

Technical Note - Discharge of Surface Water Management Planning Conditions



The Civil Engineering Practice
11 Tungsten Building
George Street
Fishergate
Sussex
BN41 1RA

Project	8 Manor Way, Elmer
Project Number	23605

By Martin Kempshall CEng MICE

Date 27 September 2021

1 Introduction

- 1.1 This Technical Note has been produced in support of the Discharge of Condition **3** of Planning Permission **M/86/20/PL** granted by Arun District Council for the proposed development at 8 Manor Way, Elmer, Bognor Regis, West Sussex.
- 1.2 The proposed development is for the demolition of the existing dwelling and the construction of a new residential dwelling with driveway access and associated landscaping and onsite parking.
- 1.3 This Technical Note is to be read in conjunction with all planning, architectural and other reports that accompany the Discharge of Conditions Planning Application for the proposed development.
- 1.4 The proposed development will discharge all surface water from the roof of the property into the beach shingles located at the rear of the site.
- 1.5 All landscaping areas will be permeable and discharge directly to ground mimicking greenfield conditions.

2 Planning Condition

2.1 Condition **3** of Permission **M/86/20/PL** states:

Development shall not commence, other than works of site survey and investigation, until full details of the proposed surface water drainage scheme have been submitted to and approved in writing by the Local Planning Authority. The design should follow the hierarchy of preference for different types of surface water drainage disposal systems as set out in Approved Document H of the Building Regulations, and the recommendations of the SuDS Manual produced by CIRIA.

Winter groundwater monitoring to establish highest annual ground water levels and winter Percolation testing to BRE 365, or similar approved, will be required to support the design



of any Infiltration drainage. No building / No part of the extended building shall be occupied until the complete surface water drainage system serving the property has been implemented in accordance with the agreed details and the details so agreed shall be maintained in good working order in perpetuity.

Reason: To ensure that the proposed development is satisfactorily drained in accordance with policies W SP1, W DM1, W DM2 and W DM3 of the Arun Local Plan. This is required to be a precommencement condition because it is necessary to implement the surface water drainage system prior to commencing any building works.

3 Information to Support Discharge of Planning Condition 3

3.1 Existing Site

3.1.1 The development site is located at 8 Manor Way, Elmer, Bognor Regis, West Sussex.

3.1.2 The site is within a residential area and is bounded by a private access road to the north which serves the Elmer Sands Estate. To the east and west are residential properties with the beach and English Channel to the south.

3.1.3 A copy of the site location plan is located at the rear of this Technical Note.

3.2 Existing Drainage

3.2.1 Surface and foul water from the existing site both discharge in an unrestricted manner to the public foul sewer located beneath Manor Way.

3.2.2 Extracts of the CCTV survey for the existing site are located at the rear of this Technical Note.

3.3 Geology and Site investigation

3.3.1 Site investigation completed by Soils Ltd in December 2020 identified made ground to depths of between 0.1mbgl to 0.9mbgl, which are underlain by raised beach deposits to a depth of 6mbgl overlaying Newhaven Chalk Formation.

3.3.2 Groundwater was recorded in December 2020 at between 1.12mbgl to 1.95mbgl with perched groundwater identified at a depth of 0.8mbgl in Trial Pit 3.

3.3.3 Infiltration testing completed during May 2021 recorded an infiltration rate of 1.9×10^{-5} m/s.

3.3.4 Extracts from the ground investigation reports are located at the rear of this Technical Note.

4 Proposed Development

4.1 The proposed development is for the demolition of the existing dwelling and the construction of a new residential dwelling with driveway access and associated landscaping together with onsite parking.

4.1.1 The impermeable areas of the various elements of the development are summarised as follows:

ζ Roof areas and terraces	105 m ²
ζ Access, driveways and hardstanding	103 m ²

4.1.2 A copy of the proposed site layout plan is located at the rear of this Technical Note.

4.2 Surface Water Drainage Design

4.2.1 For surface water discharge, the drainage hierarchy notes the following list of drainage options in order of preference:

1. Infiltration to ground
2. Discharge to a watercourse
3. Discharge to a surface water sewer
4. Discharge to a foul water sewer

4.2.2 Based on this the preferred surface water drainage strategy should, where possible, be based on infiltration to ground.

4.2.3 All areas of proposed hard landscaping, including the driveway and patio at ground floor level will comprise permeable surfacing with voided stone beneath. Rainfall landing on these areas will discharge via the voided subbase to ground mimicking greenfield conditions. The voided subbase beneath the hard landscaped areas will provide additional storage for surface water

4.2.4 The proposed drainage system will discharge all surface water runoff from the roof of the property roof together with the 1st and 2nd floor terraces via a diffuser tank into the ground within the onsite beach shingles to the south of the sea wall negating the requirement for onsite winter infiltration testing and groundwater monitoring.

4.2.5 The surface water pipework will not make contact, or have any interaction with the sea wall which is an Environment Agency maintained asset.

4.2.6 As stated within the non-statutory standards for sustainable drainage system, where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharge without any impact on flood risk from the surface water body (e.g the sea or a large estuary) the peak flow control standards and volume control technical standard need not apply.

4.2.7 The proposed drainage design reduces flood risk and is the most sustainable option available. This option is preferential in comparison to discharging surface water to ground using a soakaway as it will not be impacted by either ground saturation levels or fluctuations in seasonal groundwater levels.

4.2.8 Evidence from other recent developments completed on the Elmer Sands Estates identifies shallow groundwater during the winter months with poor to very poor infiltration rates.

4.3 Foul Water

4.3.1 Foul water from the site will discharge by gravity to the public foul sewer located beneath Manor Way via the existing connection.

4.3.2 The new connection to the public sewer will be subject to agreement with Southern Water under Section 106 of the Water Industry Act 1991.

4.3.3 The proposed drainage layout plan together with construction details and calculations are located at the rear of this document.

4.4 Surface Water Quality

4.4.1 The proposed development is for residential use. In accordance with CIRIA SuDS Manual 2015 (Report C753), the pollution hazard level for this type of development is between very low and low.

4.4.2 The surface water scheme will include mitigation to ensure that surface water is suitably treated and any pollution risk adequately managed prior to discharge.

4.4.3 Table 26.2 in Chapter 26 of CIRIA report C753 The SuDS Manual provides Pollution Hazard Indices for varying land types. Those of relevance to the development proposals are as follows:

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways, residential car park, low-traffic roads	Low	0.5	0.4	0.4

Table 1: Pollution Hazard Indices

4.4.4 Table 26.3 in Chapter 26 of CIRIA report C753 The SuDS Manual identifies the water quality mitigation index of SuDS features. An extract from Table 26.3 of CIRIA report C753 The SuDS Manual is shown below:

SuDS Type	Total suspended solids (TSS)	Metals	Hydrocarbons
Permeable pavement	0.7	0.6	0.7

Table 2: Pollution Mitigation Indices

4.4.5 The proposed use of permeable paving will meet the target treatment level required for runoff with very low to low risk of pollution hazard thus demonstrating that the surface water drainage system for the site can be designed to adequately mitigate against the risk of pollution.

4.4.6 The surface water runoff from the roofs will discharge to the beach with no further water quality mitigation required.

5 Drainage Maintenance and Management Plan

5.1 Maintenance During Construction

5.1.1 Once appointed the Contractor will prepare a site-specific method statement for the control of silt and other pollutants during construction. CIRIA Report C532 :Control of Water Pollution from Construction Sites provides further guidance on this.

5.1.2 Appropriate water quality mitigation will be undertaken in accordance with CIRIA Report C532 to allow surface water to be attenuated and sediments to be captured during the construction phase.

5.1.3 The Contractor will maintain the proposed drainage system during construction.

5.2 Management and Maintenance of Proposed SuDS Drainage System

5.2.1 Upon completion, management of the private drainage facilities will be passed on to the property freeholder upon granting of practical completion of the construction phase and will remain in their ownership in perpetuity.

5.2.2 All foul and surface water drainage features and any ancillary features will be the responsibility of the homeowner.

5.2.3 The regular and corrective maintenance of all elements of the drainage system will be managed and funded by the freeholder.

5.3 Long Term Management and Maintenance of Proposed SuDS Drainage System

5.3.1 As the drainage does not include an onsite attenuation system making it very low maintenance. The suspended above ground pipework will also be visible making it easy to maintain and inspect.

5.3.2 The management and maintenance proposals for the scheme are detailed within the Drainage Maintenance Manual for the site which is provided as a separate document in support of the discharging of Planning Condition 4.

6 Documents Appended

01 - Site Location Plan

Drawing 101 - Existing Site Layout Plan

Drawing 102 - Proposed Site Layout Plan

Drawing 201 - Proposed Surface Water Plan

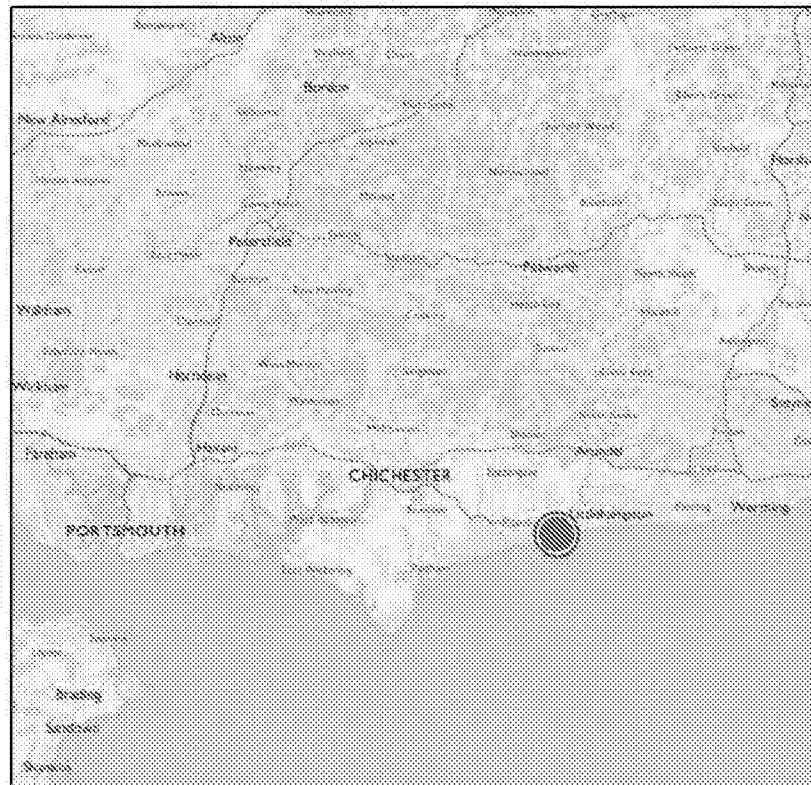
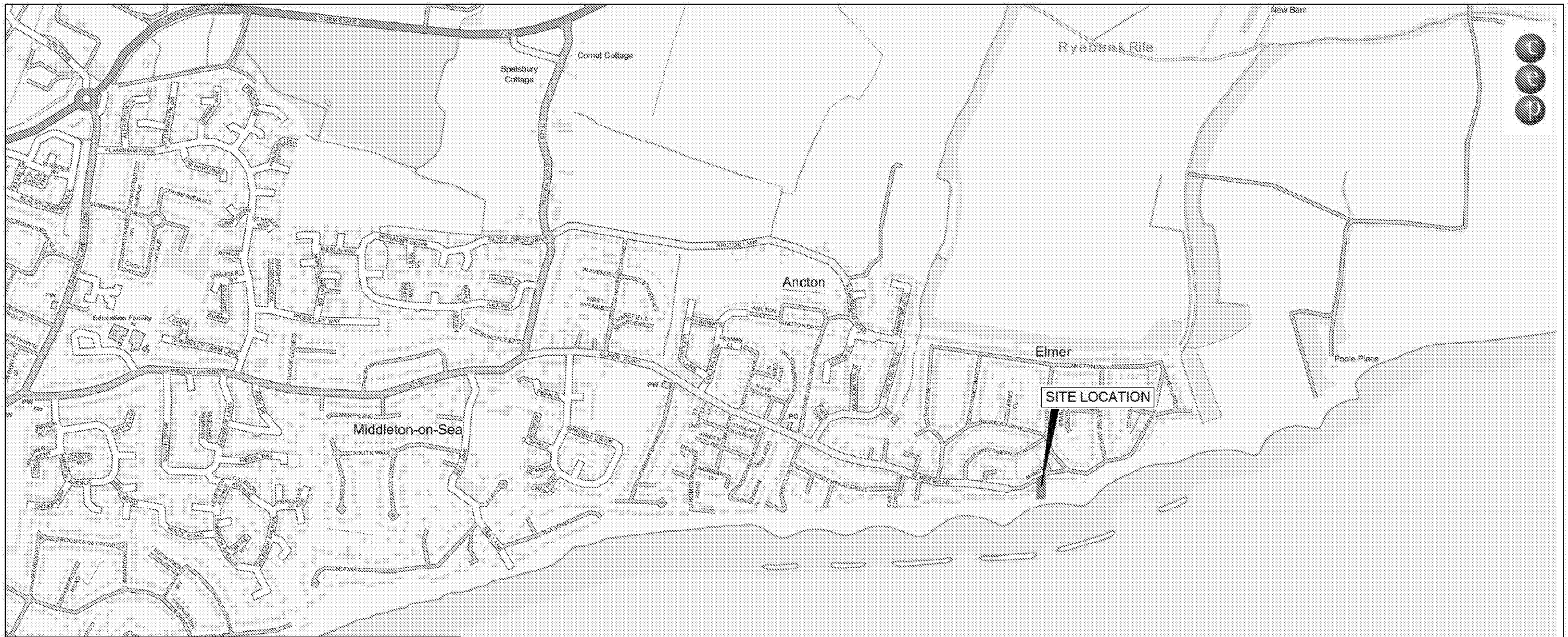
Drawing 501 - Proposed Construction Drawings

Drainage Maintenance Manual

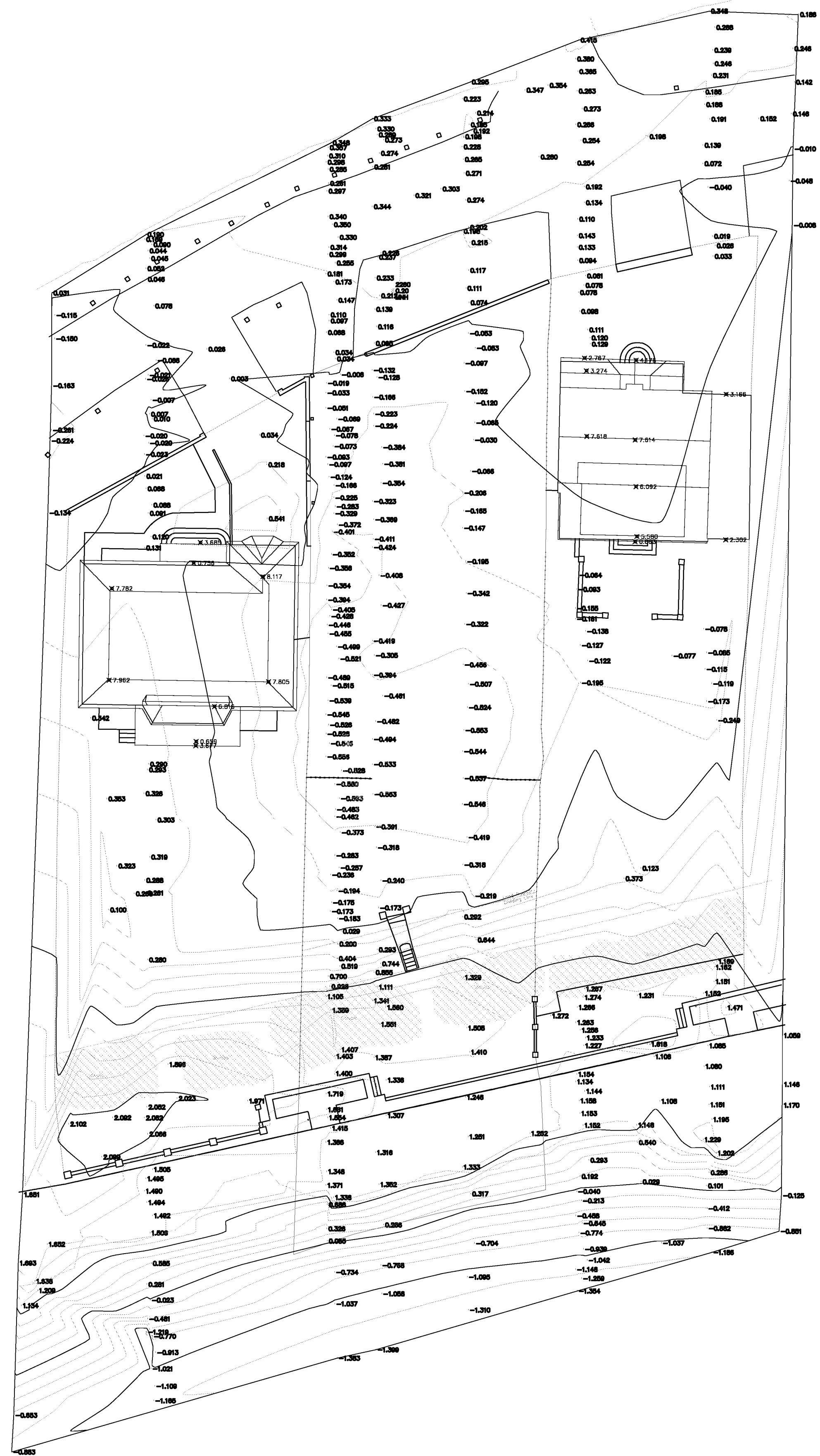
Land Registry Land Ownership Plans

CCTV Survey Extracts

Soils Ltd. Site Investigation Extracts



TITLE		Site Location Plan - Manor Way Elmer Road Bognor Regis PO22 6LA OS Reference: SU 987 000	
SCALE	1:10000 @ A3	PROJECT No.	23605
REPORT TYPE	INFORMATION		DWG. No. 01



All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.

