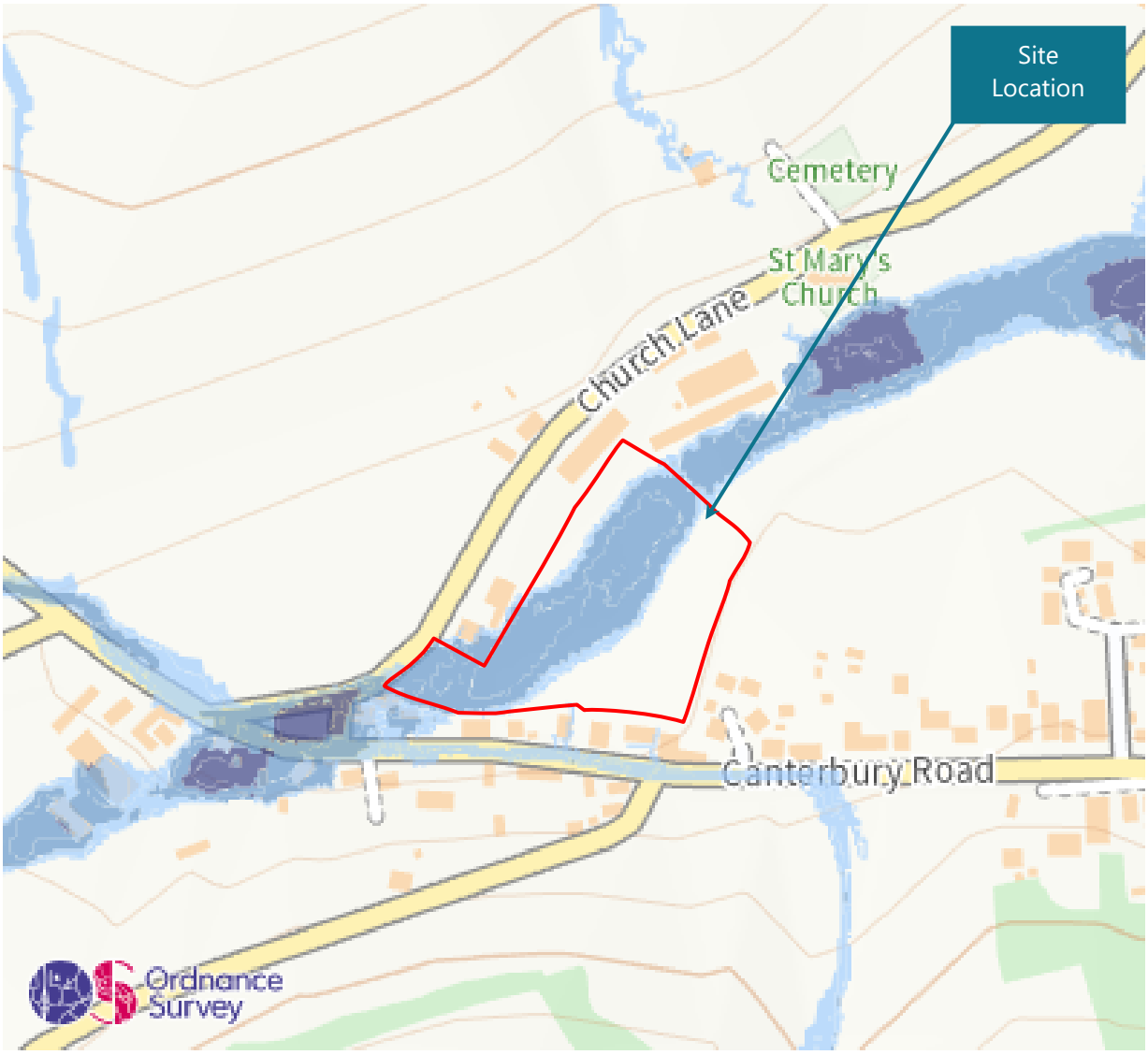
Appendix B

Environment Agency Flood Maps



EA's Online Flood Map for Planning (Rivers and Seas)

The site is located in Flood Zone 1 (FZ1)



Surface water flood risk: water depth in a low risk scenario

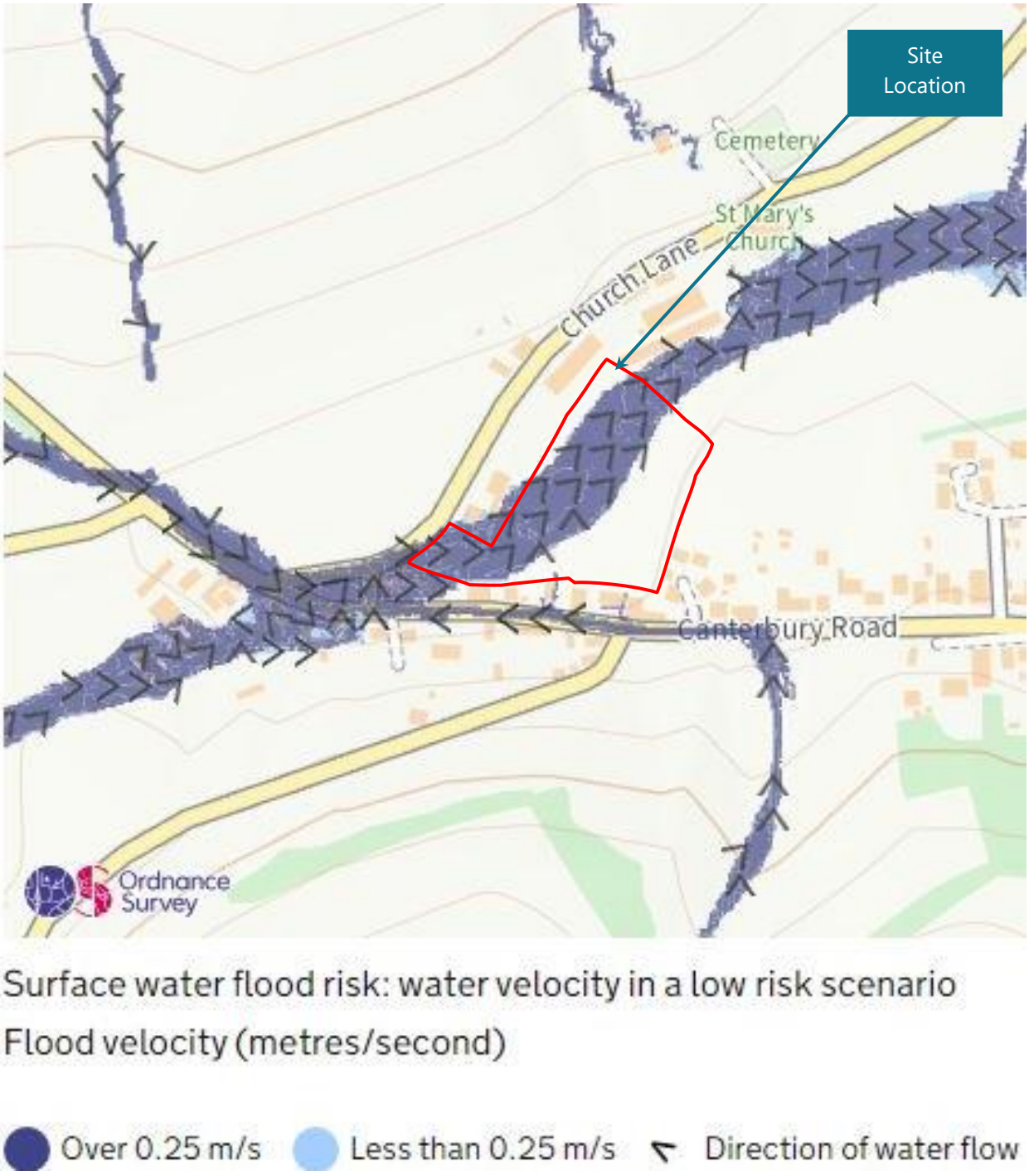
Flood depth (millimetres)

Over 900mm | 300 to 900mm | Below 300mm

EA's Online Surface Water Flood Depth Map in the 'Low Risk Scenario'

(1 in 1000 years storm event)

A SW-NE overland flow route travels through the centre of the site, liable to flood between 300mm and 900mm



EA's Online Surface Water Flood Velocity Map in the 'Low Risk Scenario'
(1 in 1000 years storm event)

An overland flow route flows SW-NE through the centre of the site at a velocity of over 0.25m/s

Site Location

SCALGO OUTPUT
EXISTING SURVEY
SURFACE.
200mm rainfall on surface

Legend

Elevation

12626 Church Lane, Lydden

60 m 80 m 100 m 120 m 140 m

Flooded Areas

12626 Church Lane, Lydden, Rain: 20.00 m.

0.0 m 0.2 m 0.4 m 0.6 m 0.8 m

Flow Accumulation

12626 Church Lane, Lydden, Rain: 20.00 m., Flow Network Detail: at least 500.00 m².

0.1 ha 1 ha 0.1 km² 1 km² 10 km² 100 km²

Topographic Map

Outdoor

Watersheds

12626 Church Lane, Lydden, Rain: 20.00 m.

Location 624277, 144010

Scale: 1:20000

SCALGO OUTPUT
EXISTING SURVEY
SURFACE.
200mm rainfall on surface

SITE

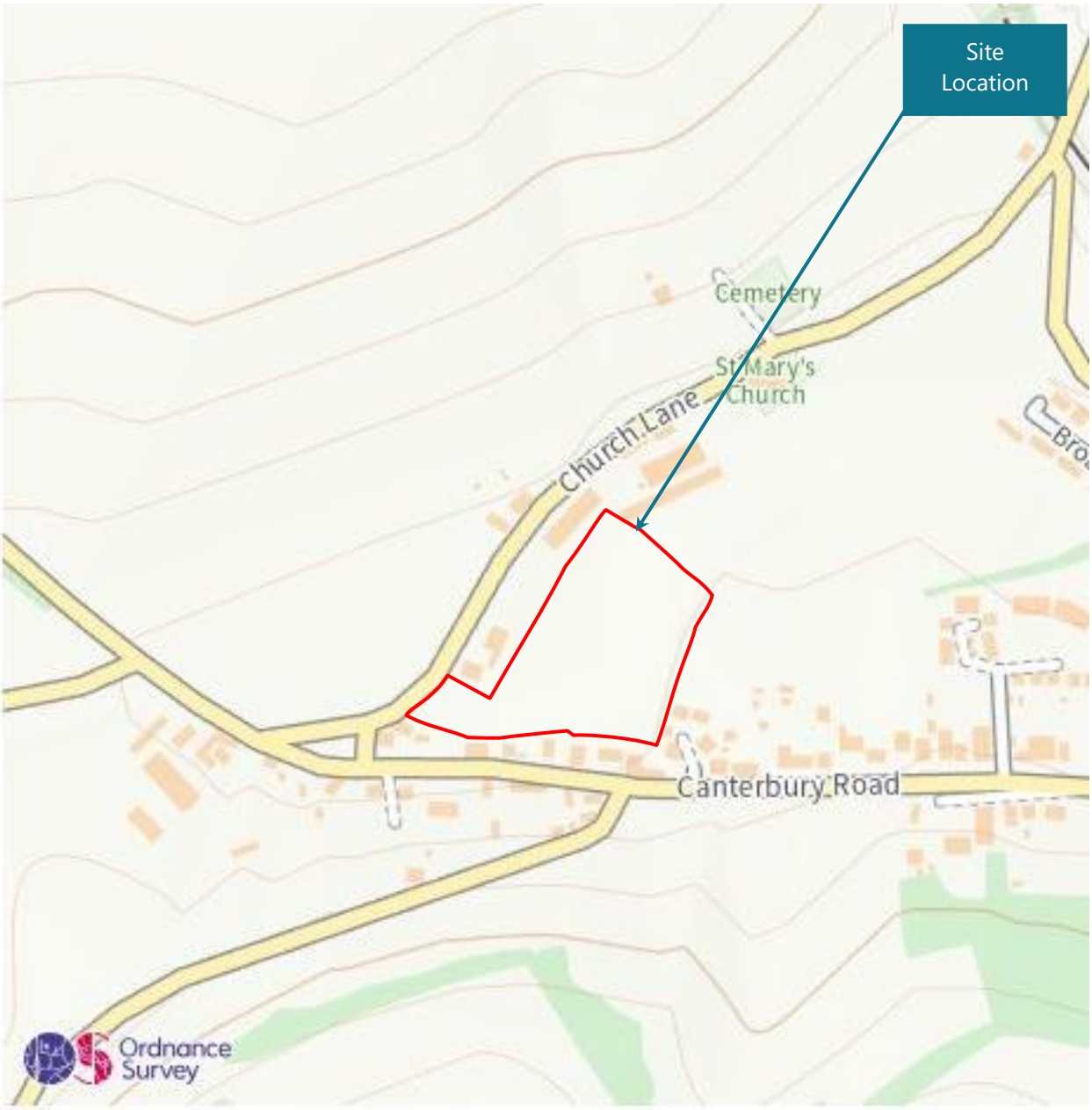
Church Lane
Stonehall
Broadacre
Canterbury Road
Lydden Hill
Warren Lane
St Mary the Virgin

