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Drainage Impact Assessment

for

Proposed Residential Housing Development

at

**37 Hill Lane
Barnham, Bognor Regis
West Sussex
PO22 0BL**

Project: FC2781
Date: Oct 2018
Author: MH
Status: Planning Issue
Revision: A

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Drainage Impact Assessment

Contents	Page
1. Introduction	1
2. Existing Site Use	2
2.1. Site Setting	2
2.2. Site Topography	2
2.3. Watercourses	2
2.4. Hydrology & Geology	2
2.5. Existing Drainage	4
2.6. Indicative Flood Risk	4
3. Proposed Development	5
4. Foul Drainage	6
4.1. Existing Foul Drainage	6
4.2. Proposed Foul Drainage	7
5. Storm Water Drainage	8
5.1. Existing Storm Water Drainage	8
5.2. Proposed Storm Water Drainage	9
4.2.6 Runoff Volume Calculations	11
4.2.7 Residual Risks and Exceedance Flows	12
4.2.8 Water Quality	14
4.2.9 General Maintenance Regime	14
6. Summary	15
Appendix A	
Site Location Plan Plan BIS 1088/DPA01	
Topographical Survey by JBP Surveys, Oct 18 – Ref 18197A Rev A	
Client CCTV survey	
Existing Drainage Layout Plan ABMH FC2781/01	
SW Sewer Records dated 11/04/18	
Geotechnical Soil Infiltration Testing and Groundwater Monitoring	
CE dated 23/04/18	
Appendix B	
Proposed Site Plan BIS 1088/DPA04	
Proposed Drainage Layout Plan ABMH FC2781/02A	
Greenfield Runoff Rates (HR Wallingford)	
Greenfield/Proposed Runoff Volume Rates (Windes Calculations)	
Windes Calculations 100year SRP + 40%CC	
Proposed External Levels & Finishes ABMH FC2781/05A	
Proposed Off Site Drainage Works ABMH FC2781/03A & 04A	

Interim - Drainage Impact Assessment

1. Introduction

- 1.1 We have been appointed by Salt Earth Ltd to provide a Drainage Impact Assessment (DIA) to accompany the planning application, for a proposed development consisting of 2No residential dwellings located at 37 Hill Lane, Barnham, Bognor Regis, West Sussex, PO22 0BL.
- 1.2 The aim of the report is to review how the existing site is drained and how the proposed site can be drained in accordance with current design practice and the requirements of local planning authority.
- 1.3 The report details the existing and proposed flows that are/will be generated and how these proposed storm water and foul water flows can be managed and discharged in a safe manner.
- 1.4 The DIA has been based upon the following documentation;
 - 1.4.1 Site Location Plan Plan BIS 1088/DPA01
 - 1.4.2 Topographical Survey by JBP Surveys, Oct 18 – Ref 18197A Rev A
 - 1.4.3 Client CCTV survey
 - 1.4.4 SW Sewer Records dated 11/04/18
 - 1.4.5 Geotechnical Soil Infiltration Testing and Groundwater Monitoring CE dated 23/04/18
 - 1.4.6 Proposed Site Plan BIS 1088/DPA04

2. Existing Site Use

2.1 Site Setting

- 2.1.1 The site is situated to the south east of Barnham Village, located at 37 Hill Lane, Barnham, Bognor Regis, West Sussex, PO22 0BL. A site location plan, BIS 1088/DPA01, as shown in Appendix A.
- 2.1.2 The site comprises an existing residential dwelling No 37, which is a semidetached dwelling linked with No 36 Hill Lane. The site has a number of other out buildings and green/glass houses that have been used for various business purposes in the past.
- 2.1.3 The site is bounded on two sides (west and east) by residential development, to the north by agricultural land and to the south by Hill Lane, a private highway. The site has an area of approximately 0.18ha in extent.