This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.

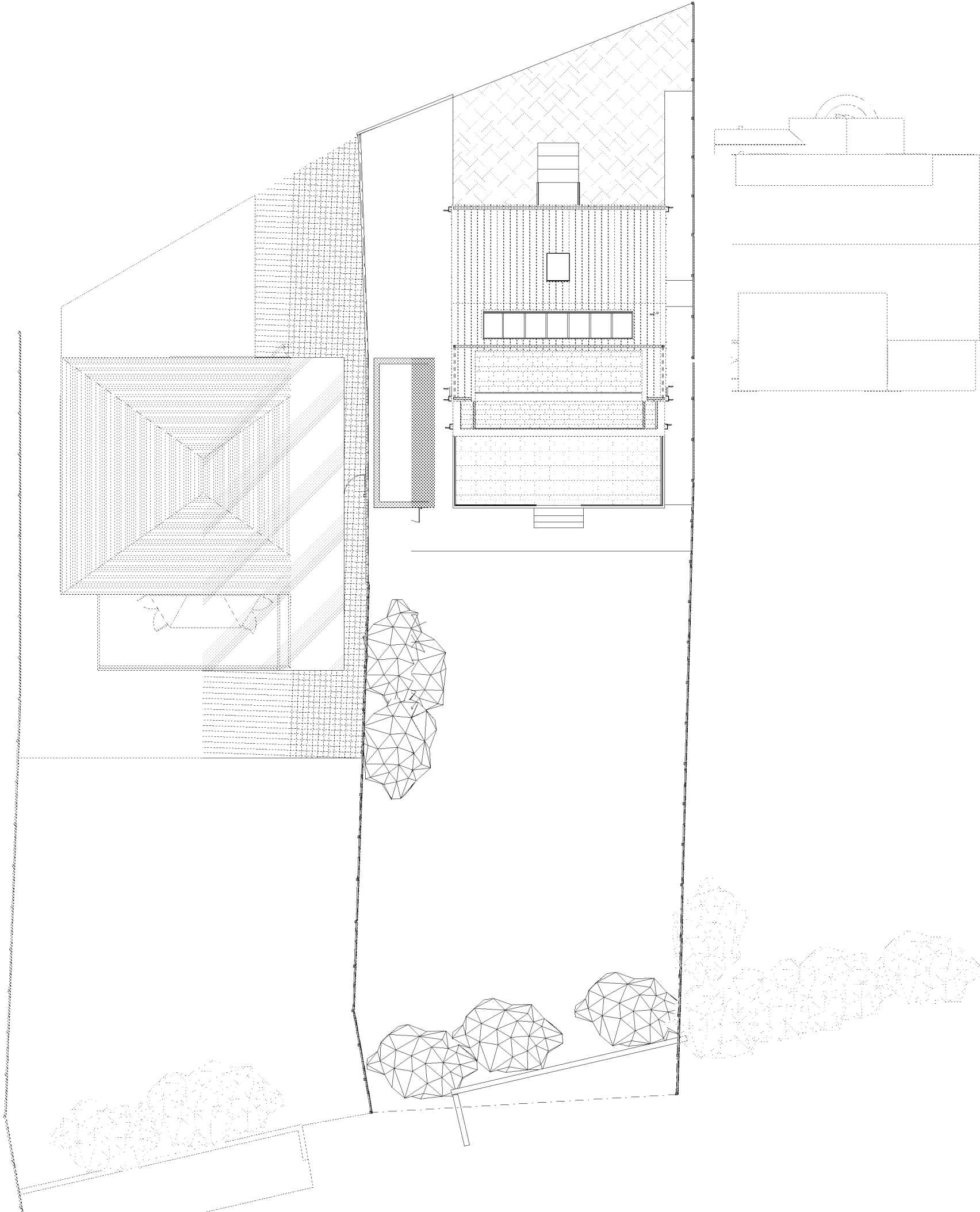
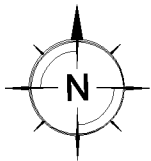
The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.

Any information given regarding existing underground services is given on good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

PRELIMINARY

CLIENT		George Bevis	
PROJECT		Manor Way Elmer	
TITLE			
Existing Site Layout Plan			
DRAWN		DATE	
M Pacifico		Sept 2021	
ENGINEER		CHECK'D	
M Kempshall		MK	
SCALE		PROJECT NO.	
1:200 @ A1		23605	
		DWG. No. REV. 101	





1m 2m 3m 4m

- NOTES:
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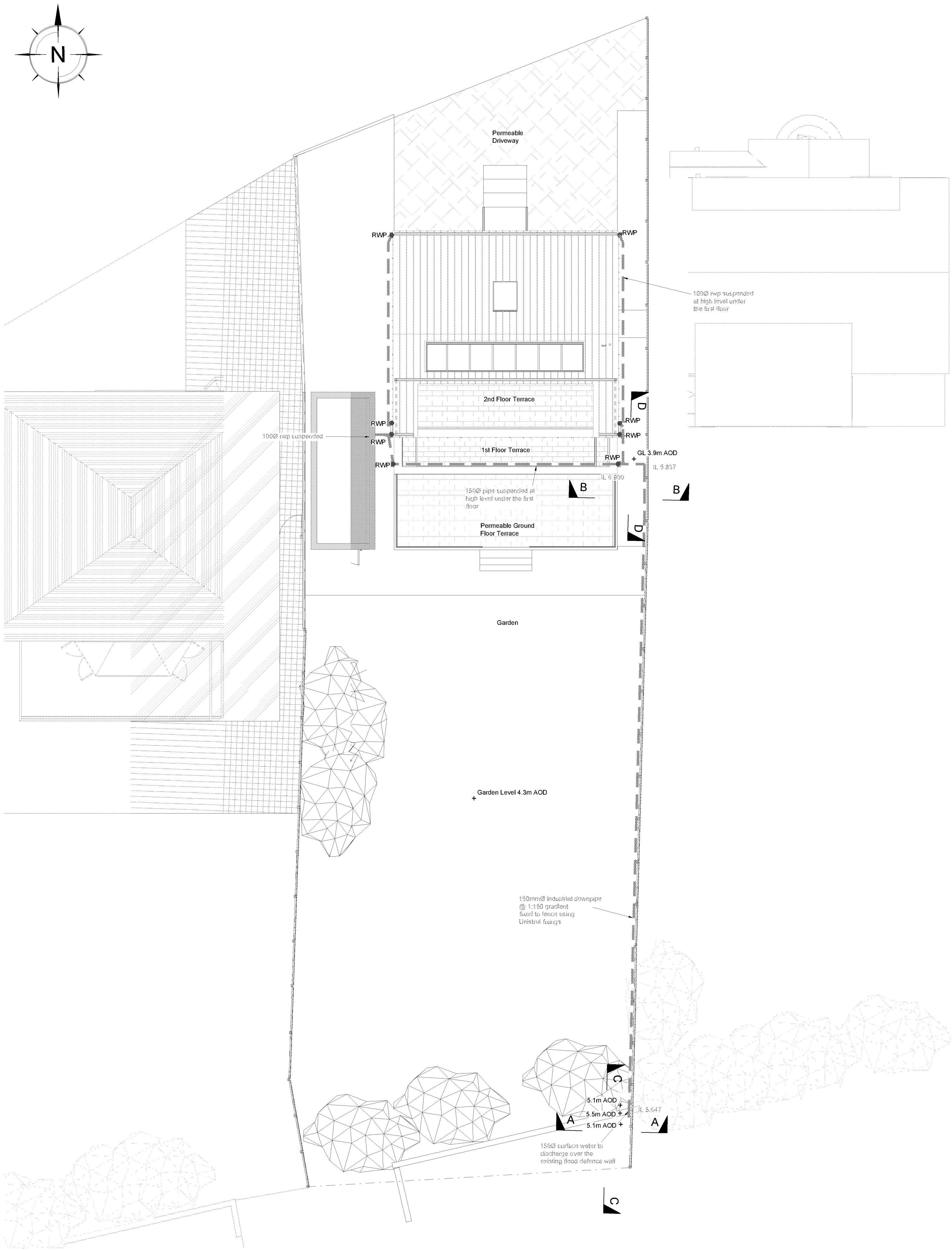
REV	DATE	INT	DESCRIPTION	CHK
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Issue Status **PRELIMINARY**



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info@the-civil-engineering-practice.co.uk
www.the-civil-engineering-practice.co.uk

CLIENT	George Bevis				
PROJECT	Manor Way Elmer				
TITLE	Proposed Site Layout Plan				
DRAWN	M Pacifico	DATE	Sept 2021	PROJECT NO.	2360
ENGINEER	M Kempshall	CHECKED	MK	DWG No.	102
SCALE	1:100 @ A1			REV	



SITE PLAN
(Scale 1:100)

GENERAL NOTES:

1. All dimensions to be checked on site. All details and dimensions relating to sub-Contractors work must be checked and agreed between the sub-Contractor or supplier and the general Contractor.
2. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and specification.
3. The main Contractor is responsible for ensuring the stability of the structure whilst the works are in progress.
4. Any information given regarding existing underground services is given in good faith after consultation with the relevant authority. No liability is accepted by the Consultant and the main Contractor is responsible for obtaining and checking all information and taking due care and attention whilst undertaking the works.

DRAINAGE NOTES:

1. All adoptable pipes, bends and junctions shall be vitrified clay in accordance with the current version of BS EN 295-1, with flexible joints and kilnmark certified.
2. All Adoptable sewers shall be in strict accordance with the SSG Appendix C - Design and Construction Guidance. Unless otherwise stated adoptable sewers shall be 150mm diameter and shall be laid in a class S bedding. Where the depth to soffit is less than 1.2m under a public highway or 0.9m elsewhere the pipe shall be laid with a class Z bedding.
3. All private building drainage shall be constructed in strict accordance with the current version of BS EN 752:2017. Unless otherwise specified building drainage shall be 100mm diameter and shall be laid at a minimum gradient of 1 in 40 for foul drains and 1 in 80 for surface water drains. All building drains shall be laid in class B bedding unless otherwise specified.
4. Where a pipe is within 1m of a foundation the trench shall be filled with class GEN 3 concrete up to the lowest level of the foundation. Where the trench is further than 1m from the foundation, the trench shall be filled with class GEN 3 concrete to a level below the lowest level for the foundation equal to the distance from the foundation less 150mm. In both cases the pipe shall be bedded and surrounded in 150mm thick class GEN 3 concrete.
5. Where pipes, external to the structures, have a depth to soffit from ground level of less than 450mm they shall have a class GEN 3 concrete encasement (150mm thick). In all other cases the pipes shall be bedded and surrounded with 100mm thick granular material.
6. In any circumstances where pipes are bedded and surrounded in concrete flexible joints should be provided. Compressible boards (fibroboard or polystyrene) shall be provided at a maximum of 8m centres (coinciding with pipe joints). The boards shall be pre-cut to pipe diameter and to a height and width equal to the concrete cross section. A board thickness of 18mm for pipes up to 450mm nominal diameter and 38mm for pipes over 450mm nominal diameter.
7. All svps shall have rodding access plates fitted at their bases (ground floor level).
8. Where existing pipes are to be abandoned they shall be dug out together with any abandoned manholes.
9. Any discrepancy between the drawing and site should be reported immediately to the Engineer.
10. All manhole and chamber sizes are given as a minimum to meet the SSG Appendix C-Design and Construction Guidance

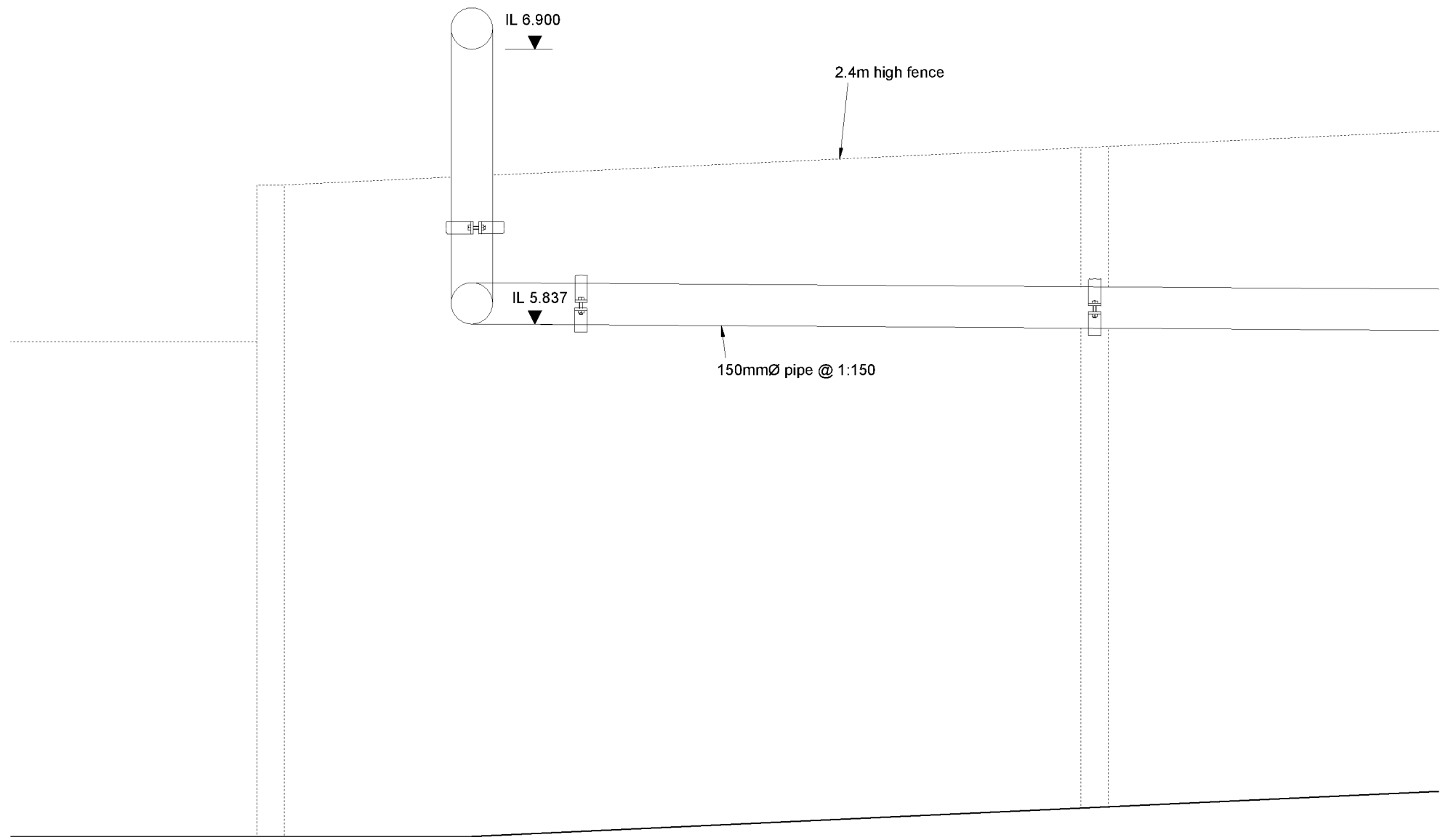
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Issue Status PRELIMINARY