SCALGO OUTPUT
PROPOSED SITE LEVELS

200mm rainfall on surface

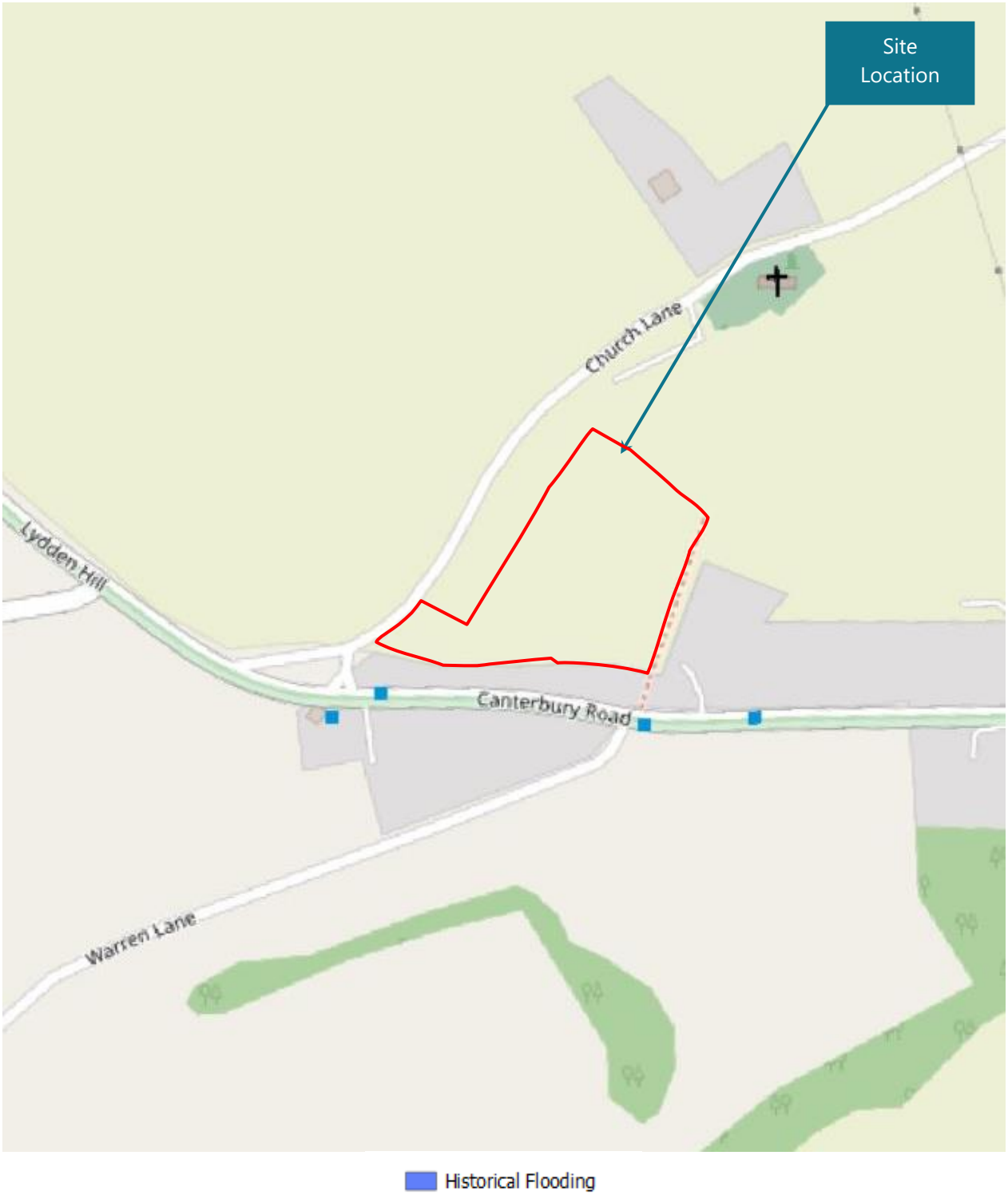
SITE

Church Lane
Stonehall
Broadacre
Canterbury Road
Lydden Hill
Warren Lane
St Mary the Virgin
Old Lydden Hall
20 m



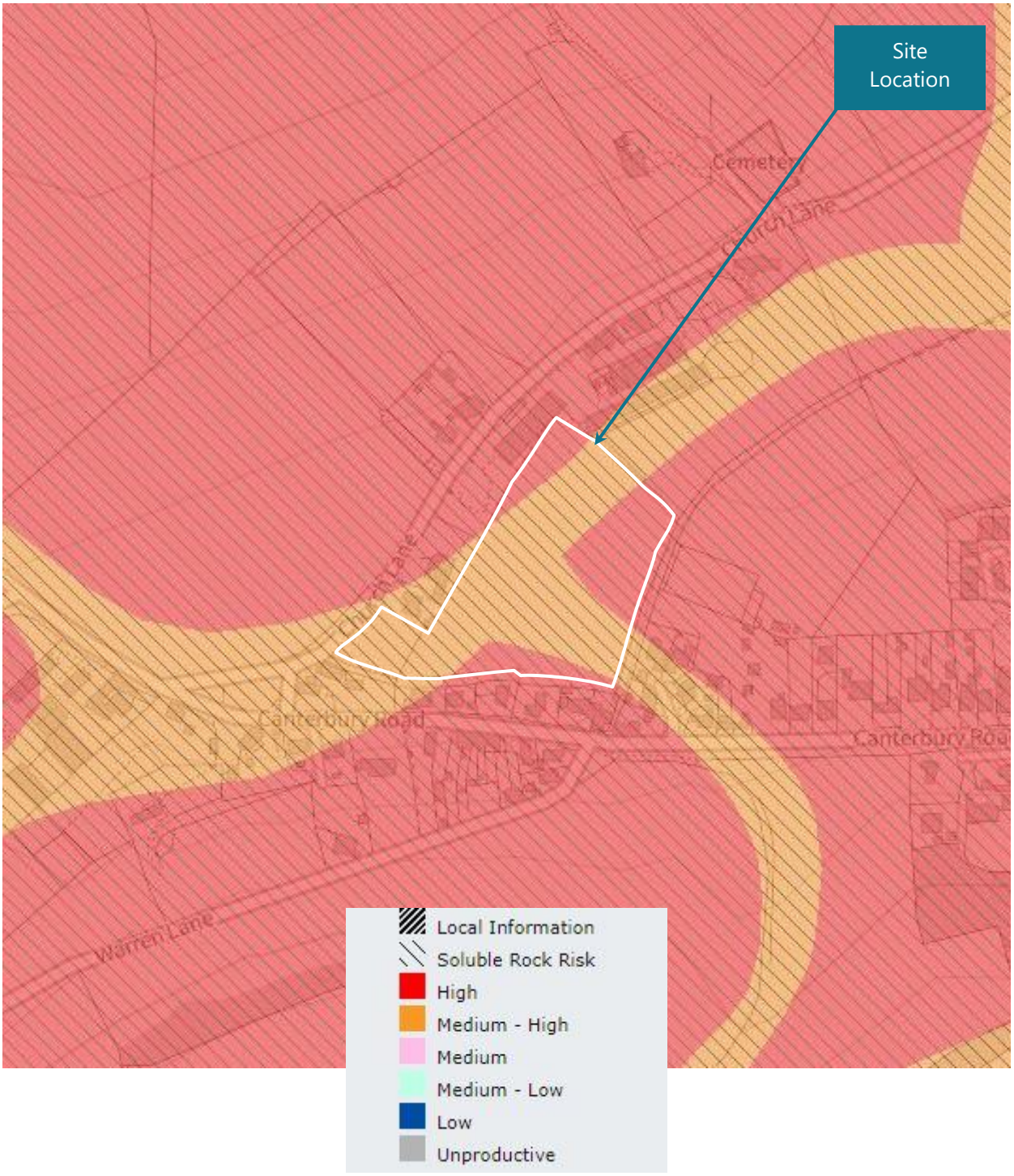
EA's Online Risk of Flooding from Reservoirs' Map

The site is not liable to flood from this source



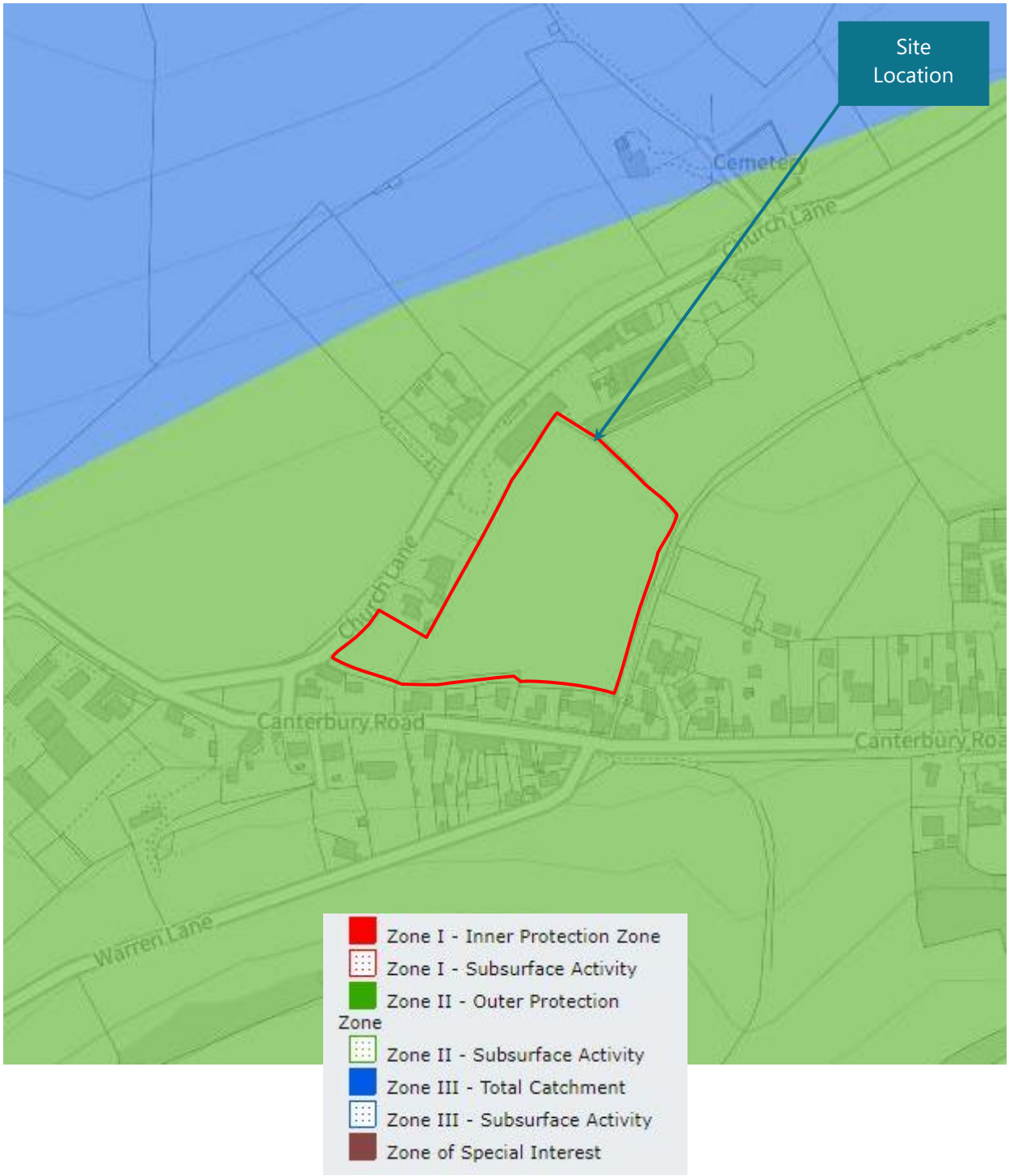
Environment Agency's Online Historic Flood Map

The site has not been affected by flooding in the past



Environment Agency's Groundwater Vulnerability Zone Map

The majority of the site overlies a 'Medium - High' zone, while the north, east and south boundaries overlie a 'High' zone

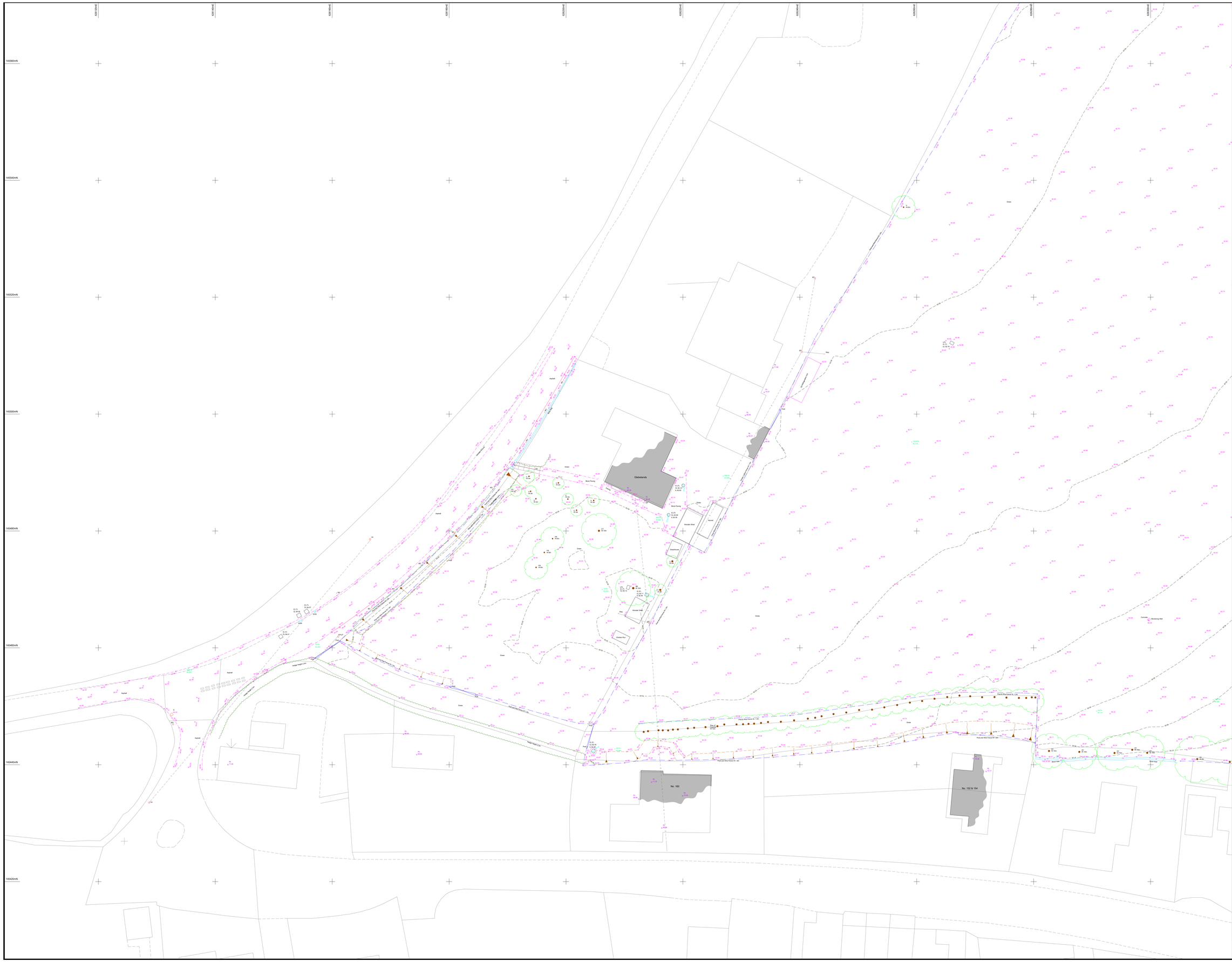


Environment Agency's Online Groundwater Source Protection Zones Map

The site lies in Zone II – Outer Protection Zone

Appendix C

Topographic Survey & Sewer Records



Project Datum

All levels and coordinates are related to the Ordnance Survey national grid by means of GPS using the Leica Smartnet RTK network. One survey control point has been fixed using GPS and then the survey orientated to an additional GPS points. No scale factor has been applied therefore only the fixed GPS point is a true Ordnance Survey position.