2.2 Site Topography

- 2.2.1 The site generally slopes very slightly from east to west across the site, with a pronounced level drop of approximately 1m towards the southern boundary with Hill Lane. A topographical survey carried out by JBP Surveys, Oct 18 – Ref 18197A Rev A indicates levels ranging across the site and the existing features, (see Appendix A).

2.3 Watercourses

- 2.3.1 There are no listed watercourses within or adjacent to the site. However, there is a ditch network along the site's southern boundary, situated just north of Hill Lane. Discussions and site visit with Arun District Council's Drainage Engineer, Laura Gibbons, have revealed that this ditch system is in a poor state of repair, but appears to flow in a westerly direction away from the site along Hill Lane.

2.4 Hydrology & Geology

2.4.1 Soil infiltration testing and ground water monitoring was undertaken by Constructive Evaluation in March and April 2018. Their report is appended in Appendix A.

2.4.2 Summary of main observations

2.4.2.1 Ground Conditions

'Below the surface covering of pea shingle, the soils were described as a black/dark brown sandy Gravel of flint and occasional brick and tarmac. This was encountered to depths between 0.20mbgl in TP1, TP2 and WS2, however an extended thickness of 1.50mbgl in WS1. This material is considered to be Made Ground.'

The initial natural soils are described as a soft to firm becoming firm brown slightly sandy silty Clay, with rare to occasional gravels of flint. This material was encountered to a maximum excavated depth of 2.10-2.30mbgl in TP1/TP2 and a 5.00mbgl in WS2. Within WS1, this material was proven to a maximum depth of 3.80mbgl. Below 3.80mbgl in WS1, soils were described as a soft pale brown gravelly Silt/Clay from 3.80mbgl to 4.30mbgl. This material is considered representative of River Terrace Deposits, or formerly 'Brickearth'.

The underlying Chalk was encountered in WS1 below 4.30mbgl. This was described as a structureless chalk, composed of a white slightly gravelly Silt and proven to a maximum drilled depth of 5.00mbgl. This material is considered representative of the Upper Chalk.

A groundwater seepage was noted in WS1 3.60m during the investigation. WS2 was recorded as dry.'

2.4.2.2 Infiltration Testing

'The 25% marker was reached in TP1 only, over the time period tested. On this basis, a soil infiltration rate for TP1 of 1.02×10^{-6} has been calculated. TP2 did not reach the 25% marker during the allotted time, due to slower infiltration, however an extrapolated soil infiltration rate of 3.5×10^{-7} has been calculated on the review of the data.

These results generally correlate to 'poor' drainage conditions'

2.4.3 The initial findings would suggest that soil infiltration drainage options are not viable given the exceptionally poor infiltration rates recorded on site. It is envisaged that the recorded ground water level is likely to be higher during the winter months, December through to February. The presence of a ditch/land drainage system in the vicinity of the site suggests that ground water tables are likely to be higher and that soil infiltration rates are poor.

2.4.4 However, in order to comply with the Building Regulation's hierarchy, it is proposed that detailed soil infiltration rate testing to BRE365 and ground water monitoring will be undertaken during the winter months (Dec-Feb) at shallower depths, typically 1m BGL, to ascertain the validity of soakaways on site for detailed design purposes.

2.4.5 Given the recorded soil infiltration rates, the anticipated higher ground water level, and the depth of made ground on site, it is envisaged for this assessment that soakaways are not valid.

2.5 Existing Drainage

2.5.1 A CCTV drainage survey has been undertaken of the existing site's drainage.

2.5.2 The CCTV survey and its findings as noted on drawing FC2781/01 Existing Drainage Layout, are appended to Appendix A.

2.5.3 Storm water runoff from the roofs of the existing buildings, No 37 dwelling and the main outbuilding on the eastern boundary, appear to discharge to onsite soakaways, which contrary to the hydrology and geological findings noted above.

2.5.4 The existing dwelling, No 37 Hill Lane, has a confirmed foul drain connection to the onsite adopted foul sewer crossing the southern section of the site.

2.5.5 The existing impermeable areas are shown on topographical survey in Appendix A.

2.5.6 A Southern Water designated foul sewer is present within the site, southern section flowing in an easterly direction, as shown on the sewer records Appendix A.