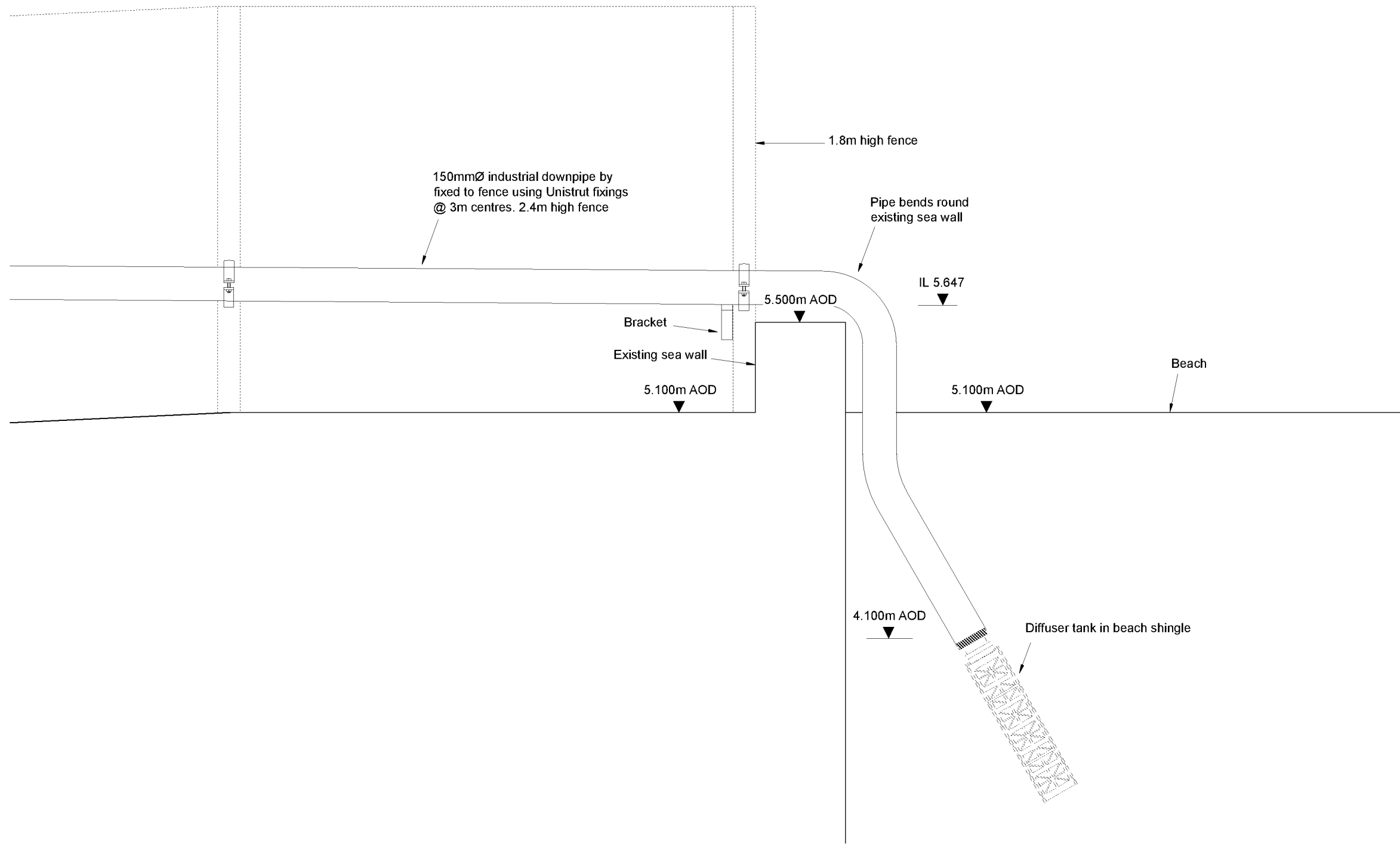


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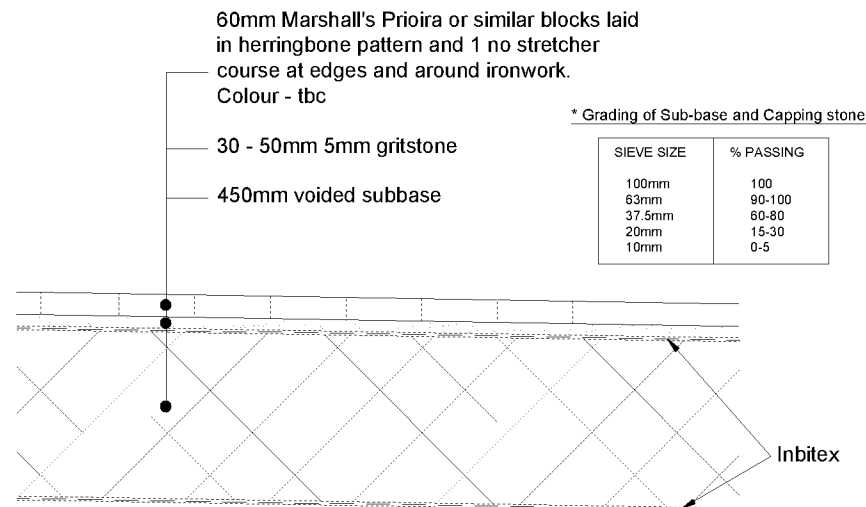
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PROJECT	Manor Way Elmer		
TITLE	Proposed Surface Water Plan		
DRAWN	DATE	PROJECT NO.	23605
PR	Sept 2021		
ENGINEER	CHECKED	DWG. NO.	
MK	MK	REV.	
SCALE	As Shown @ A1		
		201	



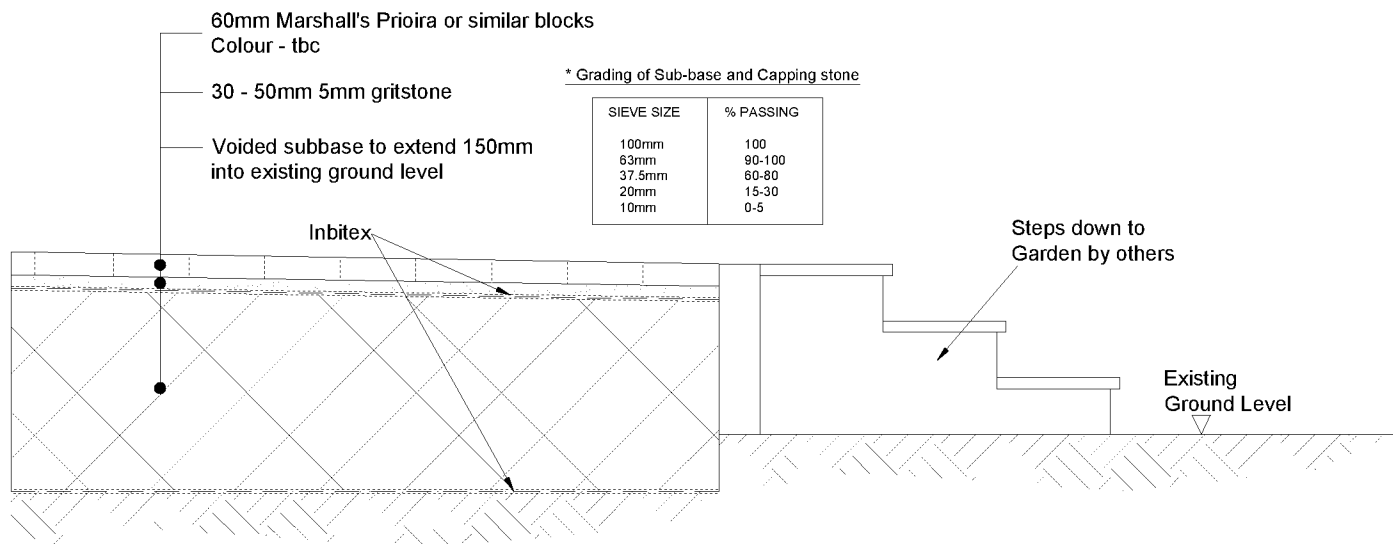
ELEVATION ON SEA WALL OUTFALL
SECTION D-D
(Scale 1:20)



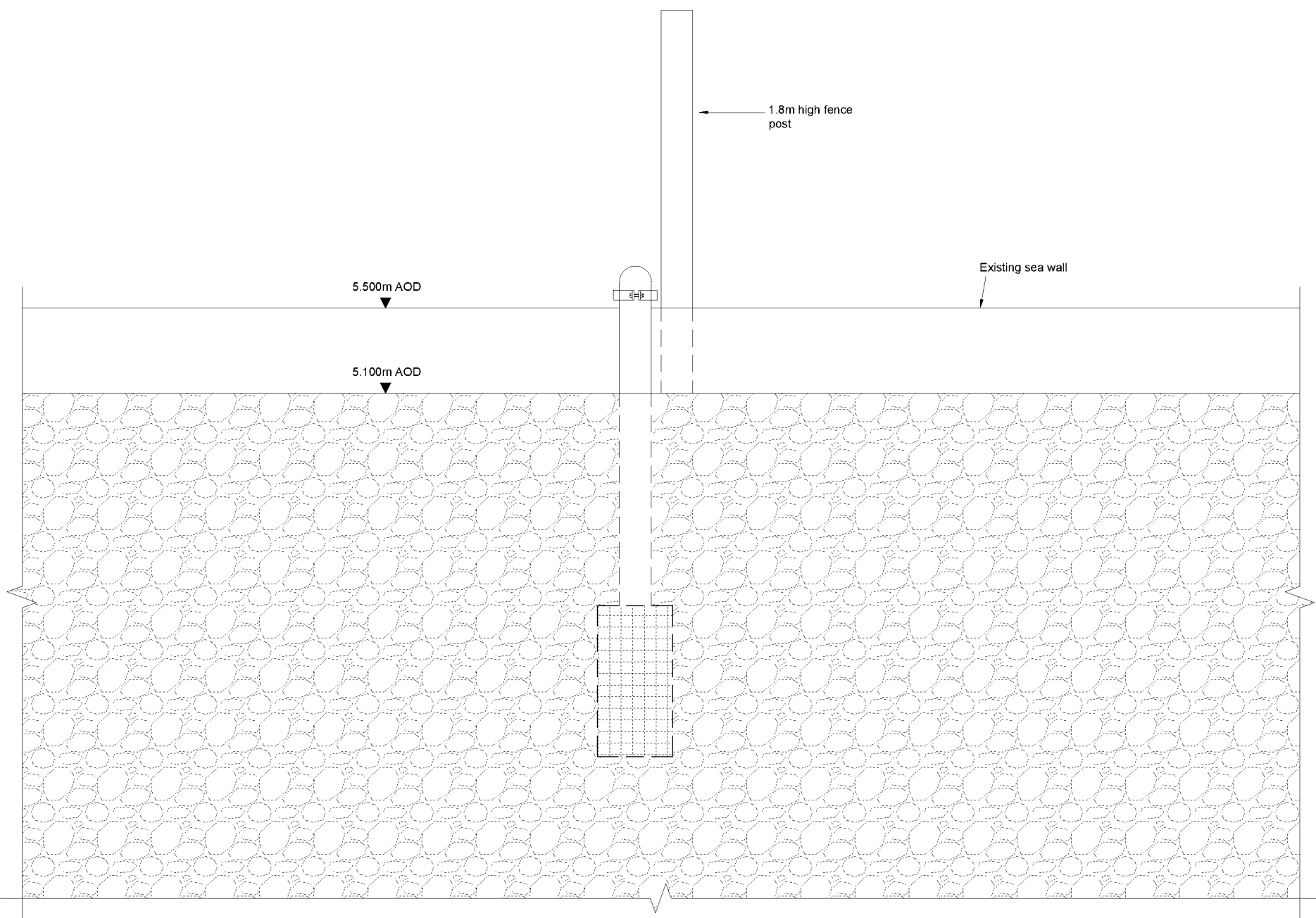
SECTION THROUGH SEAWALL OUTFALL
SECTION C-C
(Scale 1:20)



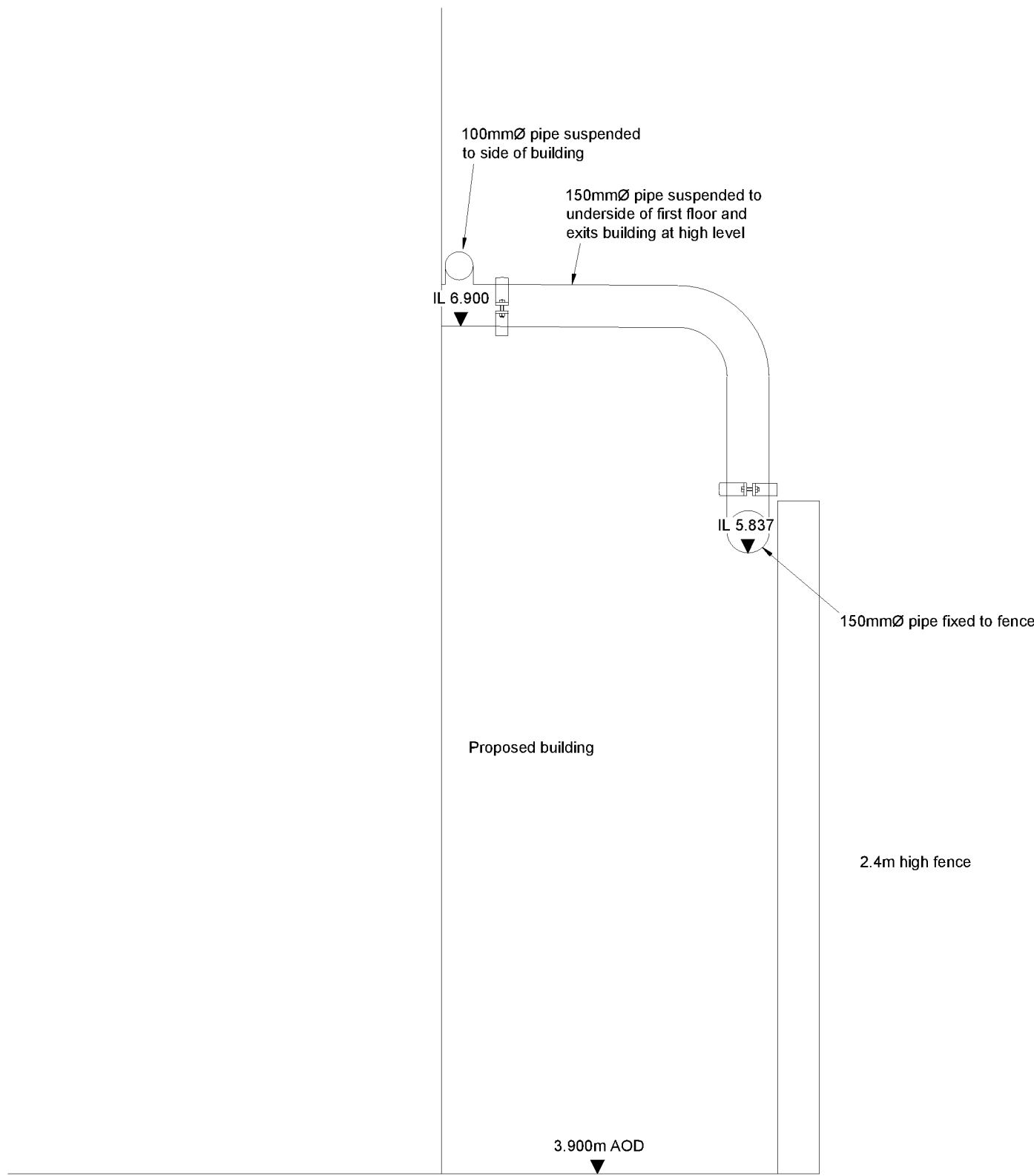
DRIVE CONSTRUCTION
PERMEABLE BLOCK PAVING
(Scale 1:20)



REAR GARDEN GROUND FLOOR TERRACE
CONSTRUCTION PERMEABLE BLOCK PAVING
(Scale 1:20)



ELEVATION ON SEA WALL OUTFALL
SECTION C-C
(Scale 1:20)



SECTION B-B
(Scale 1:20)

- NOTES:
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REV	DATE	INT	DESCRIPTION	CHK
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Issue Status PRELIMINARY



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CLIENT	George Bevis
PROJECT	Manor Way Elmer
TITLE	Construction Details

DRAWN	M Pacifico	DATE	Sept 2021	PROJECT NO.	23605
ENGINEER	M Kempshall	CHECKED		DWG. No.	501
SCALE	As Shown @ A1	REV.			