Topographical Survey Legend

BEB	Bebeha Beacon	FH	Fire Hydrant	RL	Ridge Level
BH	Borehole	FL	Flood Light	RS	Road Sign
BO	Bollard	FP	Floodlight Pole	RWall	Retaining Wall
BO	Bollard	GI	Gully	RWP	Rain Water Pipe
BP	Brick Pillar	GB	Grit Box	SEG	Side Entry Gully
BS	Bus Shelter	GIC	Grid Box/Junction Cover	S	Step
BWall	Brick Wall	GM	Gas Meter	SSL	Structural Slab Level
BS	Bus Stop	GP	Gas Pipe	STN	Survey Station
CB	Call Box	GV	Gas Valve	STAN	Stanchion
CBF	Close Board Fence	Ht	Height (in meters)	SU	Step Up
CL	Cover Level	IC	Inspection Cover	SV	Stop Valve(W)Water(G)Gas
CL	Chain Link Fence	IL	Invert Level (FoulS)Storm	TS	Traffic Signal
Conc	Concrete	IL	Invert Level	TAC	Tactile Paving
CPF	Chestnut Paling Fence	JB	Junction Box	TCB	Telephone Call Box
CPS	Concrete Post	LP	Lamp Post	TEP	Telephone / Elec Pole
CPS	Concrete Paving Slabs	MB	Multi Boled Tree	THL	Threshold Level
CRW	Concrete Retaining Wall	MK	Service Marker	TIC	Telecom Inspection Cover
CS	Concrete Step	MPF	Mesh Panel Fence	TP	Traffic Sign Pole
DC	Drainage Channel	NP	Name Plate	TL	Traffic Light
DL	Dilapidated	OBF	Open Board Fence	TLCB	Traffic Light Control Box
DP	Down Pipe	P	Post & Rail	TOB	Top Of Bank Level
DPC	Damp Proof Course	PCF	Post & Chain Fence	TWL	Top Of Wall Level
EIC	Electric Inspection Cover	PM	Parking Meter	UTL	Unable To Lift
ES	Electric Post	PWF	Post & Wire Fence	UNK	Unknown Inspection Cover
EX	Excess Arch	PWF	Post & Rail Fence	WM	Water Meter
ER	Earth Rod	PWL	Parapet Wall Level	WMF	Wire Mesh Fence
FB	Flower Bed	PWF	Post & Wire Fence	WTL	Water Level
FFL	Finished Floor Level	RE	Rotating Eye	VP	Vent Pipe

Tree Species

AC	Acer	FR	Fruit	LN	London Plane
AS	Ash	HB	Hawthorn	LR	Laurel
AL	Alder	HB	Hornbeam	MA	Maple
BE	Beech	HC	Horse Chestnut	MG	Magnolia
CE	Cedar	HY	Holly	OA	Oak
CH	Cherry	HZ	Hazel	PI	Pine
CS	Chestnut	IV	Ivy	PO	Poplar
DK	Dead	LB	Laburnum	RO	Rowan
EL	Elm	LI	Lime	SB	Silver Birch

SC	Sweet Chestnut		
SH	Shrub		
ST	Stump		
SY	Sycamore		
U	Unidentified		
WA	Walnut		
WB	Whitebeam		
WI	Willow		
YE	Yew		

Line Types

- Steps / Ramps
- Top / Bottom of Banking
- Bushes / Vegetation
- Change of Surface
- Detail
- Overhead Structure
- Telecom Overhead
- Telecom & Power Overhead
- Power Overhead
- Fence
- Building Face
- Crop Kerb
- Hedge
- Wall / Structure
- Single Gate
- Double Gate
- Banking
- Survey Station

All levels and dimensions are quoted in metres. Tree girths and canopy spreads are surveyed as a mean size and shown to scale. Tree heights are quoted based on an estimation taken from the ground and have not been accurately confirmed.
Whilst every effort is made to identify tree species and sizes, no responsibility can be taken for the accuracy of this information and an Arboriculist should be consulted for confirmation.
Boundary lines are indicative only.
It is recommended that all invert levels and pipe sizes be checked prior to construction.
Drawing correct at time of survey and to scale.
Any setting out works should be undertaken using Omega Geomatics Ltd survey control only.

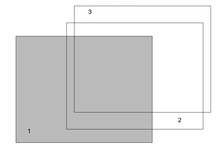
Measured Building Survey Legend

ACL	Arch Center Level / Height above floor
CH	Ceiling Height / Height above floor
C/H	Window C/E to Window Head Dimension
CLG	Ceiling Level / Height above floor
DH	Door Height / Height above floor
DHL	Door Head Level
F-C	Floor to Window C/E Dimension
FL	Floor Level
RG	Ramp Up
SCL	Suspended / False Ceiling Level / Height above floor
SL	Slab Level
SU	Step(s) Up
UH	Underside Height above floor
THL	Threshold Level
TWL	Top of Wall Level
US	Underside Level / Height above floor
USB	Underside of Beam level / Height to underside above floor
USL	Underside of Slab level / Height to underside above floor
WACL	Window Arch Center Level
WASL	Window Arch Spring Level
WCL	Window C/E Level
WHL	Window Head Level

- Sloping Roof
- Sloped Ceiling (Points up)
- Arched / Vaulted Ceiling
- Building Line / Wall Line
- Detail / Steps
- Window Detail
- Partitions
- Glazing

All building measurements are taken to existing finishes or faces which are constant and represent an average throughout. All levels and dimensions are subject to confirmation.
All window head and window cill levels are internal measurements.
Ceiling height measurements are taken to a point which best represents the general room height.

SHEET LAYOUT



N

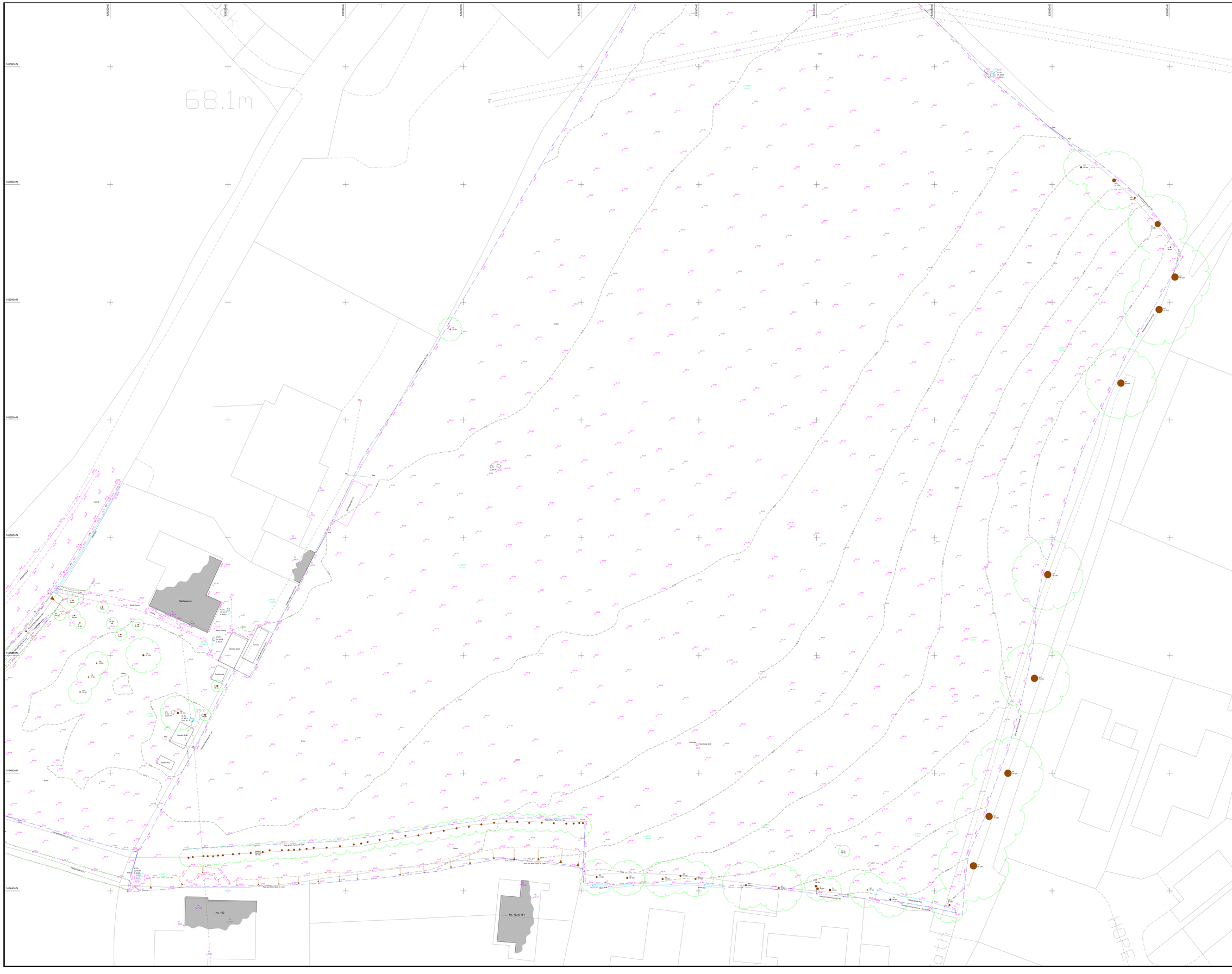
Drawing Revisions		
Rev No.	Date	Details
B		
A		
Original	See below	Original survey carried out

OmegaGeo
Member of ices RICS
Unit 5 Hoath Business Centre
Hoath Lane
Gillingham
Kent.ME8 0BF
+44 (0)1634 751 002
www.OmegaGeo.co.uk
survey@OmegaGeo.co.uk

Client
QUINN ESTATES

Project
LAND AT CHURCH LANE
LYDDEN, DOVER
KENT, CT15 7JP

Original Survey Date	OCTOBER 2019
Job Ref	1911858
Presentation Scale	1:200 @AO
Drawing Number	1 OF 3



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BP	Brick Pillar	GB	Grit Box	SEG	Side Entry Gully
BW	Brick Wall	GC	Gas Inspection Cover	SI	Step
BWK	Brick Wall	GM	Gas Meter	SSL	Structural Slab Level
BS	Bus Stop	GP	Gas Pipe	STN	Survey Station
CB	Call Box	GV	Gas Valve	SVP	Soil Vent Pipe
CBF	Close Board Fence	HI	Height (in meters)	SU	Step Up
CL	Cover Level	IC	Inspection Cover	SV	Stop Valve/W/Water/G/Gas
CLF	Chain Link Fence	IL	Invert Level (FoulS)/Storm	TB	Traffic Bollard
CON	Concrete	IL	Invert Level	TAC	Tactile Paving
CPF	Chestnut Paling Fence	JB	Junction Box	TCB	Telephone Call Box
CPO	Concrete Post	LC	Light Column	TEB	Telephone / Elec Box
CPS	Concrete Paving Slabs	MB	Multi Bollard Tree	THL	Threshold Level
CRW	Concrete Retaining Wall	MK	Service Marker	TIC	Telecom Inspection Cover
DCL	Drainage Channel	MT	Telecom Marker	TL	Traffic Light
DCL	Drainage Channel	NP	Name Plate	TL	Traffic Light
DIL	Dilapidated	OBF	Open Board Fence	TLCB	Traffic Light Control Box
DW	Dog Waste	PB	Parking Bay	TOB	Top Of Bank
DPC	Damp Proof Course	PCF	Post & Chain Fence	TWL	Top Of Wall Level
EIC	Electric Inspection Cover	PM	Parking Meter	UTL	Unable To Lift
EL	Electric Pole	PRF	Post & Rail Fence	UNK	Unknown Inspection Cover
ES	Electric Shed	PWF	Post & Wire Fence	WM	Water Meter
ER	Earth Rod	PWL	Parapet Wall Level	WMF	Wire Mesh Fence
FB	Flower Bed	PWF	Post & Wire Fence	WTL	Water Level
FFL	Finished Floor Level	RE	Rodding Eye	VP	Vent Pipe

Tree Species

AC	Acer	FR	Fruit	LN	London Plane
AP	Apple	HB	Hawthorn	MC	Monkey
AS	Ash	HB	Hornbeam	MA	Maple
BE	Beech	HC	Horse Chestnut	MG	Magnolia
CE	Cedar	HY	Holly	OA	Oak
CH	Cherry	HZ	Hazel	PI	Pine
CY	Cypress	LA	Larch	PL	Plane
DK	Dwarf	LB	Laburnum	RO	Rowan
EL	Elm	LI	Lime	SB	Silver Birch
				SC	Sweet Chestnut
				SH	Sycamore
				ST	Stump
				SY	Syrahlore
				U	Unidentified
				WA	Walnut
				WB	Whitebeam
				WI	Willow
				YE	Yew

Line Types

- Steps / Ramps
- Top / Bottom of Banking
- Bushes / Vegetation
- Change of Surface
- Detail
- Overhead Structure
- Telecom Overhead
- Telecom & Power Overhead
- Power Overhead
- Fence
- Building Face
- Crop Kerb
- Kerb
- Wall / Structure
- Single Gate
- Double Gate
- Banking
- Survey Station

All levels and dimensions are quoted in metres. Tree girths and canopy spreads are surveyed as a mean size and shown to scale. Tree heights are quoted based on an estimation taken from the ground and have not been accurately confirmed.

Whilst every effort is made to identify tree species and sizes, no responsibility can be taken for the accuracy of this information and an Arboriculist should be consulted for confirmation.

Contours are shown at 0.5m intervals.

It is recommended that all invert levels and pipe sizes be checked prior to construction.

Drawing correct at time of survey and to scale.

Any setting out works should be undertaken using Omega Geomatics Ltd survey control only.

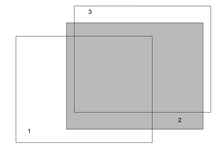
Measured Building Survey Legend

ACL	Arch Center Level / Height above floor
C/H	Window Cill to Window Head Dimension
C/H	Window Cill to Window Head Dimension
CLG	Ceiling Level / Height above floor
CLG	Ceiling Level / Height above floor
DHL	Door Head Level
F-C	Floor to Window Cill Dimension
FL	Floor Level
RO	Ramp Up
SCL	Suspended / False Ceiling Level / Height above floor
SL	Slab Level
SU	Step(s) Up
TCL	Threshold Height above floor
THL	Threshold Level
TWL	Top of Wall Level
UB	Underside Level / Height above floor
USB	Underside of Beam level / Height to underside above floor
USL	Underside of Slab level / Height to underside above floor
WACL	Window Arch Center Level
WASL	Window Arch Spring Level
WCL	Window Cill Level
WHL	Window Head Level

- Sloping Roof
- Sloped Ceiling (Points up)
- Arched / Vaulted Ceiling
- Building Line / Wall Line
- Detail / Steps
- Fixtures & Detail
- Partitions
- Glazing

All building measurements are taken to existing finishes or faces which are constant and represent an approximate average. All levels and dimensions are subject to confirmation.
All window head and window cill levels are internal measurements.
Ceiling height measurements are taken to a point which best represents the general room height.