These are the notes referred to on the following official copy

The electronic official copy of the title plan follows this message.

Please note that this is the only official copy we will issue. We will not issue a paper official copy.

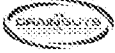
This official copy was delivered electronically and when printed will not be to scale. You can obtain a paper official copy by ordering one from HM Land Registry.

This official copy is issued on 02 March 2020 shows the state of this title plan on 02 March 2020 at 15:19:22. It is admissible in evidence to the same extent as the original (s.67 Land Registration Act 2002). This title plan shows the general position, not the exact line, of the boundaries. It may be subject to distortions in scale. Measurements scaled from this plan may not match measurements between the same points on the ground. This title is dealt with by the HM Land Registry, Durham Office .

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Old Reference: XXIV 4 A





Project

Project Name: 8 Manor Way. Elmer, Bognor Regis, PO22 6LA
Project Description: Condition and Connectivity
Project Date: 02/12/2020
Inspection Standard: MSCC5 Sewers & Drainage GB (SRM5 Scoring)





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Section:3; MH1 > MH2 (MH1X)	5
Section:4; WC > MH2 (WCX)	8
Section:5; MH2 > MH3 (MH2X)	10
Section:6; MH3 > MAINLINE (MH3X)	14



Project Information

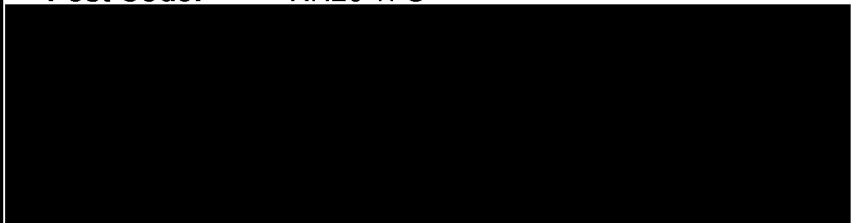
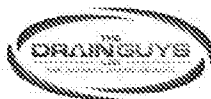
Project Name	Project Number	Project Date
8 Manor Way, Elmer, Bognor Regis, PO22 6LA		02/12/2020

Site

Street: 8 Manor Way
Town or City: Elmer
County: Bognor Regis
Post Code: PO22 6LA

Contractor

Company: The Drain Guys Ltd
Street: Oddstones, Codmore Hil
Town or City: Pulborough
County: Sussex
Post Code: RH20 1FS





Project Information

Project Name	Project Number	Project Date
8 Manor Way, Elmer, Bognor Regis, PO22 6LA		02/12/2020

Project Notes

The survey was carried out to ascertain condition and connectivity.

The pipework serves Foul and is made up of 100mm Vitrified Clayware and Polyvinyl Chloride material.

Sections 1 - 5 were confirmed to serve the property only and therefore the responsibility of the property owner to maintain.

Section 6 becomes the responsibility of Southern Water at the boundary line.

The pipework has a build-up of encrustation and debris. A combination of High-Pressure Water Jetting and Picote cleaning is required to return the subject pipework to a clear flowing condition.

The subject pipework has typical defects, the defects observed are not causing blockage points at present, but remedial works should be undertaken to prevent further deterioration and/or further defects occurring as water will leak from the existing pipework and underwash the pipework causing voids and unstable sub soil allowing ground weight to force the pipework downwards, blockages will become frequent and eventual pipework collapse may/will occur.

The defects observed can be repaired with the installation of part length and full-length structural liners, the liners are watertight, seamless, and joint less and therefore cease any egress and ingress of water etc., and improve flow characteristics, the liners are structural and therefore return structural integrity to subject pipework. The installation of full-length structural liners greatly reduces disruption to site and cost of repair.

The survey has also shown a redundant pipeline connecting to MH1. The pipework is located internally and is open/broken. The pipework should be sealed at manhole entry to prevent water ingress/egress, odours venting and rodents nesting.

The surface water pipework could not be surveyed due to no above ground access. The assets are assumed to discharge to localised soakaways.

Recommendations

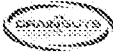
Sections 1 - 6 - To carry out a combination of High-Pressure Water Jetting and Picote cleaning to restore flow.

Section 2 - To cap off redundant connection at manhole entry using waterproof mortar/cement.

Section 3 - To prepare and install up to 2 metres of structural liner to repair multiple defects

Section 5 - To prepare and install up to 9 metres of structural liner to repair multiple defects

Section 6 - To prepare and install up to 3.50 metres of structural liner to repair multiple defects



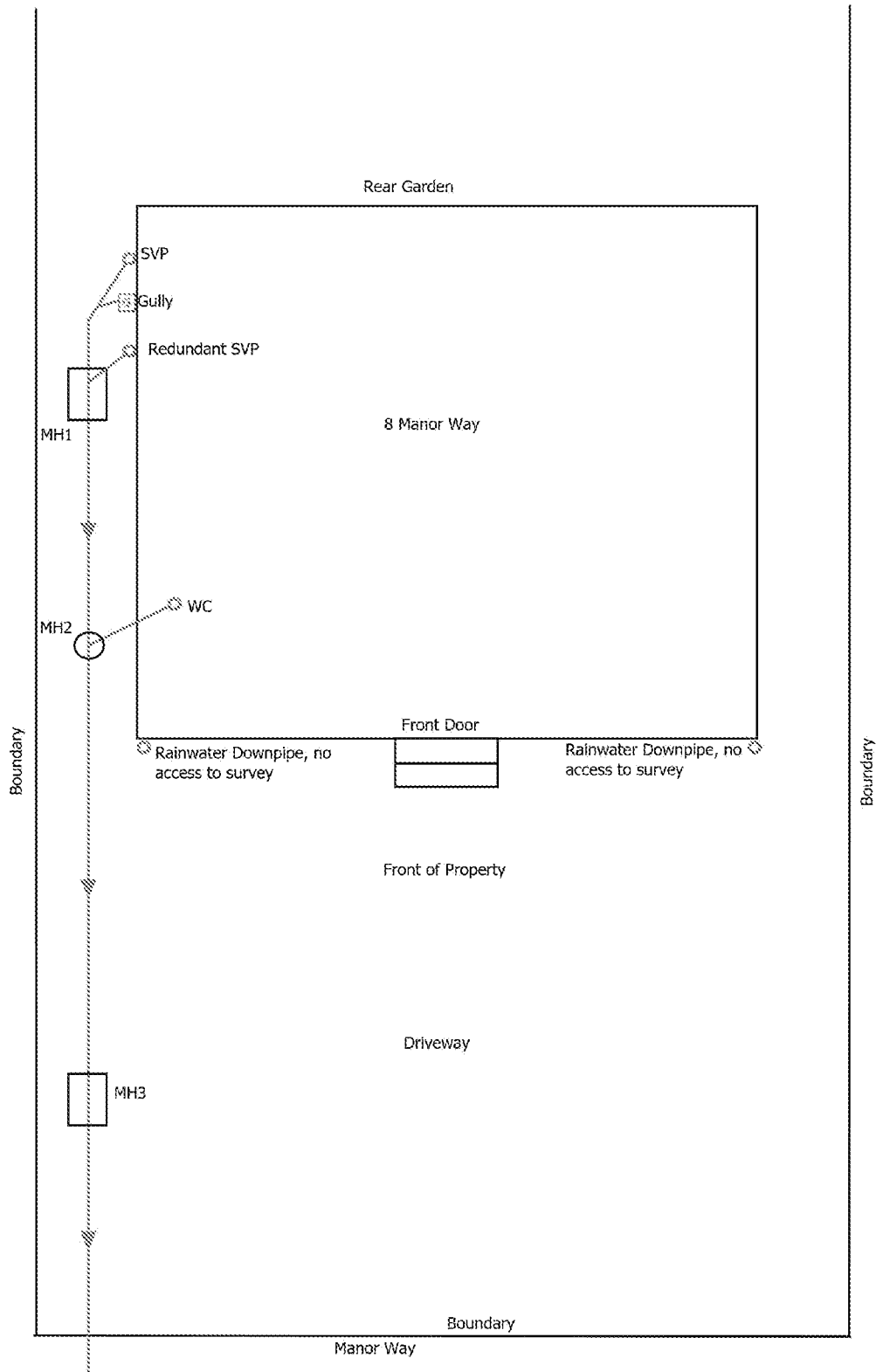
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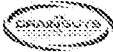
Project Name
8 Manor Way, Elmer, Bognor Regis, PO22 6LA

Project Number

Project Date
02/12/2020

Project Drawing, Page 8 Manor Way, Elmer, Bognor Regis, PO22 6LA





Section Pictures - 02/12/2020 - MH3X

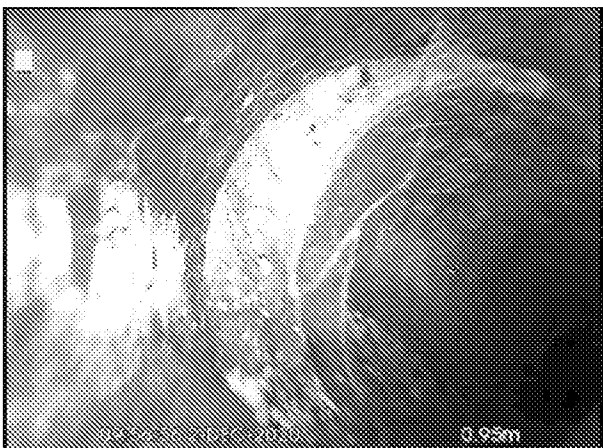
Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
6	Downstream	MH3X		



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Crack, circumferential from 12 o'clock to 12 o'clock



MH3X_a70e6926-967e-458b-8d02-3e9dbe503176_20201208_215555_423.jpg, 00:00:35, 0.95 m
Joint displaced, large



MH3X_9e064088-caa3-4ea0-819c-19b170f6255e_20201208_215628_379.jpg, 00:00:48, 2.75 m
Hole in drain or sewer from 9 o'clock to 12 o'clock



Main Investigation Report

at

8 Manor Way, Bognor Regis, West Sussex PO22 6LA

for

George Bevis

Reference: 18899/MIR_R27
January 2021

Section 2 Site Works

2.1 Proposed Project Works

The proposed intrusive investigation was designed to provide information on the ground conditions and to aid the design of foundations for the proposed residential development. The intended investigation, as outlined within the Soils Limited quotation (Q23774, dated 26th November 2020), was to comprise the following items:

- 4No. up to 4m deep windowless sampler boreholes
- 4No. up to 6m deep dynamic probes
- 5No. external hand excavated trial pits for foundation exposures
- Geotechnical laboratory testing.

2.1.1 Actual Project Works

The actual project works were undertaken on 14th December 2020 and comprised:

- 4No. windowless sampler boreholes (WS1 – WS4)
- 4No. super heavy dynamic probes (DP1 – DP4)
- 5No. hand excavated trial pits for foundation exposures (TP1 – TP5)
- Geotechnical laboratory testing,

All windowless sampler borehole locations were backfilled with gravel and all trial pits were backfilled with arisings on completion.

All trial hole locations have been presented in Figure 3.

Following completion of site works, soil cores were logged and sub sampled so that samples could be sent to the laboratory for geotechnical testing.

2.2 Ground Conditions

On 14th December 2020, four windowless sampler boreholes (WS1 – WS4) were each drilled to a depth of 4.00m below ground level (bgl) at locations selected by the client.

Four super heavy dynamic probes (DP1 – DP4) were driven prior and adjacent to the corresponding windowless sampler borehole each to a depth of 6.00m bgl.

Five trial pits (TP1 – TP5) were hand excavated to expose and record construction details of the existing foundations at locations selected by the client. Presence of concrete boulders in the area of TP3 and TP4 prevented the excavations advancing past 0.90m bgl.

The maximum depths of trial holes have been included in Table 2.1.

All trial holes were scanned with a Cable Avoidance Tool (C.A.T.) and signal generator (Genny) prior to excavation to ensure the health and safety of the operatives.

Table 2.1 Final Depth of Trial Holes

Trial Hole	Depth (m bgl)	Trial Probe	Depth (m bgl)
WS1	4.00	DPI	6.00
WS2	4.00	DP2	6.00
WS3	4.00	DP3	6.00
WS4	4.00	DP4	6.00
TP1	1.00		
TP2	1.10		
TP3	0.90 ¹		
TP4	0.90 ¹		
TP5	0.40		
Note: ¹ Terminated on concrete obstruction			

The approximate trial hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the trial hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots, or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

For more complete information about the soils encountered within the general area of the site reference should be made to the detailed records given within Appendix A, but for the purposes of discussion, the succession of conditions encountered in the trial holes in descending order can be summarised as:

Made Ground (MG)
Raised Beach Deposits (RBD)
Newhaven Chalk Formation (NCK)

The ground conditions encountered in the trial holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Epoch	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
MG	Anthropocene	0.00	0.10->0.90 ¹	0.50	The Made Ground typically comprised dark brown slightly gravelly slightly sandy CLAY with brick, concrete, clinker and flint. Boulders of brick and concrete recorded locally.
RBD	Holocene	0.10->0.90 ¹	2.55-6.00 ^{1,3}	Not proven ²	The Raised Beach Deposits comprised a complex sequence of locally interbedded grey and orangish brown mottled fine sandy silty CLAY and SILT, orangish grey very clayey fine to medium SAND and very gravelly very clayey SAND
NCK	Late Cretaceous	2.55->6.00 ^{1,3}	>6.00 ^{1,3}	Not proven ²	The Newhaven Chalk Formation comprised light orangish brown and off-white CHALK recovered as slightly sandy gravelly calcareous CLAY.

Note: ¹ Final depth of trial hole. ² Base of strata not encountered. ³ Inferred from dynamic probe. 0.00 denotes ground level.

2.3 Ground Conditions Encountered in Trial Holes

The ground conditions encountered in trial holes have been described below in descending order. The engineering logs are presented in Appendix A.1.

2.3.1 Made Ground

Soils described as Made Ground were encountered in all nine trial holes from ground level to depths ranging between 0.10 and 0.80m bgl, however, locally recorded to full depth of 0.90m bgl for FE3 and FE4 which could not be excavated further.

The Made Ground typically comprised dark brown slightly gravelly slightly sandy CLAY with occasional to frequent rootlets. Gravel comprised fragments of brick, concrete, clinker and flint.

Boulder sized clasts of cemented brick and concrete were recorded in the Made Ground adjacent to the existing building in the area of FE3 and FE4.

The depths of Made Ground have been included in Table 2.3.

Table 2.3 Final Depth of Made Ground

Trial Hole	Depth (m bgl)
WS1	0.70
WS2	0.80
WS3	0.50
WS4	0.50
TP1	0.50
TP2	0.50
TP3	>0.90 ¹
TP4	>0.90 ¹
TP5	0.10

Note: ¹ Final depth of trial hole.