SHEET LAYOUT



N

Drawing Revisions

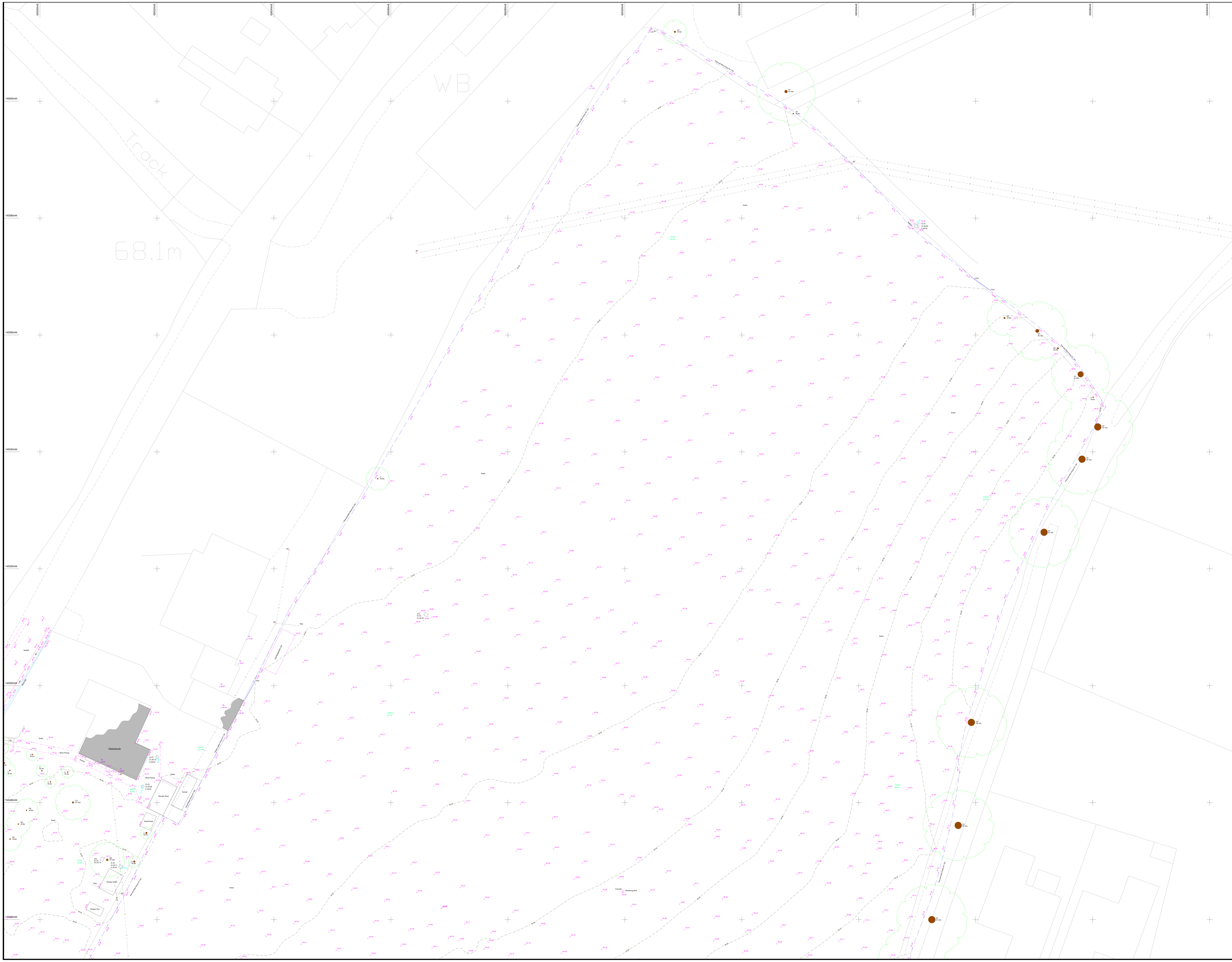
Rev No.	Date	Details
B		
A		
Original	See below	Original survey carried out

OmegaGeo
Unit 5 Hoath Business Centre
Hoath Lane
Gillingham
Kent ME8 0BF
+44 (0)1634 751 002
www.OmegaGeo.co.uk
survey@OmegaGeo.co.uk

Client: QUINN ESTATES

Project: LAND AT CHURCH LANE
LYDDEN, DOVER
KENT, CT15 7JP

Original Survey Date	OCTOBER 2019
Job Ref	1911858
Presentation Scale	1:200 @AO
Drawing Number	2 OF 3



Project Datum

All levels and coordinates are related to the Ordnance Survey national grid by means of GPS using the Leica Smartnet RTK network. One survey control point has been fixed using GPS and then the survey orientated to an additional GPS points. No scale factor has been applied therefore only the fixed GPS point is a true Ordnance Survey position.

Topographical Survey Legend

BEB	Belisha Beacon	FH	Fire Hydrant	RL	Ridge Level
BH	Borehole	FL	Flood Light	RS	Road Sign
BL	Base Level	FP	Flag Pole	RTW	Retaining Wall
BO	Bollard	G	Gully	RWP	Rain Water Pipe
BP	Brick Pillar	GB	Grit Box	SEG	Side Entry Gully
BPav	Brick Paving	GIC	Gas Inspection Cover	SI	Sign
BRW	Brick Wall	GM	Gas Meter	SSL	Structural Slab Level
BS	Bus Stop	GP	Gas Pipe	STN	Survey Station
BW	Block Wall	GV	Gas Valve	STW	Stone Wall
CBF	Close Board Fence	Ht	Height (in meters)	SU	Step Up
CL	Cover Level	IC	Inspection Cover	SV	Stop Valve(W)Water(G)Gas
CLF	Chain Link Fence	IC(C)	(C)Combined(F)Foul(S)Storm	SVP	Soil Vent Pipe
Conc	Concrete	IL	Invert Level	TAC	Tactile Paving
CPF	Chestnut Paling Fence	JB	Junction Box	TCB	Telephone Call Box
CPO	Concrete Post	LP	Lamp Post	TEP	Telegraph & Electric Pole
CPS	Concrete Paving Slabs	MB	Multi Boled Tree	THL	Threshold Level
CRW	Concrete Retaining Wall	MK	Service Marker	TIC	Telecom Inspection Cover
CW	Concrete Wall	MRF	Metal Railing Fence	TM	Ticket Machine
DC	Drainage Channel	NP	Name Plate	TL	Traffic Light
DIL	Dilapidated	OBF	Open Board Fence	TLCB	Traffic Light Control Box
DP	Down Pipe	PB	Post Box	TP	Telegraph Pole
DPC	Damp Proof Course	PCF	Post & Chain Fence	TWL	Top Of Wall Level
EIC	Electric Inspection Cover	PM	Parking Meter	UTL	Unable To Lift
EL	Eaves Level	PNF	Panel Fence	WIC	Water Inspection Cover
EP	Electric Pole	PRF	Post & Rail Fence	WM	Water Meter
ER	Earth Rod	PRL	Parapet Wall Level	WMF	Wire Mesh Fence
FB	Flower Bed	PWF	Post & Wire Fence	WTL	Water Level
FFL	Finished Floor Level	RE	Rodding Eye	VP	Vent Pipe

Tree Species

AC	Acer	FR	Fruit	LN	London Plane	SC	Sweet Chestnut
AL	Alder	HA	Hawthorn	LO	Locust	SP	Spruce
AS	Ash	HB	Hornbeam	MA	Maple	ST	Stump
BE	Beech	HC	Horse Chestnut	MG	Magnolia	SY	Sycamore
CE	Cedar	HY	Holly	OA	Oak	U	Unidentified
CH	Cherry	HZ	Hazel	PI	Pine	WA	Walnut
CY	Cypress	LA	Larch	PO	Poplar	WB	Whitebeam
DE	Dead	LB	Laburnum	RO	Rowan	WI	Willow
EL	Elm	LI	Lime	SB	Silver Birch	YE	Yew

Line Types

Steps / Ramps	Fence
Top / Bottom of Banking	Building Face
Bushes / Vegetation	Drop Kerb
Change of Surface	Kerb
Detail	Wall / Structure
Overhead Structure	Single Gate
T Telecom Overhead	Double Gate
T & E Telecom & Power Overhead	Banking
E Power Overhead	Survey Station

All levels and dimensions are quoted in metres. Tree girths and canopy spreads are surveyed as a mean size and shown to scale. Tree heights are quoted based on an estimation taken from the ground and have not been accurately confirmed.
Whilst every effort is made to identify tree species and sizes, no responsibility can be taken for the accuracy of this information and an Arborologist should be consulted for confirmation.
Eave levels are taken at the bottom of the lowest roof tile.
It is recommended that all invert levels and pipe sizes be checked prior to construction.
Drawing correct at time of survey and to scale.
Any setting out works should be undertaken using Omega Geomatics Ltd survey control only.

Measured Building Survey Legend

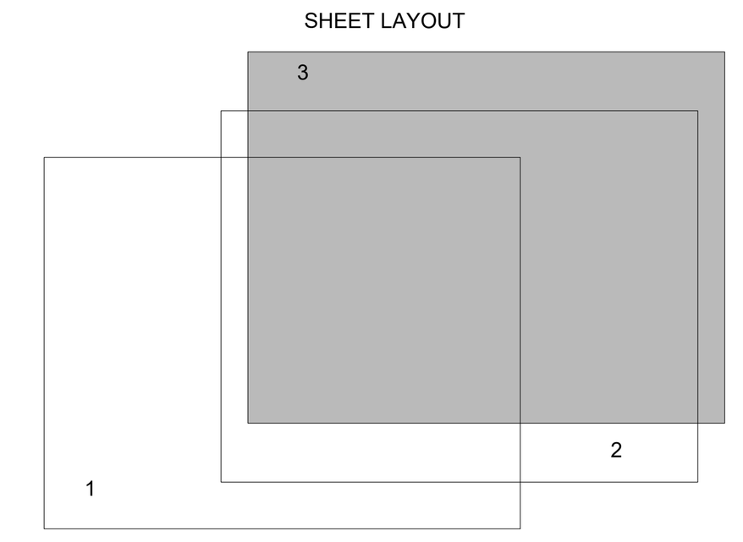
ACL	Arch Center Level / Height above floor
ASL	Arch Spring Level / Height above floor
C-H	Window Cill to Window Head Dimension
CLG	Ceiling Level / Height above floor
DH	Door Head Height above floor
DHL	Door Head Level
F-C	Floor to Window Cill Dimension
FL	Floor Level
RU	Ramp Up
SCLG	Suspended / False Ceiling Level / Height above floor
SL	Slab Level
SU	Step(s) Up
TH	Threshold Height above floor
THL	Threshold Level
TWL	Top of Wall Level
US	Underside Level / Height above floor
USB	Underside of Beam level / Height to underside above floor
USJ	Underside of Joist level / Height to underside above floor
WACL	Window Arch Center Level
WASL	Window Arch Spring Level
WCL	Window Cill Level
WHL	Window Head Level

Sloping Roof	Building Line / Wall Line
Sloped Ceiling (Points up)	Detail / Steps
Arched / Vaulted Ceiling	Overhead Detail
	Partitions
	Glazing

All building measurements are taken to existing finishes or faces which are constant and represent an average face or wall line. All levels and dimensions are quoted in metres.
All window head and window cill levels are internal measurements.
Ceiling height measurements are taken to a point which best represents the general room height.

An Ordnance Survey map is shown in the background in grey. Omega Geomatics Ltd takes no responsibility for the accuracy of this information. Its purpose on this drawing is as a guide only and should not be relied upon.

SHEET LAYOUT



N

Drawing Revisions

Rev No.	Date	Details
B		
A		
Original	See below	Original survey carried out

OmegaGeo
chartered ICES RICS
Unit 5 Hoath Business Centre
Hoath Lane
Gillingham
Kent ME8 0BF
+44 (0)1634 751 002
www.OmegaGeo.co.uk
survey@OmegaGeo.co.uk

Client	QUINN ESTATES
Project	LAND AT CHURCH LANE LYDDEN, DOVER KENT, CT15 7JP
Original Survey Date	OCTOBER 2019
Job Ref	1911858
Presentation Scale	1:200 @AO
Drawing Number	3 OF 3

SEWER RECORDS PAGE 1 OF 2

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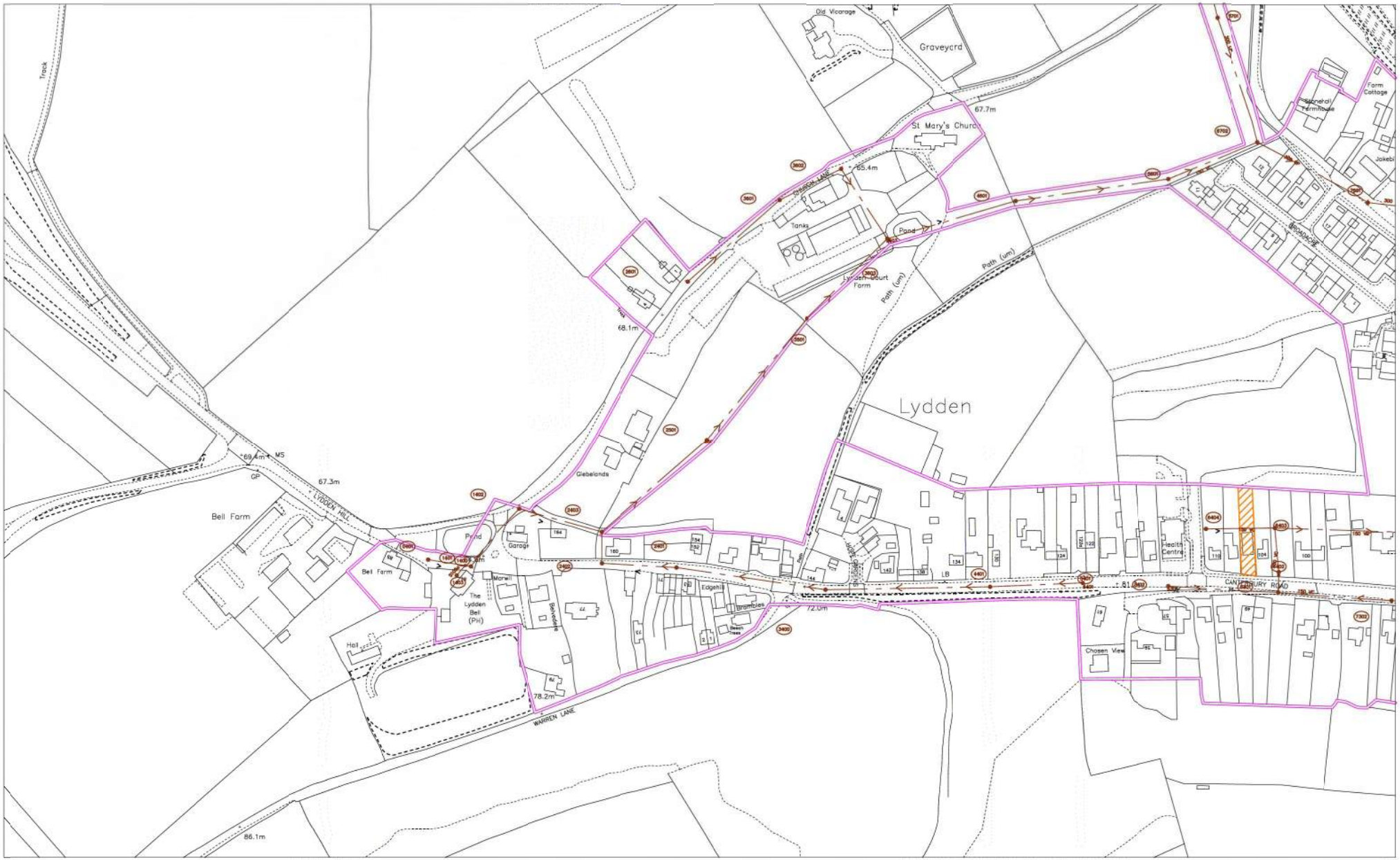


145223

625800

626742

O.S. REF. TR2645NW	Drawn by: rohandas	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement
	Scale: 1:2500	
Title: 308871_Land off Church Lane, L	Date: 14/09/2018	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

N

Southern Water

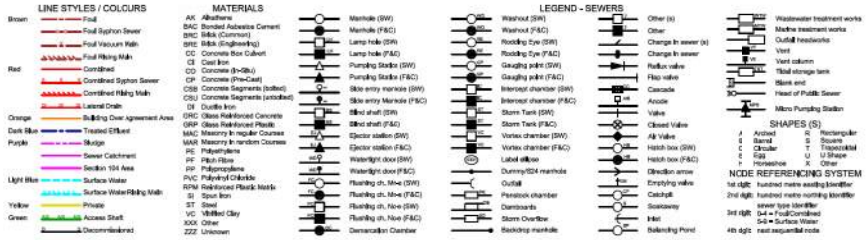
SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape
0401X	64.91		UNK	UNK	CIRC
1401X	65.02	62.86	150	VC	CIRC
1402X	64.36	62.57	150	VC	CIRC
1403X	0.5		UNK	UNK	CIRC
140DX			UNK	UNK	CIRC
2401X	68.01	66.46	150	VC	CIRC
2402X	66.21		UNK	UNK	CIRC
2403X	63.73	62.23	150	VC	CIRC
2501X			UNK	UNK	CIRC
2601X	68.06	66.71	150	VC	CIRC
3400X	72.87	71.47	150	VC	CIRC
3501X	62.87	60.39	150	VC	CIRC
3601X	67.06	65.68	150	VC	CIRC
3602X	65.41	64	150	VC	CIRC
3603X			UNK	UNK	CIRC
4401X	78.19		UNK	UNK	CIRC
4601X	61.1	58.99	150	VC	CIRC
5401X			UNK	UNK	CIRC
5402X			UNK	UNK	CIRC
5601X	60.72	58.27	150	VC	CIRC
6401X	81.47	79.76	150	VC	CIRC
6402X	80.41	78.24	150	VC	CIRC
6403X	78.23	76.93	150	VC	CIRC
6404X	80.79	79.6	150	VC	CIRC
6701X	66.42	64.82	300	CP	CIRC
6702X	59.94	57.71	300	CP	CIRC
7302X	81.66	80.64	150	VC	CIRC
7601X	59.04	57.11	300	CP	CIRC

Node	Cover	Invert	Size	Material	Shape

Node	Cover	Invert	Size	Material	Shape

Node	Cover	Invert	Size	Material	Shape



Drawn by:	rohandas
Title:	308871_Land off Church Lane, L
Date:	14/09/2018

Southern Water

Appendix D

Site Investigation Excerpts Including BRE365 Soil Soakage Testing

4.2.5 Lewes Nodular Chalk Formation

4.2.5.1 Lewes Nodular Chalk Formation was encountered below the Head deposits in the centre depression of site at depths of around 3 m bgl. At higher topographies the Lewes Nodular Chalk Formation was encountered at much shallower depths (0.40 m bgl).

4.2.5.2 Lewes Nodular Chalk Formation comprised a moderate strength creamy white fine-grained gravelly chalk. The gravels were fine to cobble sub-angular to sub-rounded flints.

4.2.5.3 There was no visual or olfactory evidence of contamination.

4.2.5.4 No groundwater was encountered.

5.6.1 Four soakage pits were excavated on 26th September 2019 (MSP01 to MSP04). Soakage tests were performed at depths ranging from 1.30 – 2.79 m bgl. MSP01 and MSP03 were tested within the Lewes Nodules Chalk Formation whilst MSP02 and MSP04 were tested within the Head deposits.

5.6.2 Soakage data is included in Appendix 6 and the data sheets show:

i. MSP01 successfully soaked away three times, taking between 27 and 50 minutes to soak;

ii. MSP02 fell by only 0.30 m over 128 minutes;

iii. MSP03 fell by only 0.22 m over 92 minutes; and

iv. MSP04 fell by only 0.49 m over 62 minutes.

5.6.4 Data obtained from MSP02, MSP03 and MSP04 was insufficient to allow extrapolation, therefore it is estimated that an infiltration rate in the order of 1.0×10^{-7} or 1.0×10^{-8} meters per second would be achieved at these locations. Therefore, it does not appear that the shallow soils at the site are suitable for the use of shallow soakaways.

5.6.5 Data obtained from the successful soakage testing of MSP01 indicated an infiltration rate of 0.134×10^{-3} to 0.201×10^{-3} meters per second. This data indicates that the underlying Lewes Nodular Chalk Formation would be suitable for use as a soakage medium, following appropriate consideration of pollution prevention measures due to the site being a source protection zone one and confirmation of the depth of groundwater.

(Appendix 6 has been extracted – set out on the following pages.)

Legend

- Site boundary
- MBHref — Merebrook borehole with location reference
- MTPref — Merebrook trial pit with location reference
- MSPref — Merebrook soakage test with location reference

First Issue	18-10-2019		-
	SNC	DCE	DCE
Issue Details	Dwn	Chd	App'd

Client/Project

Quinn Estates Ltd
Churhc Lane,
Lyddon

Dwg Title

Undertaken Site Investigation Locations

Job No.	Dwg No.	Revision
21929a	304-001	-
Scale: N.T.S	Date: October 2019	Frame Dimensions mm: (A3) 400 x 280
Drawn: SNC	Checked: DCE	Approved: DCE

London
Kent
Derbyshire
Cardiff
Manchester
Stirling
Birmingham

IDOM

Cromford Mills, Mill Lane, Matlock, Derbyshire DE4 3RQ
t: +44(0)1773 829 988 f: +44(0)1773 829 393 e: info.derbyshire@idom.com

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION

Site Name:	*Lydden*			**Job No:**	*21929a*
Engineer:	*Callum Harris*	**Date:**	*26/09/2019*	**Weather:**	*Overcast, rain*

TEST PIT DETAILS

Trial Pit Number:	*MSP01*		**Test** *2* **of** *3*				
Length (m):	*0.7*	**Width (m):**	*2.6*		**Depth (m):**	*2.1*	
Depth to Groundwater (m):	*N/A*						
Time Filling Commenced:	*09:56*		**Time Filling Completed:**			*09:57*	
Depth to Water at Start of Test:		*1.3*					
Effective Depths:		**75%:**	*1.50*	**50%:**	*1.70*	**25%:**	*1.90*

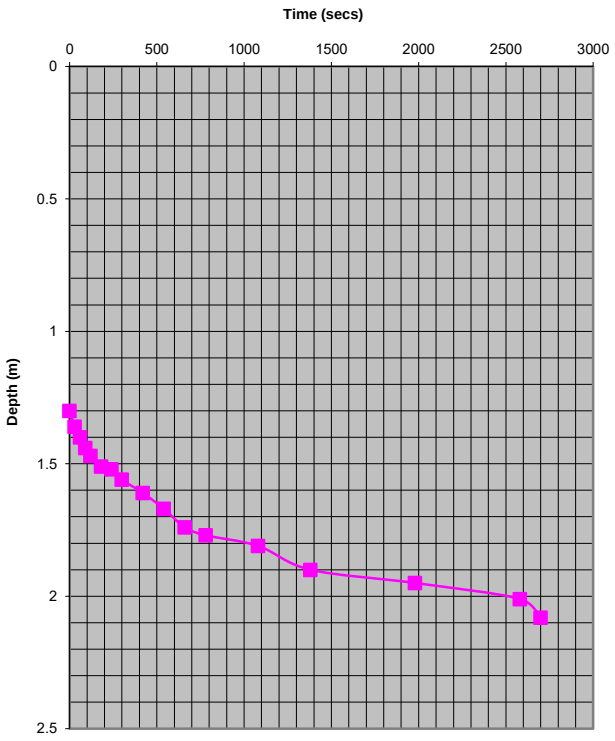
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
09:57	0	0	1.300
09:57:30	0.5	30	1.360
09:58	1	60	1.400
09:58:30	1.5	90	1.440
09:59	2	120	1.470
10:00	3	180	1.510
10:01	4	240	1.520
10:02	5	300	1.560
10:04	7	420	1.610
10:06	9	540	1.670
10:08	11	660	1.740
10:10	13	780	1.770
10:15	18	1080	1.810
10:20	23	1380	1.900
10:30	33	1980	1.950
10:40	43	2580	2.010
10:42	45	2700	2.080
			2.100

MSP01



t at 75% Effective Depth: ***165*** secs
t at 25% Effective Depth: ***1380*** secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.73***	m3
ap50:	***4.46***	m2
tp75-25	***1215***	secs

f = ***0.000134*** **m/s**

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION

Site Name:	*Lydden*			**Job No:**	*21929a*
Engineer:	*Callum Harris*	**Date:**	*26/09/2019*	**Weather:**	*Overcast, rain*

TEST PIT DETAILS

Trial Pit Number:	*MSP01*		**Test** *3* **of** *3*				
Length (m):	*0.7*	**Width (m):**	*2.6*		**Depth (m):**	*2.1*	
Depth to Groundwater (m):	*N/A*						
Time Filling Commenced:	*10:03*		**Time Filling Completed:**			*10:04*	
Depth to Water at Start of Test:		*1.36*					
Effective Depths:		**75%:**	*1.55*	**50%:**	*1.73*	**25%:**	*1.92*

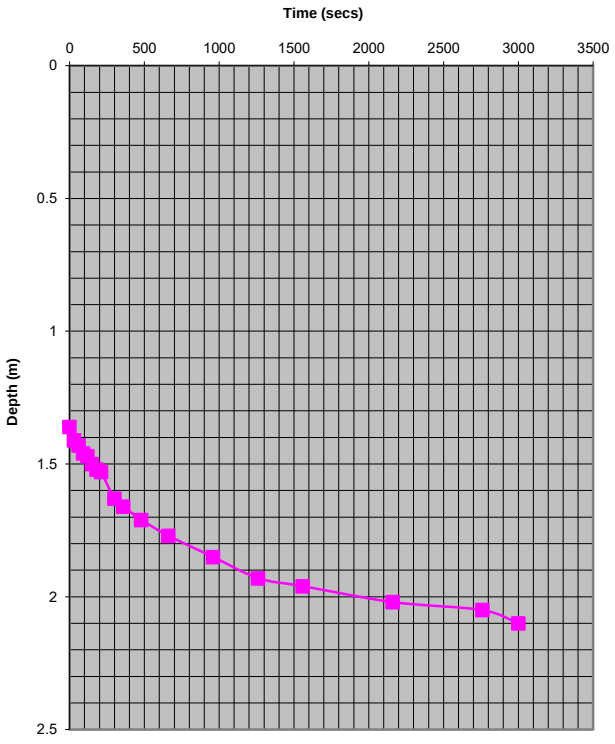
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
11:04	0	0	1.360
11:04:30	0.5	30	1.410
11:05	1	60	1.430
11:05:30	1.5	90	1.460
11:06	2	120	1.470
11:06	2.5	150	1.500
11:07	3	180	1.520
11:07	3.5	210	1.530
11:09	5	300	1.630
11:10	6	360	1.660
11:12	8	480	1.710
11:15	11	660	1.770
11:20	16	960	1.850
11:25	21	1260	1.930
11:30	26	1560	1.960
11:40	36	2160	2.020
11:50	46	2760	2.050
11:54	50	3000	2.100

MSP01



t at 75% Effective Depth: ***228*** secs
t at 25% Effective Depth: ***1223*** secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.67***	m3
ap50:	***4.262***	m2
tp75-25	***995***	secs

f = ***0.000159*** **m/s**

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION

Site Name:	*Lydden*			**Job No:**	*21929a*
Engineer:	*Callum Harris*	**Date:**	*26/09/2019*	**Weather:**	*Overcast, rain*

TEST PIT DETAILS

Trial Pit Number:	*MSP02*		**Test** *1* **of** *1*				
Length (m):	*2.7*	**Width (m):**	*0.7*		**Depth (m):**	*3.0*	
Depth to Groundwater (m):	*N/A*						
Time Filling Commenced:	*10:11*		**Time Filling Completed:**			*10:12*	
Depth to Water at Start of Test:		*2.32*					
Effective Depths:		**75%:**	*2.49*	**50%:**	*2.66*	**25%:**	*2.83*

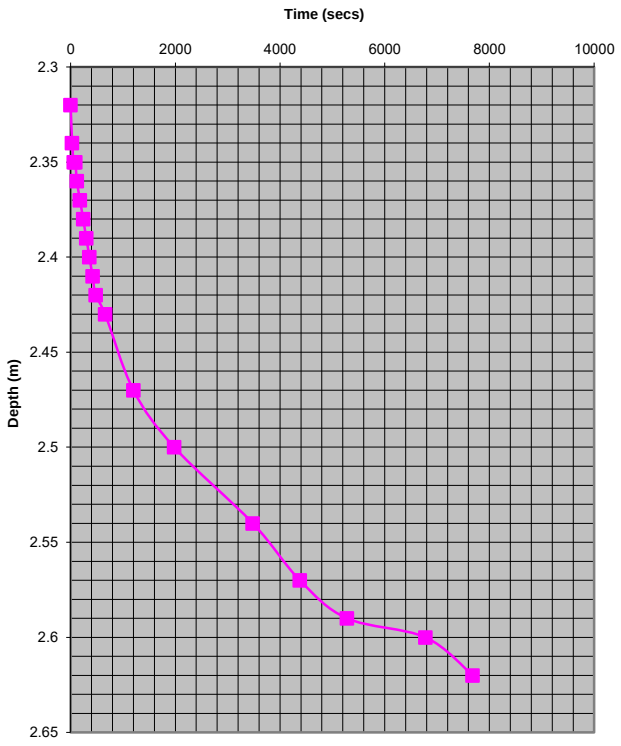
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
10:12	0	0	2.320
10:12:30	0.5	30	2.340
10:13	1	60	2.350
10:13:30	1.5	90	2.350
10:14	2	120	2.360
10:15	3	180	2.370
10:16	4	240	2.380
10:17	5	300	2.390
10:18	6	360	2.400
10:19	7	420	2.410
10:20	8	480	2.420
10:23	11	660	2.430
10:32	20	1200	2.470
10:45	33	1980	2.500
11:10	58	3480	2.540
11:25	73	4380	2.570
11:40	88	5280	2.590
12:05	113	6780	2.600
12:20	128	7680	2.620

MSP02



t at 75% Effective Depth: ***1720*** secs
t at 25% Effective Depth: _____ secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.64***	m3
ap50:	***4.202***	m2
tp75-25	***-1720***	secs

f = *-8.89E-05* m/s

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION

Site Name:	*Lydden*			**Job No:**	*21929a*
Engineer:	*Callum Harris*	**Date:**	*26/09/2019*	**Weather:**	*Overcast, rain*