2.3.2 Raised Beach Deposits

Soils described as the Raised Beach Deposits were encountered underlying the Made Ground and persisted to proven depths of between 2.55m and 3.70m bgl in the area of WS2 and WS1, respectively, and to full investigatory depth of 4.00m bgl in the remaining windowless sampler boreholes. The Storm Beach Deposits were inferred to the full dynamic probe depth of 6.00m bgl in DP3 and DP4 as the upper horizon of the underlying chalk could not be decisively inferred from the blow counts.

The Raised Beach Deposits comprised a complex sequence of locally interbedded grey and orangish brown mottled fine sandy silty CLAY and SILT, orangish grey very clayey fine to medium SAND and very gravelly very clayey SAND with a variable fines fraction. Gravel was predominantly coarse, occasionally fine to medium, sub angular to subrounded clasts of intact chalk and flint.

The depth of Raised Beach Deposits has been included in Table 2.4.

Table 2.4 Final Depth of Raised Beach Deposits

Trial Hole	Depth (m bgl)
WS1	3.70
WS2	2.55
WS3	>4.00 ¹ / 6.00 ^{1,2}
WS4	>4.00 ¹ / 6.00 ^{1,2}
TP1	>1.00
TP2	>1.00
TP5	>0.40

Note: ¹ Final depth of trial hole. ² Inferred from dynamic probe.

2.3.3 Newhaven Chalk Formation

Soils described as Newhaven Chalk Formation were encountered in WS1 and WS2, underlying the Raised Beach Deposits from between 2.55m and 3.70m bgl

and persisted to the full investigatory depth of 4.00m bgl for the windowless sampler boreholes and inferred to the full depth of 6.00m bgl for the corresponding dynamic probes.

The dynamic probe profiles of the chalk inferred in DP1 and DP2 varied from those obtained from DP3 and DP4, therefore, it was not possible to infer the depth to the upper horizon of the chalk with confidence in these locations.

The Newhaven Chalk Formation comprised light orangish brown and off-white CHALK recovered as slightly sandy gravelly calcareous CLAY. Gravel was subangular extremely weak low-density clasts of intact chalk and rounded clasts of flint.

Chalk in its unweathered state is a weak rock and the dynamic drilling process can disturb both the insitu structure and fabric of the chalk being sampled. Therefore, the chalk samples logged from the windowless sampler boreholes are heavily disturbed by the sampling process.

The depth of Newhaven Chalk Formation has been included in Table 2.5.

Table 2.5 Final Depth of Newhaven Chalk Formation

Trial Hole	Depth (m bgl)
WS1	>4.00 ¹ / 6.00 ^{1,2}
WS2	>4.00 ¹ / 6.00 ^{1,2}

Note: ¹ Final depth of trial hole. ² Inferred from dynamic probe.

2.4 Roots

Roots/rootlets were encountered in eight of the nine trial holes observed to depths ranging between 0.40 and 1.55m bgl. The depths of root penetration have been included in Table 2.6.

Table 2.6 Depth of Root Penetration

Trial Hole	Depth (m bgl)
WS1	1.50
WS2	1.55
WS3	0.50
WS4	1.00
TP1	0.40
TP2	0.40
TP3	0.90 ¹
TP4	None observed
TP5	0.40 ¹

Note:

Roots/rootlets may be found to greater depth at other locations on the site particularly close to trees and/or trees that have been removed both within the site and its close environs.

It must be emphasised that the probability of determining the maximum depth of roots from a narrow diameter borehole is low. A direct observation such as from within a trial pit is necessary to gain a better indication of the maximum root depth.

2.5 Groundwater

Groundwater “strikes” were recorded in all four windowless sampler boreholes at the time of drilling, encountered from depths of between 2.00m and 3.00m bgl, rising to depths of between 1.12m to 1.95m bgl after drilling ceased for 20 minutes. Perched water was recorded at a standing level of 0.80m bgl in TP3. The remaining hand dug trial pits were recorded as dry during excavation.

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage and tidal effects with a lag and attenuation. The investigation was conducted in December (2020), when groundwater levels should be rising from their annual minimum (lowest) elevation, which typically occurs around September to the annual maximum (highest) which typically occurs around March.

Given the sites proximity to the shoreline, it is likely that the groundwater in the area of the site will fluctuate with tidal levels with a lag and attenuation.

Groundwater records encountered at the time of the intrusive works has been presented in Table 2.7.

Table 2.7 Groundwater Records

Trial Hole	Depth to Water (m bgl)		Final Depth of Trial Hole (m bgl)
	Strike	After 20minutes	
WS1	2.00	1.12	4.00
WS2	2.00	1.50	4.00
WS3	2.00	1.23	4.00
WS4	3.00	1.95	4.00
TP1	No groundwater encountered		1.00
TP2	No groundwater encountered		1.10
TP3	0.80	0.80	0.90
TP4	No groundwater encountered		0.90
TP5	No groundwater encountered		0.40

Groundwater equilibrium conditions may only be conclusively established, if a series of observations are made via groundwater monitoring wells.

2.6 Foundation Exposures

Foundations exposures were carried out in TP1 to TP5 at locations selected by the client, with TP1 to TP4 against the two storey building, and TP5 against the detached garage.

2.6.1 Foundation Exposure TP1

TP1 encountered brickwork extending vertically down to 0.40m bgl onto a concrete foundation extending horizontally out from the brickwork by 0.07m and vertically down founding at a depth of 0.90m bgl onto predominantly cohesive soils of the Raised Beach Deposits.

2.6.2 Foundation Exposure TP2

TP2 encountered brickwork extending vertically down to 0.37m bgl onto a concrete foundation extending horizontally out from the brickwork by 0.28m and vertically down founding at a depth of 1.10m bgl onto predominantly cohesive soils of the Raised Beach Deposits.

2.6.3 Foundation Exposure TP3

TP3 encountered a concrete foundation from ground level extending horizontally out from the brickwork by 0.12m and vertically down to the full pit depth of 0.90m bgl, where the pit could not be advanced further due to an obstruction of cemented brick and concrete boulders which could not be excavated by hand. The base of the foundation could not be proven in this location.

2.6.4 Foundation Exposure TP4

TP4 encountered brickwork extending vertically down to 0.50m bgl onto rough concrete which extended vertically down to 0.60m bgl onto a concrete foundation extending horizontally out from the wall by 0.13m and vertically down to the full pit depth of 0.90m bgl, where the pit could not be advanced further due to an obstruction of cemented brick and concrete boulders which could not be excavated by hand. From probing the base of the trial pit with a road pin, the base of foundation was anticipated at a depth of between 0.90m and 1.20m bgl.

2.6.5 Foundation Exposure TP5

TP5, excavated against the detached garage, encountered brickwork extending vertically down by 0.14m onto a concrete foundation which extended flush with the brickwork vertically down founding at a depth of 0.25m bgl onto predominantly cohesive Raised Beach Deposits.

The full foundation sketches and photographs for TP1 to TP5 are presented in Appendix A.1.

Section 4 Foundation Design

4.1 General

An engineering appraisal of the soil types encountered during the site investigation and likely to be encountered during the redevelopment of this site is presented. Soil descriptions are based on analysis of disturbed samples taken from the trial holes.

4.1.1 Made Ground and Topsoil

The terms *Fill* and *Made Ground (non-engineered fill)* are used to describe material, which has been placed by man either for a particular purpose e.g. to form an embankment, or to dispose of unwanted material. For the former use, the Fill and/or Made Ground may well have been selected for the purpose and placed and compacted in a controlled manner. With the latter, great variations in material type, thickness and degree of compaction invariably occur and there can be deleterious or harmful matter, as well as potentially methanogenic organic material.

The BSI Code of Practice for Foundations, BS 8004:2015, Clause 4.1.2.2 states, *'Spread foundations should not be placed on non-engineered fill unless such use can be justified on the basis of a thorough ground investigation and detailed design.'*

Soils described as Made Ground were encountered in all nine trial holes from ground level to depths ranging between 0.10 and 0.80m bgl, however, locally recorded to full depth of 0.90m bgl for FE3 and FE4 which could not be excavated further. The Made Ground typically comprised dark brown slightly gravelly slightly sandy CLAY with occasional to frequent rootlets. Gravel comprised fragments of brick, concrete, clinker and flint. Boulder sized clasts of cemented brick and concrete were recorded in the Made Ground adjacent to the existing building in the area of FE3 and FE4.

A result of the inherent variability, particularly of uncontrolled Topsoil, Fill and/or Made Ground is that it is usually unpredictable in terms of bearing capacity and settlement characteristics. Foundations should, therefore, be taken through any Topsoil and/or Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

4.1.2 Raised Beach Deposits

Soils described as the Raised Beach Deposits were encountered underlying the Made Ground and persisted to proven depths of between 2.55m and 3.70m bgl in the area of WS2 and WS1, respectively, and to full investigatory depth of 4.00m bgl in the remaining windowless sampler boreholes. The Storm Beach Deposits were inferred to the full dynamic probe depth of 6.00m bgl in DP3 and DP4 as the upper horizon of the underlying chalk could not be decisively inferred from the blow counts.

The Raised Beach Deposits comprised a complex sequence of locally interbedded grey and orangish brown mottled fine sandy silty CLAY and SILT, orangish grey very clayey fine to medium SAND and very gravelly very clayey SAND with a variable fines fraction. Gravel was predominantly coarse, occasionally fine to medium, sub angular to subrounded clasts of intact chalk and flint.

The results from DPSH testing inferred that the predominantly cohesive soils of the Raised Beach Deposits within the top c. 2.00m bgl were typically extremely low to very low strength with inferred undrained cohesive strength of <10kPa to 20kPa. The predominantly cohesive unit at depth in the area of DP3 from 2.30m bgl was inferred as medium to very high strength with undrained cohesions between 60kPa and 200kPa, increasing with depth. The predominantly granular beds of the Raised Beach Deposits were inferred as typically loose to medium dense relative density, with loose to dense granular soils recorded locally at depth in the area of DP4.

The results from Atterberg Limits tests showed that the predominantly cohesive soils of the Raised Beach Deposits had low to medium volume change potential in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

The results from PSD testing showed that the predominantly granular soils of the Raised Beach Deposits had a volume change potential in accordance with BRE Digest 240.

Soils of the Raised Beach Deposits are normally consolidated variously interbedded cohesive and granular soils and as such are expected to display low to moderate bearing capacities with moderate to high settlement characteristics. Given the encountered variation in deposition thickness and composition both vertically and horizontally across the site, poor engineering characteristics recorded in the top circa 2.00m bgl and presence of shallow groundwater, the soils of the Raised Beach Deposits are unlikely to be a suitable bearing stratum for the proposed development.

4.1.3 Newhaven Chalk Formation

Soils described as Newhaven Chalk Formation were encountered in WS1 and WS2, underlying the Raised Beach Deposits from between 2.55m and 3.70m bgl and persisted to the full investigatory depth of 4.00m bgl for the windowless sampler boreholes and inferred to the full depth of 6.00m bgl for the corresponding dynamic probes.

The dynamic probe profiles of the chalk inferred in DP1 and DP2 varied from those obtained from DP3 and DP4, therefore, it was not possible to infer the depth to the upper horizon of the chalk with confidence in these locations.

The results from the dynamic probing inferred that the Newhaven Chalk Formation, where encountered in DP1 and DP2, comprised structureless Grade Dc to structured Grade C5 – A1 chalk.

The SMC test undertaken on the stratum indicated the chalk was of low density, with a dry density of 1.32Mg/m³ recorded.

Chalk descriptions from windowless sampler boreholes are not in accordance with CIRIA C574 and are not representative of in-situ chalk. Generally, soils of the Newhaven Chalk Formation are structureless to weak rock and would possess low to moderate bearing and settlement characteristics. The Newhaven Chalk Formation would be suitable as a bearing stratum, adopting a piled foundation solution given the deep and variable depth to its upper horizon across the site.

4.1.4 Roots

Roots/rootlets were encountered in eight of the nine trial holes observed to depths ranging between 0.40 and 1.55m bgl. Roots/rootlets may be found to greater depth at other locations on the site particularly close to trees and/or trees that have been removed both within the site and its close environs.

4.1.5 Groundwater

Groundwater “strikes” were recorded in all four windowless sampler boreholes at the time of drilling, encountered from depths of between 2.00m and 3.00m bgl, rising to depths of between 1.12m to 1.95m bgl after drilling ceased for 20 minutes. Perched water was recorded at a standing level of 0.80m bgl in TP3. The remaining hand dug trial pits were recorded as dry during excavation.

Given the sites proximity to the shoreline, it is likely that the groundwater in the area of the site will fluctuate with tidal levels with a lag and attenuation.

4.2 Foundation Scheme General

The proposed development comprised demolition of the existing dwelling onsite, retaining the detached garage, and subsequent erection of a two storey house with loft accommodation and domestic garden.

In compiling this report reliance was placed on drawing number B59051 – 3100 to 3600, dated November 2020, prepared by Resi. Any change or deviation from the scheme outlined in the drawing could invalidate the recommendations presented within this report. Soils Limited must be notified about any such changes.

Development plans provided by the client are presented in Appendix C.

4.2.1 Guidance on Shrinkable Soils

The Building Research Establishment (BRE) Digests 240, 241 and 242 provide guidance on ‘best practice’ for the design and construction of foundations on shrinkable soils.

The results from Atterberg Limits tests indicated the predominantly cohesive soils

of the Raised Beach Deposits had **low to medium volume change potential** in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

Medium volume change potential must therefore be adopted where foundations pass through the cohesive Raised Beach Deposits.

The results from PSD testing indicated the predominantly granular soils of the Raised Beach Deposits had a volume change potential in accordance with BRE Digest 240, however, did not have a volume change potential in accordance with NHBC Standards Chapter 4.2.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot by plot basis to establish an appropriate founding depth prior to the construction of foundations. This must take account of trees, substantial bushes and hedgerows that are to remain, those that have already been removed or are to be removed or those that are to be planted as part of the site landscaping. When trees are felled it can take up to twenty years for desiccation caused by roots to recover. Supplied site surveys may not include substantial shrubs or bushes and is also unlikely to have data or any trees, bushes or shrubs removed prior to or following the site survey.

The BRE Digest 241 states: “An increasingly common, potentially damaging situation is where trees or hedges have been cut down prior to building. The subsequent long-term swelling of the zone of clay desiccated by the roots, as moisture slowly returns to the ground, can be substantial. The rate at which the ground recovers is very difficult to predict and if there is any doubt that recovery is complete then bored pile foundations with suspended beams and floors should be used”.

The stated intention of the NHBC is to ensure that shrinkage and swelling of plastic soils does not adversely affect the structural integrity of foundations to such a degree that remedial works would be required to restore the serviceability of the building. It must be borne in mind that adherence to the NHBC tables and design recommendations may not, in all cases, totally prevent foundation movement and cracking of brickwork might occur.

The BRE Digest 240 suggests: *“Two courses of action are open:*

Estimate the potential for swelling or shrinkage and try to avoid large changes in the water content, for example by not planting trees near the foundations.

Accept that swelling or shrinkage will occur and take account of it. The foundations can be designed to resist resulting ground movements or the superstructure can be designed to accommodate movement without damage.”

The design of foundations suitable to withstand movements is presented in BRE Digest 241 "Low-rise buildings on shrinkable clay soils: Part 2"

4.3 Foundation Scheme

Foundations **must not** be constructed within any Made Ground/Topsoil and Raised Beach Deposits due to the likely variability and potential for large load induced settlements both total and differential.

Roots/rootlets were encountered in eight of the nine trial holes observed to depths ranging between 0.40 and 1.55m bgl. If roots are encountered during the construction phase foundations **must not be placed within any live root penetrated or desiccated cohesive soils or those with a volume change potential**. Should the foundation excavations reveal such materials, the excavations **must** be extended to greater depth in order to bypass these unsuitable soils. Excavations must be checked by a suitable person prior to concrete being poured.