TEST PIT DETAILS

Trial Pit Number:	*MSP03*		**Test** *1* **of** *1*				
Length (m):	*2.7*	**Width (m):**	*0.7*		**Depth (m):**	*3.5*	
Depth to Groundwater (m):	*N/A*						
Time Filling Commenced:	*11:17*		**Time Filling Completed:**			*11:18*	
Depth to Water at Start of Test:		*2.79*					
Effective Depths:		**75%:**	*2.97*	**50%:**	*3.15*	**25%:**	*3.32*

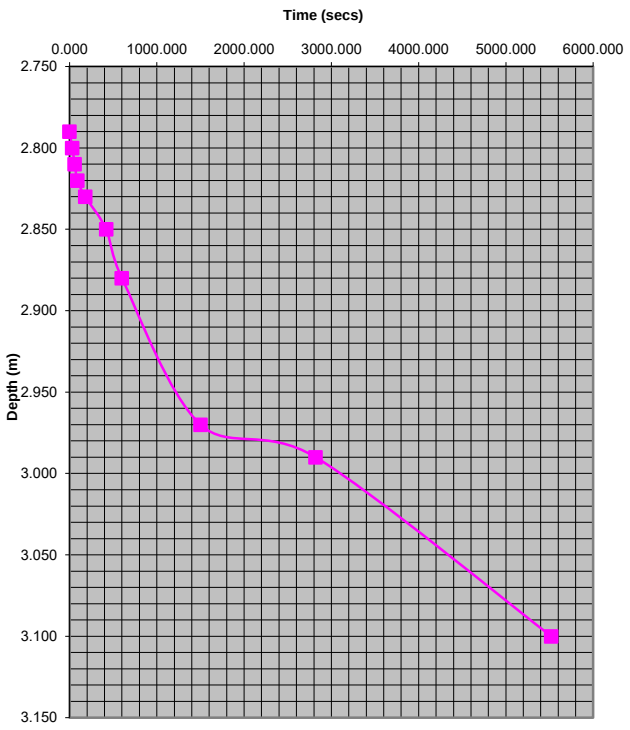
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
11:18	0.000	0.000	2.790
11:18:30	0.500	30.000	2.800
11:19	1.000	60.000	2.810
11:19:30	1.500	90.000	2.820
11:21	3.000	180.000	2.830
11:25	7.000	420.000	2.850
11:28	10.000	600.000	2.880
11:43	25.000	1500.000	2.970
12:05	47.000	2820.000	2.990
12:50	92.000	5520.000	3.100

MSP03



t at 75% Effective Depth: ***1500*** secs

t at 25% Effective Depth: _____ secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.67***	m3
ap50:	***4.304***	m2
tp75-25	***-1500***	secs

f = ***-0.000104*** **m/s**

DETERMINATION OF SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365

GENERAL INFORMATION

Site Name:	***Lydden***			**Job No:**	***21929a***
Engineer:	***Callum Harris***	**Date:**	***26/09/2019***	**Weather:**	***Overcast, rain***

TEST PIT DETAILS

Trial Pit Number:	***MSP04***		**Test** ***1*** **of** ***1***				
Length (m):	***2.6***	**Width (m):**	***0.7***		**Depth (m):**	***2.2***	
Depth to Groundwater (m):	***N/A***						
Time Filling Commenced:	***12:27***		**Time Filling Completed:**			***12:29***	
Depth to Water at Start of Test:		***1.33***					
Effective Depths:		**75%:**	***1.55***	**50%:**	***1.77***	**25%:**	***1.98***

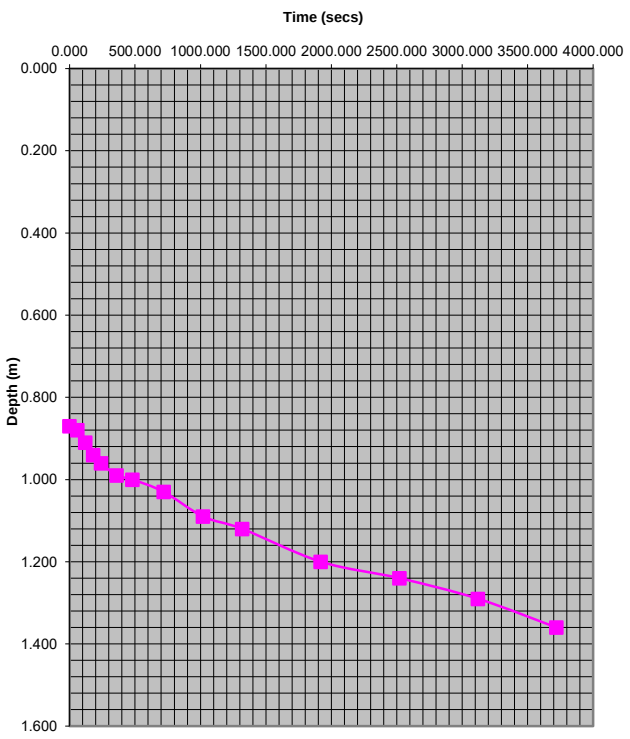
NOTE: Soakage to at least 25% effective depth is required in order to calculate infiltration rate. If infiltration rates are slow extrapolation maybe required to determine time at which 25% effective depth would be achieved.

TEST PIT RESULTS

TEST DATA

Time	t (mins)	t (secs)	Depth to Water (m)
12:28	0.000	0.000	0.870
12:29:00	1.000	60.000	0.880
12:30	2.000	120.000	0.910
12:31:00	3.000	180.000	0.940
12:32	4.000	240.000	0.960
12:34	6.000	360.000	0.990
12:36	8.000	480.000	1.000
12:40	12.000	720.000	1.030
12:45	17.000	1020.000	1.090
12:50	22.000	1320.000	1.120
13:00	32.000	1920.000	1.200
13:10	42.000	2520.000	1.240
13:20	52.000	3120.000	1.290
13:30	62.000	3720.000	1.360

MSP04



t at 75% Effective Depth: ..... secs
t at 25% Effective Depth: ..... secs

Infiltration Rate f = Vp75-25 / ap50 x tp75-25

Vp75-25:	***0.79***	m3
ap50:	***4.691***	m2
tp75-25	***0***	secs

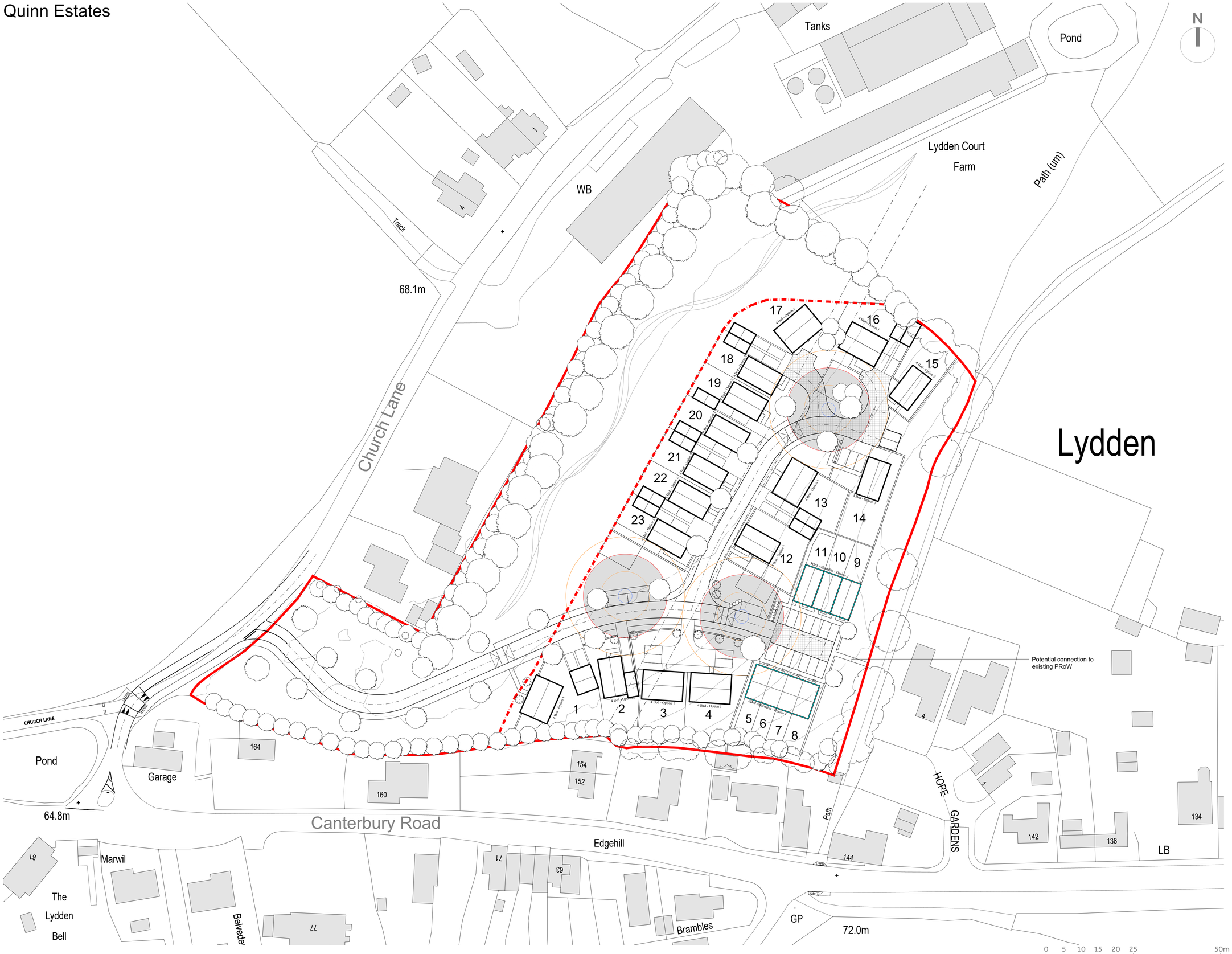
f = ***#DIV/0!*** **m/s**

Appendix E

Proposed Scheme Drawings including Floodplain Volumes Balancing Exercise

As Proposed Site Block Plan

Quinn Estates



Proposed Residential Development, Land at Church Lane, Lydden

NOTES:

Do Not Scale.

Report all discrepancies, errors and omissions.

Verify all dimensions on site before commencing any work on site or preparing shop drawings.

All materials, components and workmanship are to comply with the relevant British Standards, Codes of Practice, and appropriate manufacturers recommendations that from time to time shall apply.

For all specialist work, see relevant drawings.

Rev	Date	Description
R	07.07.2023	Water constraints added
S	11.07.2023	Highways access amended
T	24.07.2023	Parking amended
U	26.07.2023	Highways Comments

Key

Project Title

Proposed Residential Development
Land at Church Lane
Lydden
CT15 7JP

Drawing Description

Sketch Scheme

Scale
1:500@A1

Drawn by
AS

Date
July 2023

Checked by
CSS

CLAGUE ARCHITECTS

62 Burgate, Canterbury
Kent CT1 2BH 01227 762060

1 Kinsbourne Court, Luton Road,
Harpenden, Hertfordshire AL5 3BL 01582 765102

8, Disney Street
London SE1 1JF 0203 597 6112

CANTERBURY LONDON HARPENDEN

Drawing Number
23371A / 100

Revision
U

GENERAL NOTES

1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations , record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. any discrepancies shall be notified to gta prior to works commencing.

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N

0 10m 20m 30m 40m 50m

Scale 1:500

PROPOSED LAYOUT OVERLAY ONTO ENVIRONMENT AGENCY MAPPING OF LOW, MEDIUM AND HIGH RISK FLOODING EVENTS

Existing Low Risk - 1 in 1000 year extents - Existing level 63.050 at edge of flooding

Existing High Risk - 1 in 100 year extents - Existing level 62.700 at edge of flooding

Indicates zone where peak flood level is approx. 63.100 in low risk - min. Floor Level to be 63.400

Existing Medium Risk - 1 in 100 year extents - Existing level 62.800 at edge of flooding

Existing Low Risk - 1 in 1000 year extents - Existing level 63.100 at edge of flooding

Existing High Risk - 1 in 100 year extents - Existing level 62.750 at edge of flooding

Existing Low Risk - 1 in 1000 year extents - Existing level 63.250 at edge of flooding

Existing Medium Risk - 1 in 100 year extents - Existing level 62.900 at edge of flooding

Existing Medium Risk - 1 in 100 year extents - Existing level 62.800 at edge of flooding

Existing High Risk - 1 in 100 year extents - Existing level 62.800 at edge of flooding

Existing Low Risk - 1 in 1000 year extents - Existing level 63.250 at edge of flooding

Existing Medium Risk - 1 in 100 year extents - Existing level 62.900 at edge of flooding

Indicates zone where peak flood level is approx. 63.250 in low risk - min. Floor Level to be 63.550

Existing High Risk - 1 in 100 year extents - Existing level 63.000 at edge of flooding

Existing High Risk - 1 in 100 year extents - Existing level 62.900 at edge of flooding

Existing Low Risk - 1 in 1000 year extents - Existing level 63.400 at edge of flooding

Indicates zone where peak flood level is approx. 63.400 in low risk - min. Floor Level to be 63.700

Tanks
Pond
Path (um)
Lydden Court Farm
WB
Track
68.1m
Lydden
CHURCH LANE
Glebelands
CANTERBURY ROAD
Edgehill
HOPE GARDENS
Path
Brambles
GP
72.0m
Belvedere
LB

Rev.	Amendments	Date	Dsn	Chk
P1	INITIAL ISSUE	31.07.2023	GS	MR

Status: PRELIMINARY

Client: QUINN ESTATES

Architect:

Project: CHURCH LANE LYDDEN, KENT

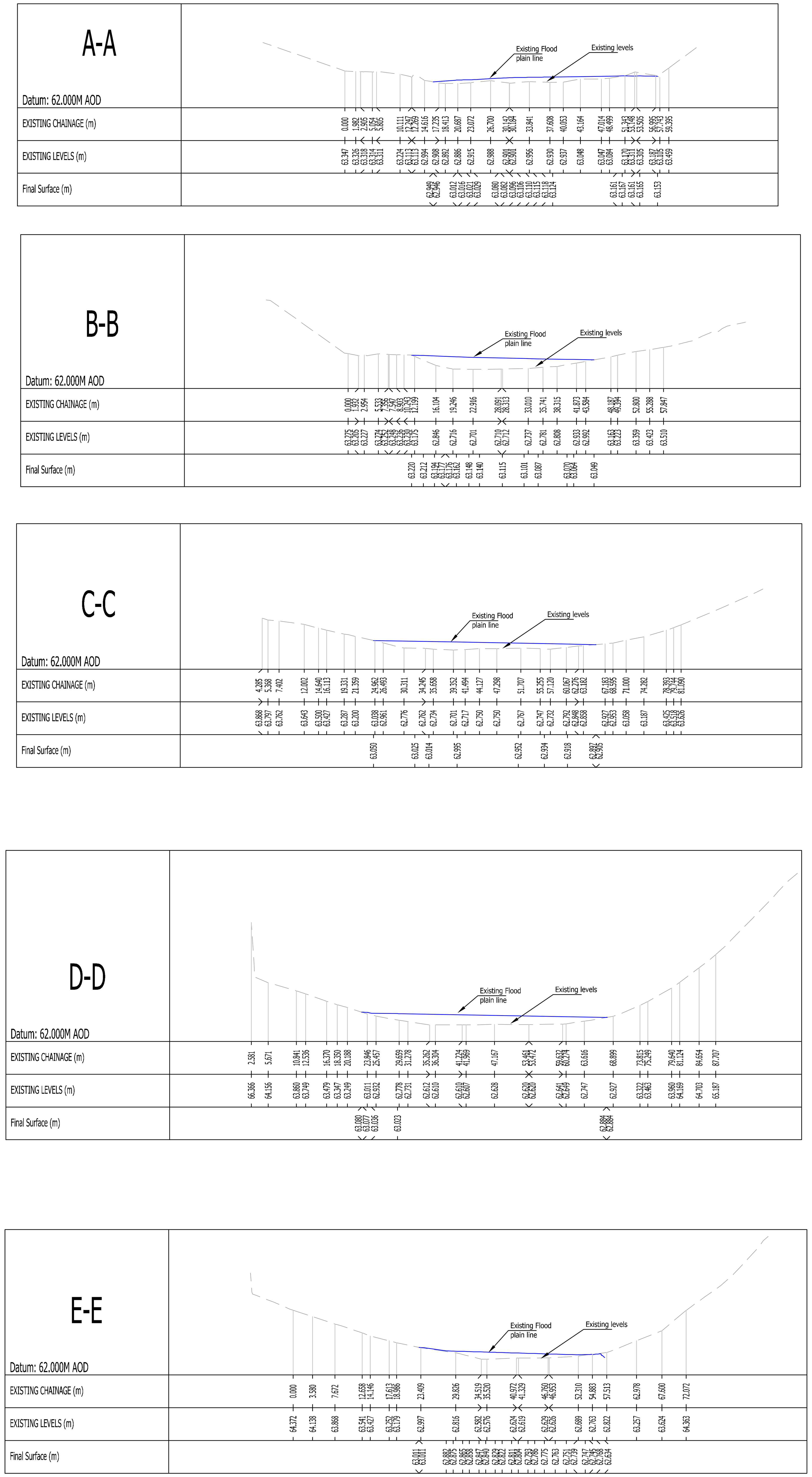
Title: EXISTING SURFACE WATER FLOODING LOW, MEDIUM & HIGH RISK OVERLAY TO PROPOSED LAYOUT

Date: JULY 2023 | Scale @ A1: 1 : 500

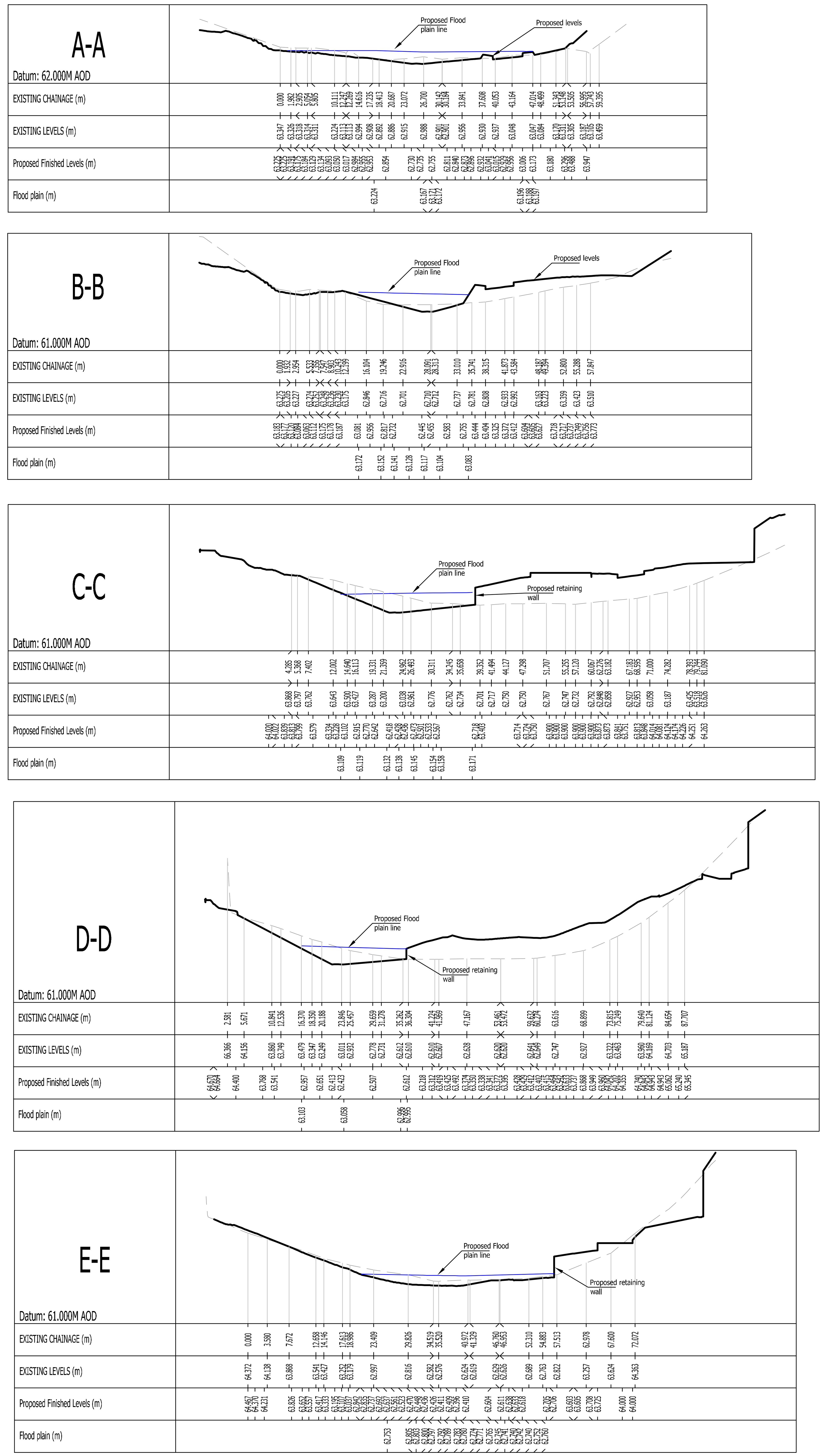
Clients Ref. | Project Ref.: 12626

gta Civils & Transport
Maple House, 192-198 London Road.
Burgess Hill, West Sussex, RH15 9RD
Tel.01444 871444 Web: www.gtacivils.co.uk

Drawing Number: 12626/1100 | Rev.: P1



EXISTING SITE SECTIONS - SCALE 1:500H, 1:100V



PROPOSED SITE SECTIONS - SCALE 1:500H, 1:100V

GENERAL NOTES

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REFER TO DRAWING NO. 12626/1115 FOR SECTION LOCATIONS

Rev	Amendments	Date	Dsn	Chk
P1	INITIAL ISSUE	31.07.2023	AE	MR

Status: PRELIMINARY

Client: QUINN ESTATES

Architect:

Project: CHURCH LANE LYDDEN, KENT

Title: EXISTING & PROPOSED SITE SECTIONS

Date	Scale @ A1
JULY 2023	1 : 500H, 1:100V
Clients Ref.	Project Ref. 12626

gta Civils & Transport
Maple House, 192-198 London Road,
Burgess Hill, West Sussex, RH15 9RD
Tel.01444 871444 Web: www.gtacivils.co.uk

Drawing Number: 12626/1116

Rev.: P1

Appendix F

Drainage Strategy Layout & MicroDrainage Calculation Sheets

DESIGN NOTES

1. SURFACE WATER STORAGE BASED ON 1 IN 100 YEAR + 45% PEAK STORM.

2. DEEP BORE SOAKAWAYS DESIGNED TO ASSUMED RATES OF 3.1l/s PER BOREHOLE. ONSITE CONSTANT HEAD TESTING TO BE CARRIED OUT TO CONFIRM RATE.

3. DRAIN POINTS AND LOCATIONS TO BE CONFIRMED BY ARCHITECT.

4. CONNECTION TO PUBLIC FOUL SEWER SUBJECT TO APPROVAL FROM SOUTHERN WATER VIA S106 APPLICATION

5. CONTRACTOR TO ESTABLISH LOCATIONS OF ALL EXISTING SERVICES PRIOR TO COMMENCING.

6. EXISTING TREES TO BE PROTECTED WHERE EXCAVATIONS RUN CLOSE.

ABBREVIATIONS

FO	FOUL DRAIN
SWD	SURFACE WATER DRAIN
MH	MANHOLE
IC	INSPECTION CHAMBER
FIC	450mm DIA. FOUL INSPECTION CHAMBER - D202.6
SIC	450mm DIA. SURFACE WATER INSPECTION CHAMBER - D202.6
FAC	300mm DIA. FOUL ACCESS CHAMBER - D202.18
SAC	300mm DIA. SURFACE WATER ACCESS CHAMBER - D202.18
G	SMALL GULLY - D209.0
YG	YARD GULLY - D209.2
RG	ROAD GULLY - D208.1
DP	BELOW GROUND DRAIN POINT
DT	SURFACE WATER DISTRIBUTION TANK
FFL	FINISHED FLOOR LEVEL
GL	GROUND LEVEL
CL	COVER LEVEL
IL	INVERT LEVEL
BL	BASE LEVEL

N

GENERAL NOTES

1. The location, size, depth and identification of existing services that may be shown or referred to on this drawing have been assessed from non intrusive observations , record drawings or the like. The contractor shall safely carry out intrusive investigations, trial holes or soundings prior to commencing work to satisfy himself that it is safe to proceed and that the assessments are accurate. any discrepancies shall be notified to gta prior to works commencing.

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3. Do not scale. All dimensions and levels to be site confirmed.

4. This drawing shall be read in conjunction with all relevant architects, consultants drawings and specifications, together with H&S plan requirements

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6. All drawings specifications and recommendations made by gta are subject to Local Authority and other relevant Statutory Authorities approval. Any works or services made abortive due to the client proceeding prior to these approvals is considered wholly at the Clients risk. gta hold no responsibility for resulting abortive works or costs.

KEY

- Existing foul water drain
- Private surface water drain
- Private foul water drain
- Adoptable foul sewer
- Private foul water manhole
- Private surface water manhole
- Cellular storage
- Lined Permeable paving
- Overland flow arrow
- 10m Exclusion Zone to Deep bore soakaway

DIVERSION REQUIRED TO THE FOUL WATER SEWER SUBJECT TO S185 CONSENT. ALL LEVELS TO BE CONFIRMED

CONNECT NEW FOUL WATER DRAINS TO EXISTING SEWER SUBJECT TO S106 CONSENT FROM SOUTHERN WATER

FOUL SEWER TO BE DIVERTED FROM THIS POINT. ACTUAL INVERT LEVEL TO BE CONFIRMED

EXISTING FOUL SEWER TO BE REMOVED

ATTENUATION STORAGE 1
51.0x6.5x1.3m deep SDS Tank
Maximum Volume 199m³ net, Impermeable Area = 1950m²
CL min =42.850 Top Level=42.700 Base Level=40.850
Discharging into 1no. Deep Bore Soakaway Tank wrapped in Welded Impermeable Membrane
Providing treatment through base

ATTENUATION STORAGE 2
19.5x5.5x1.750m deep SDS Tank
Maximum Volume 133m³ net, Impermeable Area = 2150m²
CL min =44.600 Top Level=44.450 Base Level=42.000
Discharging into 1no. Deep Bore Soakaway Tank wrapped in Welded Impermeable Membrane
Providing treatment through base

ATTENUATION STORAGE 3
11mHC/3H deep SDS Tank
Maximum Volume 62.7m³ net, Impermeable Area = 1370m² CL min =63.880 Top Level=63.200 Base Level=60.880 Discharging into 1no. Deep Bore Soakaway Tank wrapped in Welded Impermeable Membrane
Providing treatment through base

DEEP BORE SOAKAWAY DB1
CL 63.420
Bore Level = 53.410
IL 150Ø = 60.743
SL = 59.743
Discharge Rate = 3 lt/s

DEEP BORE SOAKAWAY DB2
CL 65.135
Bore Level = 55.125
IL 150Ø = 61.870
SL = 60.970
Discharge Rate = 3 lt/s

DEEP BORE SOAKAWAY DB3
CL 53.200
Bore Level = 53.890
IL 150Ø in = 47.735
SL = 46.735
Discharge Rate = 3 lt/s

Rev	Amendments	Date	Dsn	Chk
P1	INITIAL ISSUE	31.07.2023	AE	MR

Status: PRELIMINARY

Client: QUINN ESTATES

Architect:

Project: CHURCH LANE LYDDEN, KENT

Title: DRAINAGE STRATEGY LAYOUT

Date: JULY 2023 | Scale @ A0: 1:250

Clients Ref: | Project Ref: 12626

gta Civils & Transport
Gloucester House, 66a Church Walk, Burgess Hill, West Sussex, RH15 9AS
Tel.01444 871444 Web: www.gtacivils.co.uk

Drawing Number: 12626/1601 | Rev. P1

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 298 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	61.385	0.535	0.0	3.1	3.1	48.3	O K
30 min Summer	61.545	0.695	0.0	3.1	3.1	62.7	O K
60 min Summer	61.686	0.836	0.0	3.1	3.1	75.4	O K
120 min Summer	61.780	0.930	0.0	3.1	3.1	83.9	O K
180 min Summer	61.811	0.961	0.0	3.1	3.1	86.7	O K
240 min Summer	61.816	0.966	0.0	3.1	3.1	87.2	O K
360 min Summer	61.828	0.978	0.0	3.1	3.1	88.3	O K
480 min Summer	61.849	0.999	0.0	3.1	3.1	90.1	O K
600 min Summer	61.865	1.015	0.0	3.1	3.1	91.6	O K
720 min Summer	61.875	1.025	0.0	3.1	3.1	92.5	O K
960 min Summer	61.875	1.025	0.0	3.1	3.1	92.5	O K
1440 min Summer	61.818	0.968	0.0	3.1	3.1	87.3	O K
2160 min Summer	61.659	0.809	0.0	3.1	3.1	73.1	O K
2880 min Summer	61.484	0.634	0.0	3.1	3.1	57.2	O K
4320 min Summer	61.175	0.325	0.0	3.1	3.1	29.3	O K
5760 min Summer	60.971	0.121	0.0	3.1	3.1	10.9	O K
7200 min Summer	60.868	0.018	0.0	3.1	3.1	1.6	O K
8640 min Summer	60.850	0.000	0.0	2.8	2.8	0.0	O K
10080 min Summer	60.850	0.000	0.0	2.5	2.5	0.0	O K
15 min Winter	61.455	0.605	0.0	3.1	3.1	54.6	O K
30 min Winter	61.638	0.788	0.0	3.1	3.1	71.1	O K
60 min Winter	61.805	0.955	0.0	3.1	3.1	86.2	O K
120 min Winter	61.929	1.079	0.0	3.1	3.1	97.4	O K
180 min Winter	61.983	1.133	0.0	3.1	3.1	102.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	141.569	0.0	51.7	18
30 min Summer	94.138	0.0	68.8	33
60 min Summer	59.528	0.0	87.0	62
120 min Summer	36.415	0.0	106.3	122
180 min Summer	27.426	0.0	120.4	180
240 min Summer	22.521	0.0	131.8	232
360 min Summer	17.231	0.0	151.0	294
480 min Summer	14.392	0.0	168.4	362
600 min Summer	12.547	0.0	183.4	432
720 min Summer	11.222	0.0	196.7	504
960 min Summer	9.377	0.0	219.5	644
1440 min Summer	7.189	0.0	252.3	924
2160 min Summer	5.385	0.0	283.4	1320
2880 min Summer	4.333	0.0	304.3	1704
4320 min Summer	3.139	0.0	330.5	2420
5760 min Summer	2.484	0.0	348.9	3064
7200 min Summer	2.068	0.0	362.9	3680
8640 min Summer	1.780	0.0	374.8	0
10080 min Summer	1.568	0.0	385.4	0
15 min Winter	141.569	0.0	57.8	18
30 min Winter	94.138	0.0	77.1	33
60 min Winter	59.528	0.0	97.3	62
120 min Winter	36.415	0.0	119.4	120
180 min Winter	27.426	0.0	134.7	176