Based on the results of this intrusive investigation, a shallow foundation solution is not considered viable, due to:

- The high groundwater table, probably influenced by the tide,
- Unstable ground, particularly below the groundwater table,
- Poor engineering characteristics of the top 2.00m bgl which must be bypassed,
- The medium volume change potential of the cohesive soil.

Consideration should be given towards adopting a piled foundation scheme for the proposed development. The construction of a piled foundation would require further investigation via deeper boreholes to gain soil parameters at greater depth and confirm depth to the underlying Newhaven Chalk Formation across the site.

4.4 Subsurface Concrete

Sulphate concentration measured in 2:1 water/soil extracts fell into Class **DS-1** of the BRE Special Digest 1 2005, '*Concrete in Aggressive Ground*'. Table C2 of the Digest indicated ACEC (Aggressive Chemical Environment for Concrete) site classifications of **AC-1**. The pH of the soils tested ranged between 8.0 and 8.9. The classification given was determined using the mobile groundwater case. The laboratory results are presented in Appendix B.3.

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1 2005, '*Concrete in Aggressive Ground*' taking into account any possible exposure of potentially pyrite bearing natural ground and the pH of the soils.

4.5 Excavations

Shallow and deep excavations in the Made Ground/Topsoil and Raised Beach Deposits are likely to be unstable and will required supporting, especially given the presence of shallow groundwater. Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions should therefore be taken to ensure that such earth faces are adequately supported or battered back to a safe angle of repose before excavations are entered by personnel.

Excavations beneath the groundwater table are likely to be unstable and dewatering of trenches may be necessary.

4.6 Additional Investigation and Analysis

Following the results of this intrusive investigation and considerations given in Section 4.3 the following supplementary works are recommended:

- Cable percussive borehole(s) to depths of circa 12m to permit in-situ and laboratory sample analysis to greater depth to inform pile design.
- Groundwater monitoring well installations with dataloggers to gain continuous groundwater data given potential for tidal influence to the groundwater regime to conclusively establish groundwater equilibrium conditions, ideally during winter months.

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Appendix B Geotechnical In-Situ and Laboratory Testing

Appendix B.1 Classification

Appendix B.2 Interpretation

Appendix B.3 Geotechnical In-Situ and Laboratory Results

Appendix C Information Provided by the Client

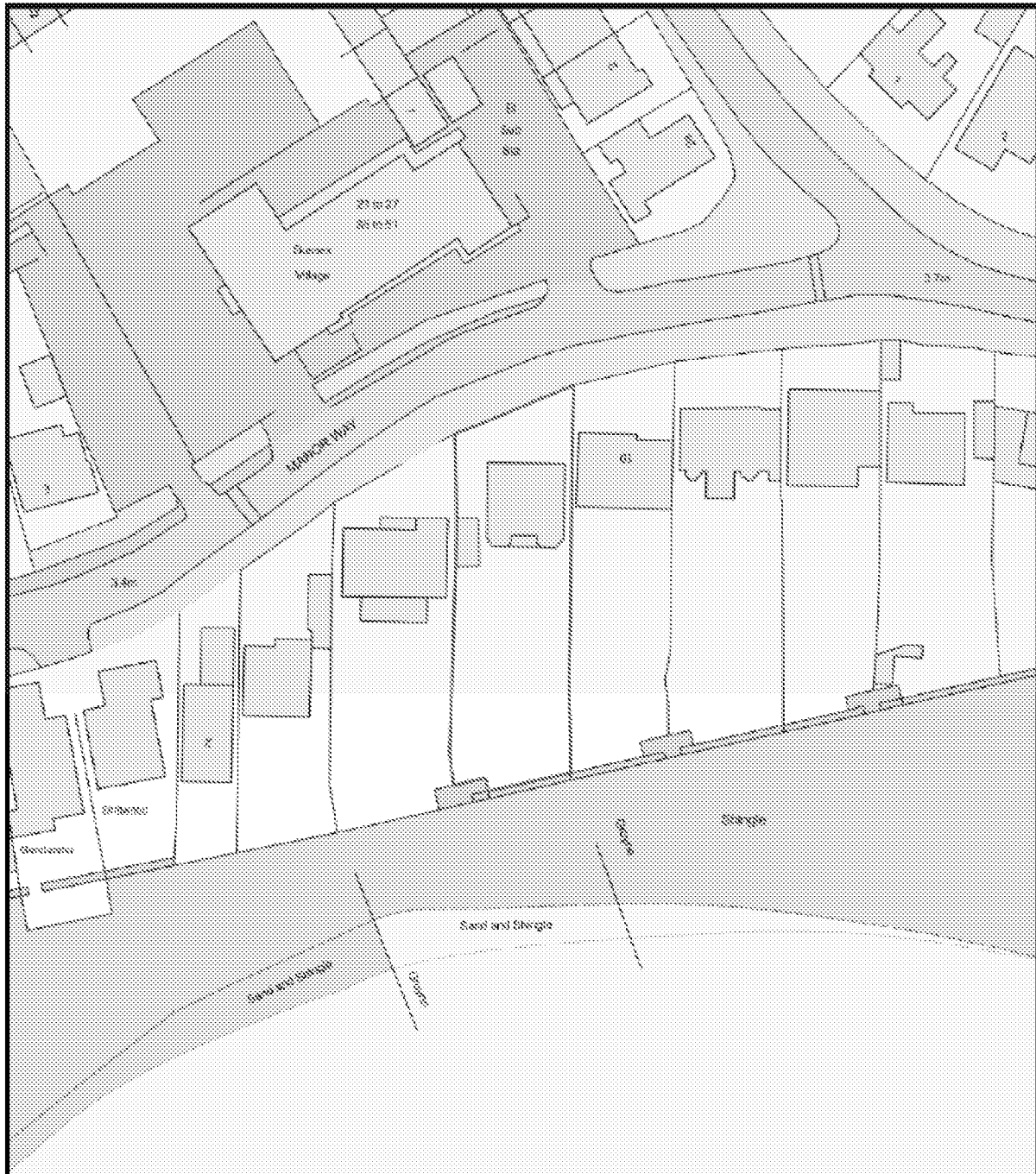


Figure 1 – Site Location Map



Job Number
18899

Project
8 Manor Way, Bognor Regis, West Sussex PO22 6LA

Client
George Bevis

Date
January 2021



Figure 2 – Aerial Photograph

Project

8 Manor Way, Bognor Regis, West
Sussex PO22 6LA

Client

George Bevis

Date

January 2021

Job Number

18899



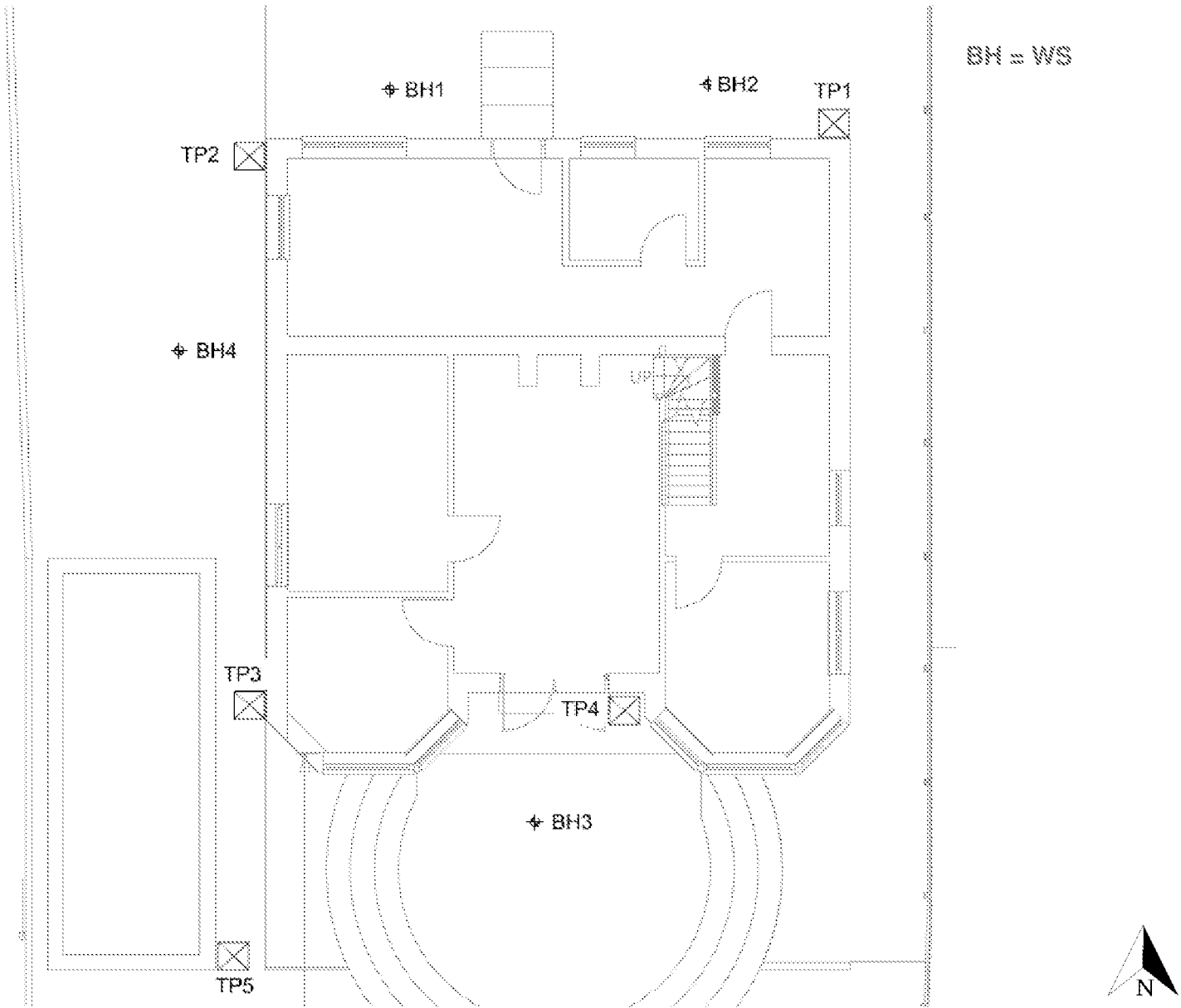
Figure 3 – Trial Hole Plan

Project
8 Manor Way, Bognor Regis, West
Sussex PO22 6LA

Client
George Bevis

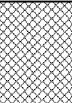
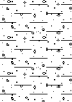
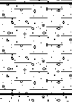
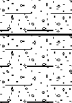
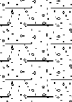
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January 2021

Job Number
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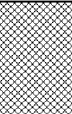
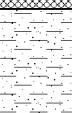
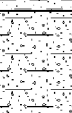


Appendix A Field Work

Appendix A.1 Engineers Logs

	Contract Name: 8 Manor Way			Client: George Bevis			Hole ID: WS1							
	Contract Number: 18899		Start and End Date: 14-12-20		Logged By: JD		Checked By:		Status:		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 22-01-2021		Scale: 1:50			
Weather:			Termination:									Sheet 1 of 1		
Samples & In Situ Testing				Strata Details								Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.20	D			(0.70)		Brown, slightly gravelly sandy CLAY with frequent rootlets. Gravel is angular clasts of flint, brick and concrete. MADE GROUND								
0.60	D			0.70		Firm, yellowish brown sandy CLAY with occasional rootlets.. Rare angular flint gravels. RAISED BEACH DEPOSITS						1		
0.80	D			(0.80)										
1.30	D			1.50										
1.60	D			(0.60)		Soft, greyish brown and red mottled fine to medium sandy CLAY. RAISED BEACH DEPOSITS						2		
2.00	D			2.10		Yellowish grey clayey gravelly SAND. Gravel is fine to medium subangular to rounded clasts of flint. RAISED BEACH DEPOSITS								
2.30	D			(0.35)										
2.60	D			2.45		Yellowish grey very clayey gravelly SAND. Gravel is subangular to rounded clasts of flint and chalk. Fines fraction decreasing with depth. RAISED BEACH DEPOSITS								
3.00	D			(1.25)										
3.50	D			3.70		Yellow, orangish brown and off-white CHALK recovered as sandy gravel in comminuted calcareous clay matrix. NEWHAVEN CHALK FORMATION								
3.80	D			(0.30)										
				4.00		End of Borehole at 4.00m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets to 1.50m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									2.00			20	1.12	
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

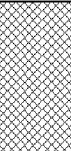
ARUN DISTRICT COUNCIL M/130/21/DOC

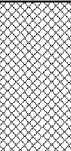
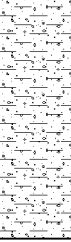
	Contract Name: 8 Manor Way				Client: George Bevis				Hole ID: WS2											
	Contract Number: 18899		Start and End Date: 14-12-20		Logged By: JD		Checked By:		Status:		Hole Type: WS									
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 22-01-2021		Scale: 1:50									
Weather:			Termination:					Sheet 1 of 1												
Samples & In Situ Testing				Strata Details								Groundwater								
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation							
0.20	D			(0.80)		Brown, slightly gravelly sandy CLAY. Gravel is angular fine to coarse flint. Occasional brick fragments. Frequent rootlets. MADE GROUND.														
0.70	D			0.80								Firm, yellowish brown sandy CLAY. Occasional rootlets. RAISED BEACH DEPOSITS						1		
0.90	D			(0.75)																
1.40	D			1.55		Orangish grey very clayey slightly gravelly fine to medium SAND. Gravel is subangular flint and chalk clasts. Percentage fines decreasing with depth. RAISED BEACH DEPOSITS						2								
1.60	D			(1.00)																
2.10	D			2.55								Yellow, orangish brown and off-white CHALK recovered as sandy gravel in comminuted calcareous clay matrix. NEWHAVEN CHALK FORMATION						3		
2.40	D			(1.45)																
2.60	D			4.00	End of Borehole at 4.00m						4									
3.10	D																			
3.70	D																			
Start & End of Shift Observations				Borehole Diameter		Casing Diameter		Remarks:												
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets to 1.55m bgl.											
Chiselling				Installation				Water Strikes												
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks						
									2.00			20	1.50							
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.																				