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	62.009	1.159	0.0	3.1	3.1	104.6	O K
360 min Winter	62.024	1.174	0.0	3.1	3.1	105.9	O K
480 min Winter	62.033	1.183	0.0	3.1	3.1	106.7	O K
600 min Winter	62.048	1.198	0.0	3.1	3.1	108.1	O K
720 min Winter	62.058	1.208	0.0	3.1	3.1	108.6	O K
960 min Winter	62.034	1.184	0.0	3.1	3.1	106.8	O K
1440 min Winter	61.918	1.068	0.0	3.1	3.1	96.4	O K
2160 min Winter	61.656	0.806	0.0	3.1	3.1	72.7	O K
2880 min Winter	61.386	0.536	0.0	3.1	3.1	48.3	O K
4320 min Winter	60.965	0.115	0.0	3.1	3.1	10.3	O K
5760 min Winter	60.850	0.000	0.0	2.9	2.9	0.0	O K
7200 min Winter	60.850	0.000	0.0	2.4	2.4	0.0	O K
8640 min Winter	60.850	0.000	0.0	2.0	2.0	0.0	O K
10080 min Winter	60.850	0.000	0.0	1.8	1.8	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	22.521	0.0	147.4	232
360 min Winter	17.231	0.0	169.2	338
480 min Winter	14.392	0.0	188.4	388
600 min Winter	12.547	0.0	205.5	466
720 min Winter	11.222	0.0	220.6	544
960 min Winter	9.377	0.0	245.6	702
1440 min Winter	7.189	0.0	282.7	1008
2160 min Winter	5.385	0.0	317.6	1424
2880 min Winter	4.333	0.0	340.8	1812
4320 min Winter	3.139	0.0	370.0	2424
5760 min Winter	2.484	0.0	390.7	0
7200 min Winter	2.068	0.0	406.4	0
8640 min Winter	1.780	0.0	419.7	0
10080 min Winter	1.568	0.0	431.6	0

Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 623212 152430	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.195

Time (mins) From:	To:	Area (ha)
0	4	0.195

Model Details

Storage is Online Cover Level (m) 62.950

Cellular Storage Structure

Invert Level (m) 60.850 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	95.0	95.0	1.200	95.0	141.8	1.210	0.0	141.8

Pump Outflow Control

Invert Level (m) 60.740

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.1000	10.000	3.1000

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 348 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	62.662	0.662	0.0	3.1	3.1	53.6	O K
30 min Summer	62.861	0.861	0.0	3.1	3.1	69.7	O K
60 min Summer	63.041	1.041	0.0	3.1	3.1	84.3	O K
120 min Summer	63.171	1.171	0.0	3.1	3.1	94.8	O K
180 min Summer	63.222	1.222	0.0	3.1	3.1	99.0	O K
240 min Summer	63.242	1.242	0.0	3.1	3.1	100.6	O K
360 min Summer	63.259	1.259	0.0	3.1	3.1	101.9	O K
480 min Summer	63.287	1.287	0.0	3.1	3.1	104.3	O K
600 min Summer	63.311	1.311	0.0	3.1	3.1	106.2	O K
720 min Summer	63.329	1.329	0.0	3.1	3.1	107.6	O K
960 min Summer	63.338	1.338	0.0	3.1	3.1	108.4	O K
1440 min Summer	63.286	1.286	0.0	3.1	3.1	104.2	O K
2160 min Summer	63.112	1.112	0.0	3.1	3.1	90.1	O K
2880 min Summer	62.910	0.910	0.0	3.1	3.1	73.7	O K
4320 min Summer	62.528	0.528	0.0	3.1	3.1	42.7	O K
5760 min Summer	62.250	0.250	0.0	3.1	3.1	20.3	O K
7200 min Summer	62.079	0.079	0.0	3.1	3.1	6.4	O K
8640 min Summer	62.003	0.003	0.0	3.1	3.1	0.2	O K
10080 min Summer	62.000	0.000	0.0	2.8	2.8	0.0	O K
15 min Winter	62.747	0.747	0.0	3.1	3.1	60.5	O K
30 min Winter	62.975	0.975	0.0	3.1	3.1	79.0	O K
60 min Winter	63.187	1.187	0.0	3.1	3.1	96.2	O K
120 min Winter	63.352	1.352	0.0	3.1	3.1	109.5	O K
180 min Winter	63.431	1.431	0.0	3.1	3.1	115.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	141.569	0.0	56.9	18
30 min Summer	94.138	0.0	75.9	33
60 min Summer	59.528	0.0	96.0	62
120 min Summer	36.415	0.0	117.5	122
180 min Summer	27.426	0.0	132.7	180
240 min Summer	22.521	0.0	145.3	240
360 min Summer	17.231	0.0	166.9	310
480 min Summer	14.392	0.0	185.6	378
600 min Summer	12.547	0.0	202.3	446
720 min Summer	11.222	0.0	217.1	514
960 min Summer	9.377	0.0	241.8	656
1440 min Summer	7.189	0.0	278.1	938
2160 min Summer	5.385	0.0	312.9	1340
2880 min Summer	4.333	0.0	335.2	1732
4320 min Summer	3.139	0.0	364.5	2464
5760 min Summer	2.484	0.0	384.9	3120
7200 min Summer	2.068	0.0	400.0	3752
8640 min Summer	1.780	0.0	413.2	4400
10080 min Summer	1.568	0.0	424.9	0
15 min Winter	141.569	0.0	63.8	18
30 min Winter	94.138	0.0	84.9	33
60 min Winter	59.528	0.0	107.4	62
120 min Winter	36.415	0.0	131.7	120
180 min Winter	27.426	0.0	148.6	176

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	63.476	1.476	0.0	3.1	3.1	119.5	O K
360 min Winter	63.517	1.517	0.0	3.1	3.1	122.8	O K
480 min Winter	63.532	1.532	0.0	3.1	3.1	124.1	O K
600 min Winter	63.552	1.552	0.0	3.1	3.1	125.7	O K
720 min Winter	63.567	1.567	0.0	3.1	3.1	126.9	O K
960 min Winter	63.561	1.561	0.0	3.1	3.1	126.4	O K
1440 min Winter	63.449	1.449	0.0	3.1	3.1	117.4	O K
2160 min Winter	63.157	1.157	0.0	3.1	3.1	93.7	O K
2880 min Winter	62.839	0.839	0.0	3.1	3.1	68.0	O K
4320 min Winter	62.293	0.293	0.0	3.1	3.1	23.7	O K
5760 min Winter	62.005	0.005	0.0	3.1	3.1	0.4	O K
7200 min Winter	62.000	0.000	0.0	2.6	2.6	0.0	O K
8640 min Winter	62.000	0.000	0.0	2.3	2.3	0.0	O K
10080 min Winter	62.000	0.000	0.0	2.0	2.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	22.521	0.0	162.8	234
360 min Winter	17.231	0.0	186.9	342
480 min Winter	14.392	0.0	208.0	442
600 min Winter	12.547	0.0	226.6	478
720 min Winter	11.222	0.0	243.2	556
960 min Winter	9.377	0.0	271.1	714
1440 min Winter	7.189	0.0	311.6	1024
2160 min Winter	5.385	0.0	349.9	1452
2880 min Winter	4.333	0.0	375.7	1844
4320 min Winter	3.139	0.0	408.2	2548
5760 min Winter	2.484	0.0	430.7	2992
7200 min Winter	2.068	0.0	448.1	0
8640 min Winter	1.780	0.0	462.8	0
10080 min Winter	1.568	0.0	475.9	0

Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 623212 152430	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.215

Time (mins) From:	To:	Area (ha)
0	4	0.215

Model Details

Storage is Online Cover Level (m) 64.600

Cellular Storage Structure

Invert Level (m) 62.000 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	85.3	85.3	1.600	85.3	152.5	1.610	0.0	152.5

Pump Outflow Control

Invert Level (m) 61.870

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.1000	10.000	3.1000

Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 181 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	62.434	0.634	0.0	3.1	3.1	33.2	O K
30 min Summer	62.614	0.814	0.0	3.1	3.1	42.5	O K
60 min Summer	62.757	0.957	0.0	3.1	3.1	50.0	O K
120 min Summer	62.818	1.018	0.0	3.1	3.1	53.2	O K
180 min Summer	62.819	1.019	0.0	3.1	3.1	53.2	O K
240 min Summer	62.817	1.017	0.0	3.1	3.1	53.1	O K
360 min Summer	62.819	1.019	0.0	3.1	3.1	53.2	O K
480 min Summer	62.823	1.023	0.0	3.1	3.1	53.5	O K
600 min Summer	62.820	1.020	0.0	3.1	3.1	53.3	O K
720 min Summer	62.810	1.010	0.0	3.1	3.1	52.8	O K
960 min Summer	62.768	0.968	0.0	3.1	3.1	50.6	O K
1440 min Summer	62.631	0.831	0.0	3.1	3.1	43.4	O K
2160 min Summer	62.380	0.580	0.0	3.1	3.1	30.3	O K
2880 min Summer	62.157	0.357	0.0	3.1	3.1	18.7	O K
4320 min Summer	61.882	0.082	0.0	3.1	3.1	4.3	O K
5760 min Summer	61.825	0.025	0.0	2.8	2.8	1.3	O K
7200 min Summer	61.810	0.010	0.0	2.3	2.3	0.5	O K
8640 min Summer	61.800	0.000	0.0	2.0	2.0	0.0	O K
10080 min Summer	61.800	0.000	0.0	1.8	1.8	0.0	O K
15 min Winter	62.519	0.719	0.0	3.1	3.1	37.6	O K
30 min Winter	62.727	0.927	0.0	3.1	3.1	48.5	O K
60 min Winter	62.902	1.102	0.0	3.1	3.1	57.6	O K
120 min Winter	62.999	1.199	0.0	3.1	3.1	62.7	O K
180 min Winter	63.657	1.857	0.0	3.1	3.1	63.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	141.569	0.0	36.3	18
30 min Summer	94.138	0.0	48.3	33
60 min Summer	59.528	0.0	61.0	62
120 min Summer	36.415	0.0	74.9	120
180 min Summer	27.426	0.0	84.4	156
240 min Summer	22.521	0.0	92.5	190
360 min Summer	17.231	0.0	106.1	256
480 min Summer	14.392	0.0	118.3	328
600 min Summer	12.547	0.0	128.9	398
720 min Summer	11.222	0.0	138.3	470
960 min Summer	9.377	0.0	154.0	608
1440 min Summer	7.189	0.0	177.3	878
2160 min Summer	5.385	0.0	199.1	1252
2880 min Summer	4.333	0.0	213.6	1588
4320 min Summer	3.139	0.0	232.2	2248
5760 min Summer	2.484	0.0	245.1	2936
7200 min Summer	2.068	0.0	254.9	3656
8640 min Summer	1.780	0.0	263.3	0
10080 min Summer	1.568	0.0	270.7	0
15 min Winter	141.569	0.0	40.7	18
30 min Winter	94.138	0.0	54.1	32
60 min Winter	59.528	0.0	68.6	60
120 min Winter	36.415	0.0	83.8	118
180 min Winter	27.426	0.0	94.6	172

Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
240 min Winter	63.179	1.379	0.0	3.1	3.1	63.0	O K
360 min Winter	62.997	1.197	0.0	3.1	3.1	62.6	O K
480 min Winter	62.987	1.187	0.0	3.1	3.1	62.0	O K
600 min Winter	62.966	1.166	0.0	3.1	3.1	60.9	O K
720 min Winter	62.935	1.135	0.0	3.1	3.1	59.3	O K
960 min Winter	62.844	1.044	0.0	3.1	3.1	54.5	O K
1440 min Winter	62.602	0.802	0.0	3.1	3.1	41.9	O K
2160 min Winter	62.215	0.415	0.0	3.1	3.1	21.7	O K
2880 min Winter	61.924	0.124	0.0	3.1	3.1	6.5	O K
4320 min Winter	61.817	0.017	0.0	2.5	2.5	0.9	O K
5760 min Winter	61.800	0.000	0.0	2.0	2.0	0.0	O K
7200 min Winter	61.800	0.000	0.0	1.7	1.7	0.0	O K
8640 min Winter	61.800	0.000	0.0	1.4	1.4	0.0	O K
10080 min Winter	61.800	0.000	0.0	1.3	1.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	22.521	0.0	103.6	220
360 min Winter	17.231	0.0	118.9	278
480 min Winter	14.392	0.0	132.6	358
600 min Winter	12.547	0.0	144.3	434
720 min Winter	11.222	0.0	154.9	512
960 min Winter	9.377	0.0	172.7	658
1440 min Winter	7.189	0.0	198.5	938
2160 min Winter	5.385	0.0	222.9	1300
2880 min Winter	4.333	0.0	239.3	1612
4320 min Winter	3.139	0.0	260.1	2204
5760 min Winter	2.484	0.0	274.5	0
7200 min Winter	2.068	0.0	285.5	0
8640 min Winter	1.780	0.0	294.9	0
10080 min Winter	1.568	0.0	303.2	0

Rainfall Details

Rainfall Model	FEH	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
FEH Rainfall Version	2013	Cv (Winter)	0.840
Site Location	GB 623212 152430	Shortest Storm (mins)	15
Data Type	Point	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.137

Time (mins) From:	To:	Area (ha)
0	4	0.137

Model Details

Storage is Online Cover Level (m) 63.880

Cellular Storage Structure

Invert Level (m) 61.800 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	55.0	55.0	1.200	55.0	93.4	1.210	0.0	93.4

Pump Outflow Control

Invert Level (m) 61.735

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.1000	10.000	3.1000

Civil Engineering - Transport Planning - Flood Risk

GTA Civils & Transport, Maple House, 192-198 London Road, Burgess Hill, West Sussex, RH15 9RD
T: 01444 871444 E: enquiries@gtacivils.co.uk www: gtacivils.co.uk

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