ARUN DISTRICT COUNCIL M/130/21/DOC

	Contract Name: 8 Manor Way				Client: George Bevis				Hole ID: WS3					
	Contract Number: 18899		Start and End Date: 14-12-20		Logged By: JD		Checked By:		Status:		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 22-01-2021		Scale: 1:50			
Weather:			Termination:								Sheet 1 of 1			
Samples & In Situ Testing				Strata Details								Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.30	D			(0.50)		Brown, slightly gravelly sandy CLAY. Gravel is angular fine to coarse flint and rare chalk. Occasional brick and clinker fragments. Frequent rootlets. MADE GROUND.								
0.70	D			0.50		Firm, brown, grey mottled sandy CLAY. Rare angular flint gravel clasts. RAISED BEACH DEPOSITS								
1.20	D			(1.00)								1		
1.70	D			1.50		Orange and grey very gravelly very clayey SAND. Gravel is coarse occasionally fine to medium angular clasts of flint and chalk. Sand is medium to coarse. RAISED BEACH DEPOSITS						2		
2.20	D			(0.80)										
2.40	D			2.30		Firm interlaminated dark grey slightly sandy CLAY and SILT. Sand is fine. Occasional angular fine to coarse chalk and flint gravels increasing with depth. RAISED BEACH DEPOSITS								
2.90	D			(1.70)								3		
3.40	D													
3.90	D			4.00		End of Borehole at 4.00m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations				Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets to 0.50m bgl.					
Chiselling				Installation				Water Strikes						
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									2.00			20	1.23	
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

	Contract Name: 8 Manor Way				Client: George Bevis				Hole ID: WS4					
	Contract Number: 18899		Start and End Date: 14-12-20		Logged By: JD		Checked By:		Status:		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 22-01-2021		Scale: 1:50			
Weather:			Termination:					Sheet 1 of 1						
Samples & In Situ Testing					Strata Details							Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.30	D			(0.50)		Brown slightly gravelly sandy CLAY. Gravel is angular fine flint. Occasional brick fragments and clinker. Frequent rootlets. MADE GROUND								
0.70	D			0.50										Soft brown fine to medium sandy CLAY. Frequent rootlets. RAISED BEACH DEPOSITS
1.20	D			(0.50)		Soft, grey and orange mottled, fine to medium sandy silty CLAY. RAISED BEACH DEPOSITS						1		
1.70	D			1.00										
2.20	D			(1.00)		Light yellowish grey very clayey gravelly SAND. Gravel is angular clast s of chalk and flint. Fines faction decreases with depth. RAISED BEACH DEPOSITS						2		
2.70	D			2.00										
3.20	D			(2.00)								3		
3.70	D			4.00										End of Borehole at 4.00m
												5		
												7		
												9		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets to 1.00m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									3.00			20	1.95	
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

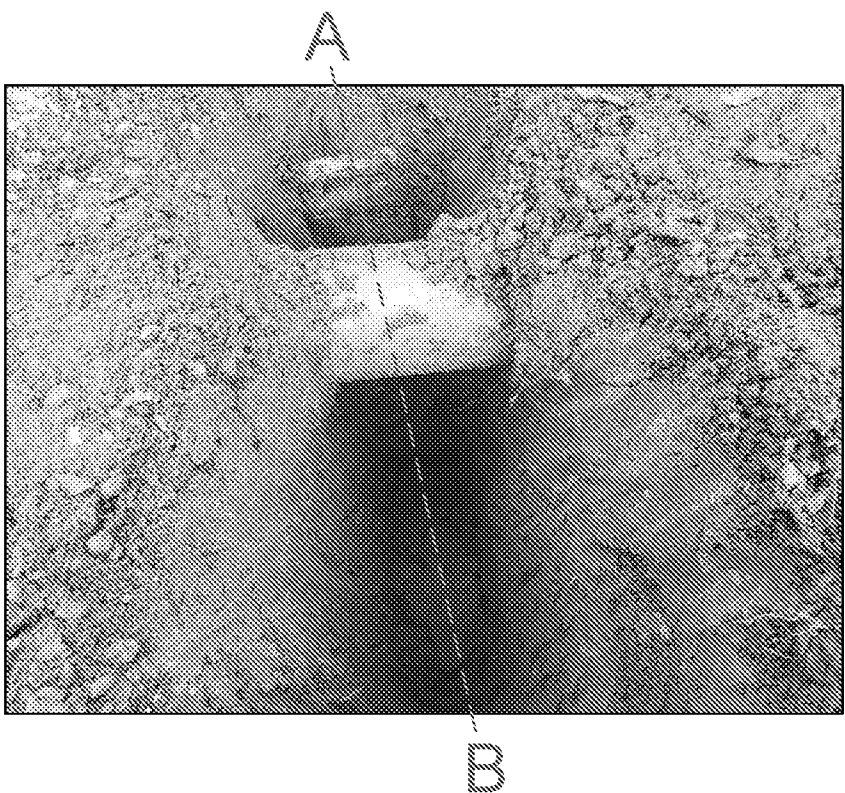
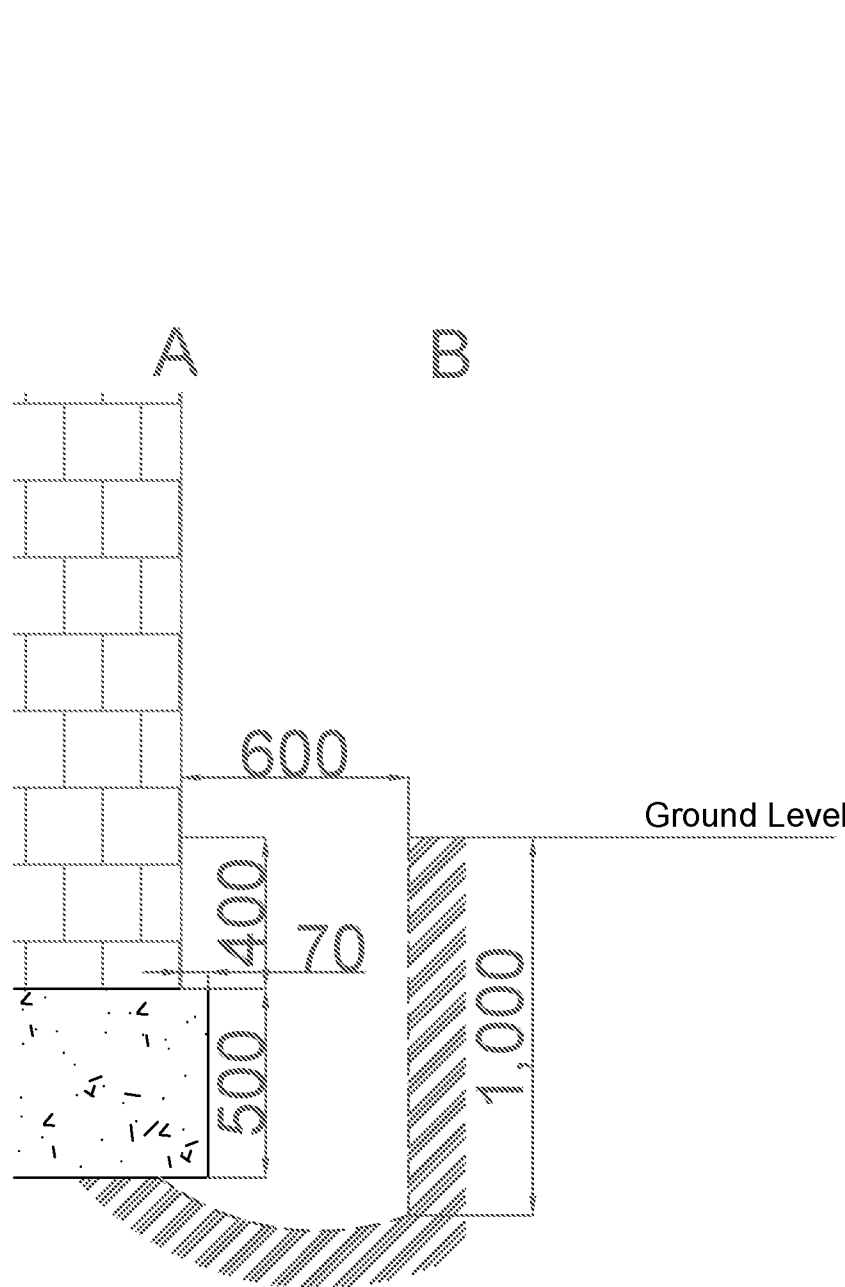
		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. TP1 Sheet 1 of 1	
Project Name: 8 Manor Way				Project No.: 18899		Method: Hand Excavated		Hole Type TP
Location: Bognor Regis, West Sussex PO22 6LA						Plant:		
Client: George Bevis				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 14-12-2020				Level:		Co-ords:		Logged By JC
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D					Turf over brown sandy slightly gravelly SILT. Sand is fine, gravel is fine to medium sub-angular flint and pea shingle. frequent roots and rootlets., rare find to medium ash and clinker. MG	
	0.50	D		0.50			Brown mottled orange slightly sandy CLAY. Rare fine to coarse sub-angular flint. RBD	
				0.80			Orangish brown CLAY. RBD	
	1.00	D		1.00			End of Pit at 1.000m	
								1
								2
								3
								4
								5
General Remarks: Rootlets observed to 0.40m								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks:								

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. TP2 Sheet 1 of 1	
Project Name: 8 Manor Way				Project No.: 18899		Method: Hand Excavated		Hole Type TP
Location: Bognor Regis, West Sussex PO22 6LA						Plant:		
Client: George Bevis				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 14-12-2020				Level:		Co-ords:		Logged By JC
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	D					Turf over brown sandy slightly gravelly SILT. Sand is fine, gravel is fine to medium sub-angular flint and pea shingle. Frequent roots and rootlets,. rare find to medium ash and clinker. MG	
	0.50	D		0.50			Greyish brown mottled orange slightly sandy CLAY. Rare fine to coarse sub-angular flint. RBD	1
	1.00	D		1.30			End of Pit at 1.300m	2
								3
								4
								5
General Remarks: Rootlets observed to 0.40m								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks:								

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. TP4 Sheet 1 of 1	
Project Name: 8 Manor Way				Project No.: 18899		Method: Hand Excavated		Hole Type TP
Location: Bognor Regis, West Sussex PO22 6LA						Plant:		
Client: George Bevis				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 14-12-2020				Level:		Co-ords:		Logged By JC
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.00 - 0.90	B		0.06 0.10		                                                                   	CONCRETE Sandy GRAVEL. Gravel is fine to coarse sub-angular to well-rounded flint, brick and concrete. MG Sandy gravelly BRICK AND CONCRETE. gravel is fine to boulder Brick and concrete, frequent fine to coarse sub-angular flint and brick. MG	
				0.90			End of Pit at 0.900m	
General Remarks:								Sample Type D: Disturbed B: Bulk J: Jar W: Water
No rootlets observe								
Groundwater Remarks:								

		Soils Limited Newton House, Cross Road, Tadworth KT20 5SR Tel: 01737 814221 Email: admin@soilslimited.co.uk			Trial Pit Log		Trial Pit No. TP5 Sheet 1 of 1	
Project Name: 8 Manor Way				Project No.: 18899		Method: Hand Excavated		Hole Type TP
Location: Bognor Regis, West Sussex PO22 6LA						Plant:		
Client: George Bevis				Trial Pit Length: m		Trial Pit Width: m		Scale 1:25
Dates: 14-12-2020				Level:		Co-ords:		Logged By JC
Water Strike	Samples & In Situ Testing			Depth (m)	Level (mAOD)	Legend	Stratum Description	
	Depth	Type	Results					
	0.30	D		0.06 0.10 0.40		  	PAVING SLAB Sandy GRAVEL. Gravel is fine to coarse sub-angular to well-rounded flint, brick and concrete. Frequent roots and rootlets MG Sandy slightly gravelly CLAY. Gravel is fine to medium sub-angular flint. Rare roots and rootlets. RBD	
							End of Pit at 0.400m	
1 2 3 4 5								
General Remarks: Rootlets observed to full pit depth								Sample Type D: Disturbed B: Bulk J: Jar W: Water
Groundwater Remarks:								

TP-FE-01



Trial Hole



LEGEND			
WATER PIPE		Brick	Concrete
DRAINAGE		Clay	Made Ground
TELECOM CABLE		Sand	Silt
GAS PIPE		Gravel	Chalk
ELECTRIC CABLE		Screed	Limestone
UNKNOWN SERVICE		Slab	Membrane
WARNING TAPE			
FIBRE OPTIC			
CONCRETE			
DIMENSION (mm)			

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Web: soilslimited.co.uk Tel: 01962 673330 Email: admin@soilslimited.co.uk

Client:	George Bevis
Title:	Foundation Exposure

Project:
Manor Way, Bognor Regis,
England PO22 6LA, United Kingdom

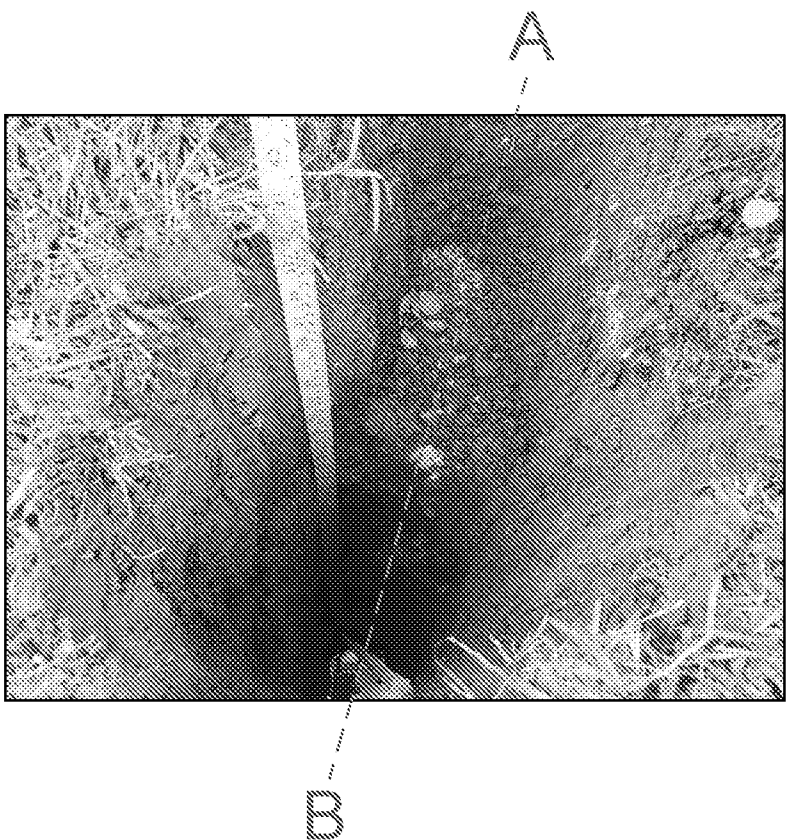
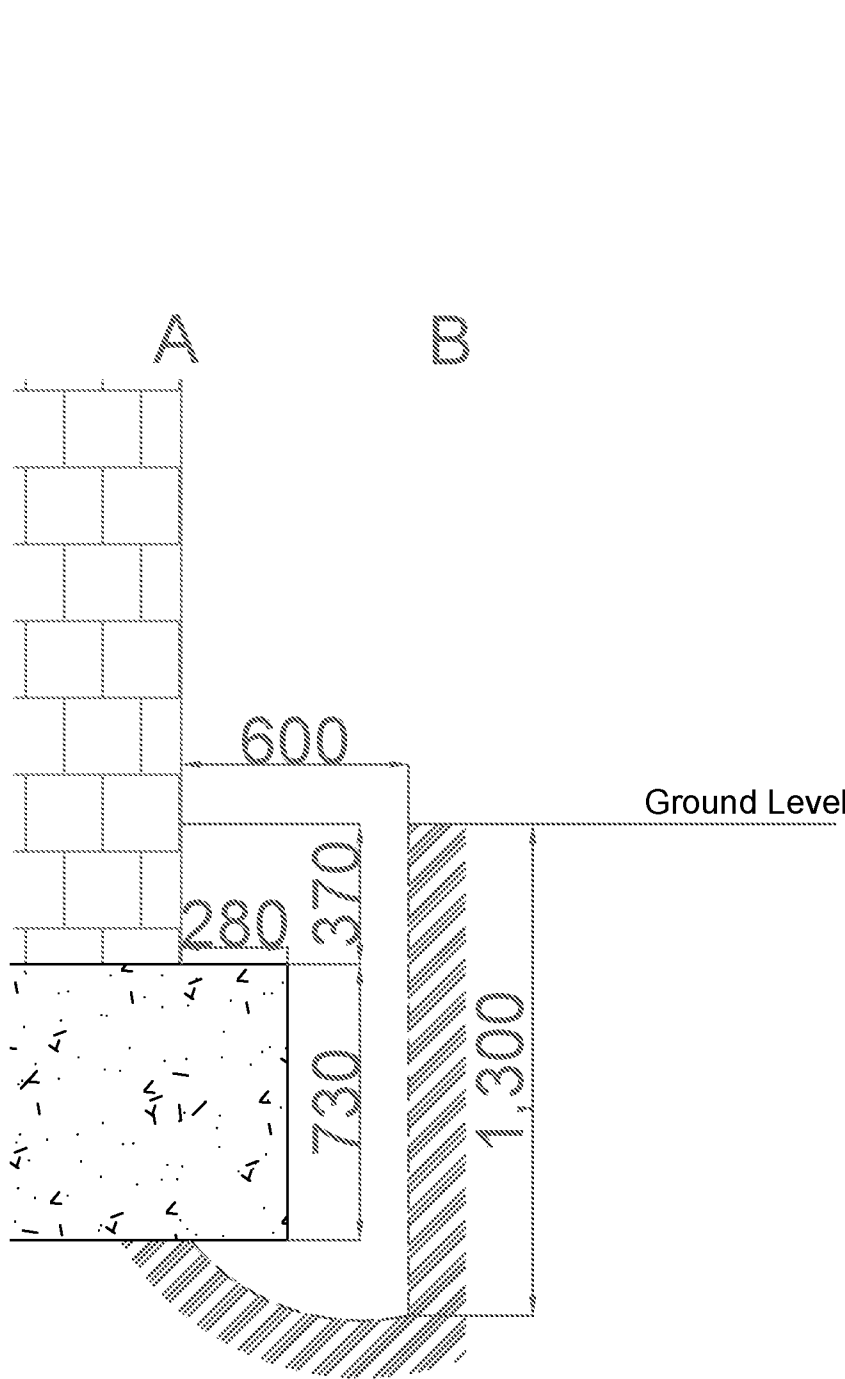
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Project Number:	Rev:	Excavated By:	Drawn By:	Approved By:
18899	1:0	JC	JC/PO	TR



All dimensions are in mm

1:20

TP-FE-02



Trial Hole



LEGEND			
WATER PIPE		Brick	Concrete
DRAINAGE		Clay	Made Ground
TELECOM CABLE		Sand	Silt
GAS PIPE		Gravel	Chalk
ELECTRIC CABLE		Gravel	Limestone
UNKNOWN SERVICE		Screed	Slate
WARNING TAPE		Slate	Membrane
FIBRE OPTIC			
CONCRETE			
DIMENSION (mm)			

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Web: soilslimited.co.uk Tel: 01962 673330 Email: admin@soilslimited.co.uk

Client:	George Bevis
Title:	Foundation Exposure

Project:
Manor Way, Bognor Regis,
England PO22 6LA, United Kingdom

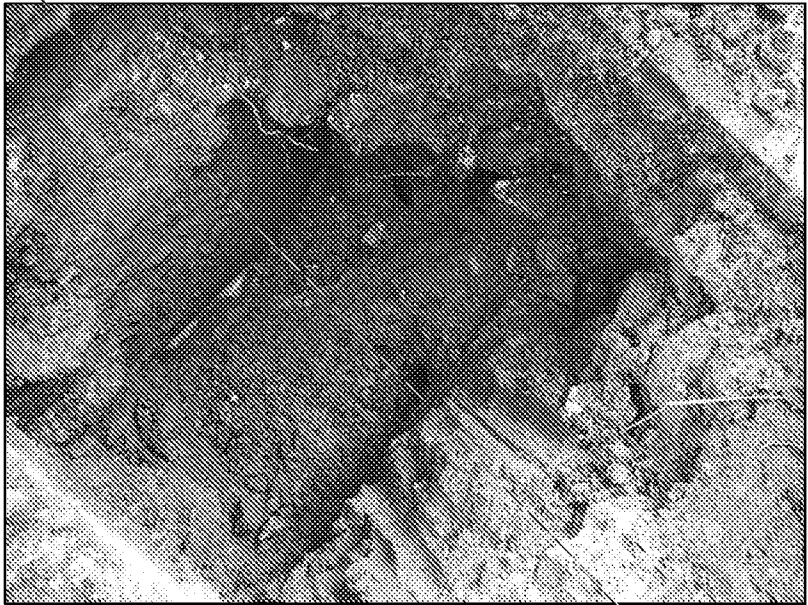
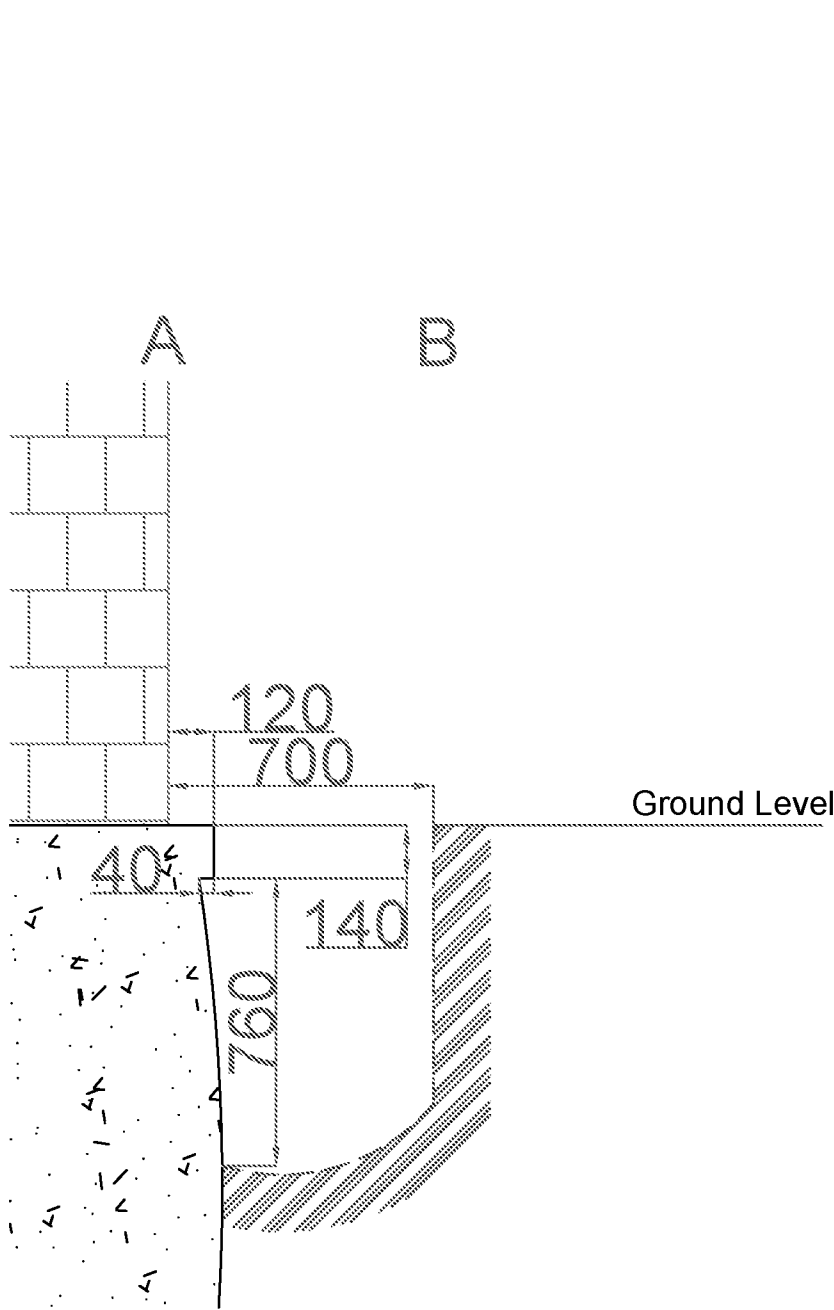
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Project Number:	Rev:	Excavated By:	Drawed By:	Approved By:
18899	1:0	JC	JC/PO	TR



All dimensions are in mm

1:20

TP-FE-03



All dimensions are in mm

1:20

Trial Hole



LEGEND			
WATER PIPE		Brick	Concrete
DRAINAGE		Clay	Made Ground
TELECOM CABLE		Gravel	Sand
GAS PIPE		Chalk	Silt
ELECTRIC CABLE		Limestone	
UNKNOWN SERVICE		Screed	
WARNING TAPE		Slate	
FIBRE OPTIC		Membrane	
CONCRETE			
DIMENSION (mm)			

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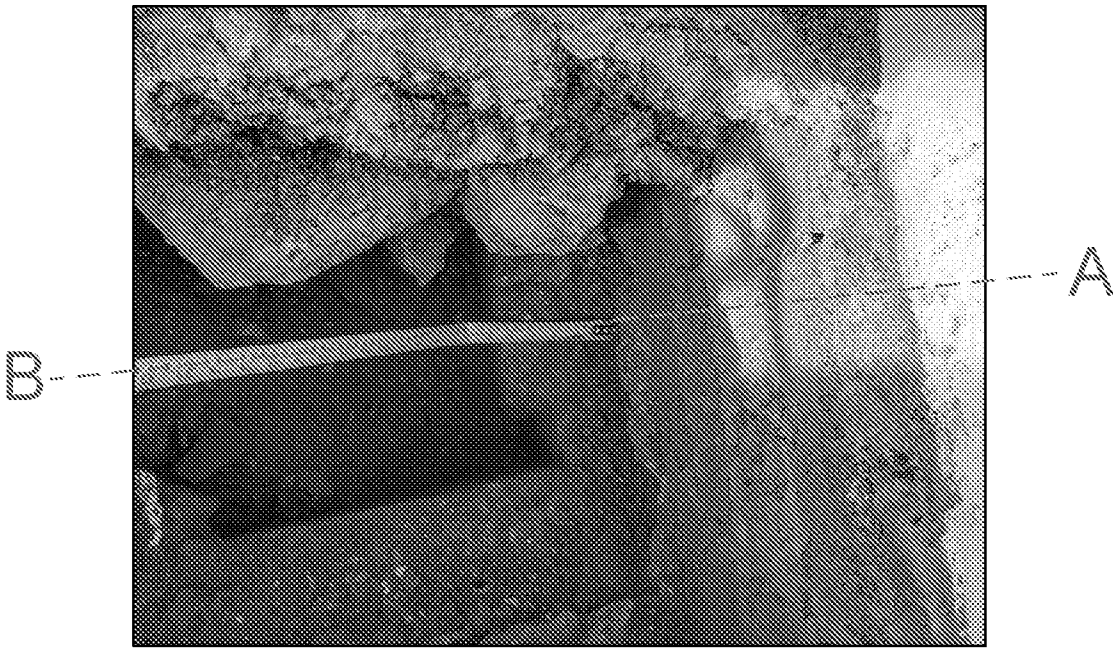
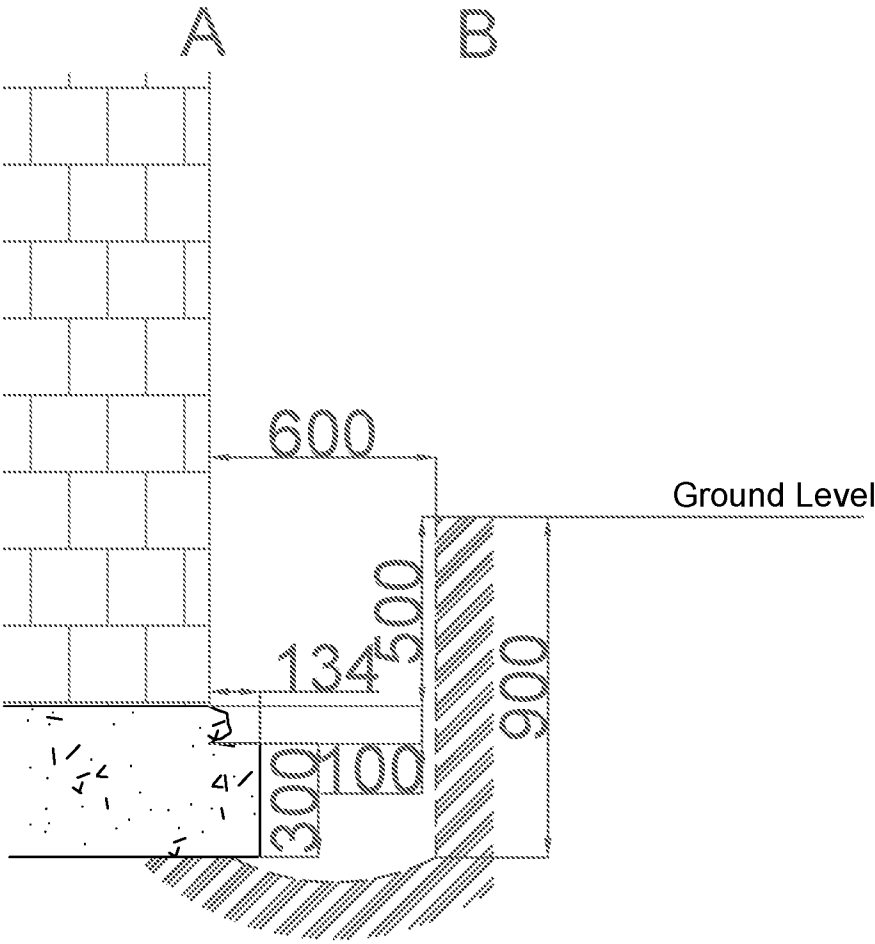
Client: George Bevis

Title: Foundation Exposure

Project:
Manor Way, Bognor Regis,
England PO22 6LA, United Kingdom

Scale	Sheet Size:	Sheet Number:	Date:	
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Project Number:	Rev:	Excavated By:	Drawed By:	Approved By:
18899	1:0	JC	JC/PO	TR

TP-FE-04



Trial Hole



LEGEND			
WATER PIPE		Brick	Concrete
DRAINAGE		Clay	Made Ground
TELECOM CABLE		Sand	Silt
GAS PIPE		Gravel	Chalk
ELECTRIC CABLE		Limestone	
UNKNOWN SERVICE		Screed	Slate
WARNING TAPE		Membrane	
FIBRE OPTIC			
CONCRETE			
DIMENSION (mm)			

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Client:	George Bevis
Title:	Foundation Exposure

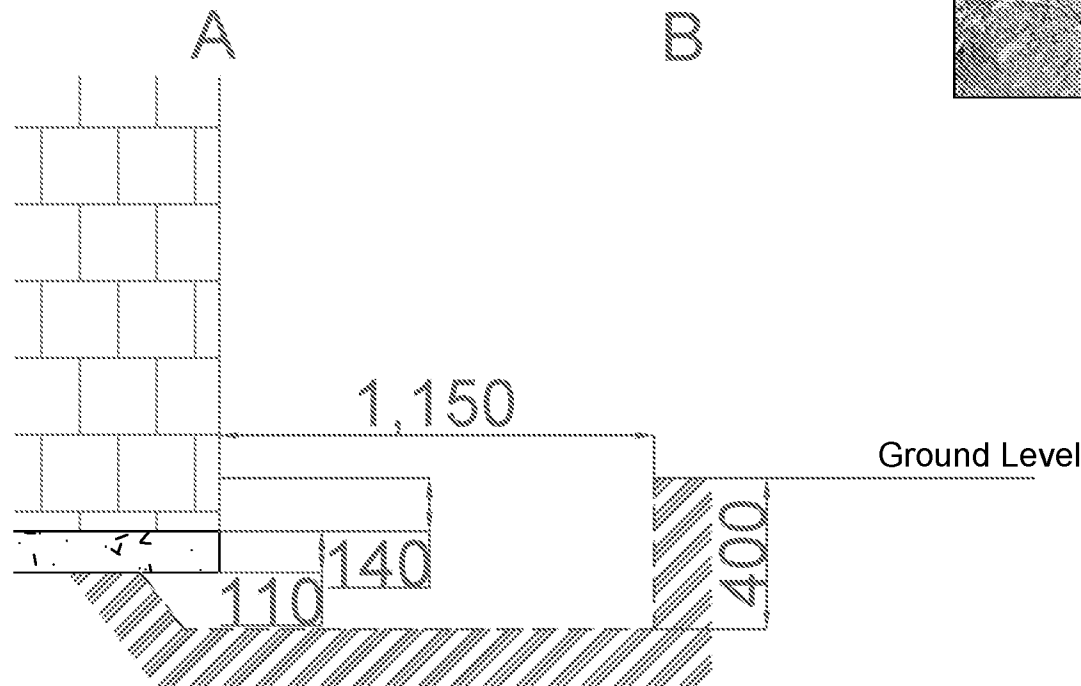
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Project Number:	Rev:	Excavated By:	Drawed By:	Approved By:
18899	1:0	JC	JC/PO	TR

All dimensions are in mm

1:20

TP-FE-05



All dimensions are in mm

1:20

Trial Hole



LEGEND			
WATER PIPE		Brick	Concrete
DRAINAGE		Clay	Made Ground
TELECOM CABLE		Sand	Silt
GAS PIPE		Gravel	Chalk
ELECTRIC CABLE		Screed	Limestone
UNKNOWN SERVICE		Slab	Membrane
WARNING TAPE			
FIBRE OPTIC			
CONCRETE			
DIMENSION (mm)			

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Client:	George Bevis
Title:	Foundation Exposure

Project:
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England PO22 6LA, United Kingdom

Scale	Sheet Size:	Sheet Number:	Date:	
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Project Number:	Rev:	Excavated By:	Drawed By:	Approved By:
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