2.5.7 There are no storm water sewers in the locality.

2.6 Indicative Site Flood Risk

- 2.6.1 Initial indications based on long term flood risk information maps on the GOV.UK website site suggest that the site is situated within a Flood Zone 1, ie very low with regards to flood risk from Rivers or the Sea, and very low from surface water flooding, ie overland flood flows.
- 2.6.2 It is acknowledged that the flood risk from surface water flooding is shown to be of low risk in the highway Hill Lane, to the south of the site. However, the risk is based on recorded flooding in the past, and given the current state of the offsite drainage ditch system, it is not surprising that flooding occurs along Hill Lane.
- 2.6.3 Given the level differences between the main site and Hill Lane, with the site generally 1m higher than the highway, the surface water flood risks present in Hill lane do not pose a direct flood risk to the existing site.
- 2.6.4 Specific site flood risks, other than proposed drainage issues, fall outside the scope of this report.

3. Proposed Development

- 3.1 The proposed site is to be developed as two distinct and separate developments as follows:
 - 3.1.1 The western side of the site comprising No 37 Hill Lane will be retained as a residential dwelling with both front and rear garden areas.
 - 3.1.2 The eastern portion of the site will be developed to form 2No detached dwellings with associated shared driveways, parking and garages.
- 3.2 The proposed development is as shown on the architect's layout BIS 1088/DPA04, Appendix B.

4. Foul Drainage

4.1 Existing Foul Drainage

4.1.1 The existing peak foul flow from site is 0.046 l/s (SFA7).

4.2 Proposed Foul Drainage

4.2.1 The peak foul flows entering the foul sewer network from the development as a whole is as follows:

4.2.2

- Existing Dwelling No 37 = 0.046 l/s (SFA7)
- New 2 dwellings = 0.092 l/s (SFA7)
- Total Peak Foul Flow = 0.046 + 0.092 = 0.14 l/s (SFA7)

4.2.3 The proposed foul flows, from the development as a whole to the designated foul sewer network, will be increased from existing flows, due to the two additional dwellings.

4.2.4 However, as the 150 foul water sewer effectively starts at No 36 (head of sewer run) we are not anticipating any capacity issues which would prevent the additional discharge to the foul water sewer from the 2No additional plots.

4.2.5 On this basis it is not envisaged that Southern Water will not have any concerns with the proposed foul flows from the development, subject to a S106 sewer connection application.

4.2.6 An indicative foul drainage layout for the development is shown on drawings FC2781/02A, Appendix B, and indicates that a gravity foul drainage system from site to the adopted sewer system is viable.

5. Storm Water Drainage

5.1 Existing Storm Water Drainage

5.1.1 Greenfield runoff rates for the site have been calculated using HR Wallingford software online, based on a site area of 1800m² (0.18 ha), as shown in Appendix B.

5.1.2 A summary of the greenfield runoff rates are as follows:

5.1.2.1	Qbar	0.35 l/s
5.1.2.2	1 in 1 year	0.3 l/s
5.1.2.3	1 in 30 years	0.81 l/s
5.1.2.4	1 in 100 years	1.12 l/s

5.2 Proposed Storm Water Drainage

5.2.1 The most appropriate method of disposing of the surface water runoff from site, in line with Building Regulations drainage hierarchy, is as follows, to discharge to:

- 5.2.1.1 soakaways
- 5.2.1.2 an existing watercourse
- 5.2.1.3 storm water sewer
- 5.2.1.4 combined sewer

5.2.2 Detailed geotechnical investigations have been undertaken on site encompassing soil infiltration testing in accordance with BRE365. Soil infiltration rates of 1×10^{-6} m/s and 3.5×10^{-7} m/s were recorded.

5.2.3 It is proposed that detailed soil infiltration rate testing to BRE365 and ground water monitoring will be undertaken during the winter months (Dec-Feb) at shallower depths, typically 1m BGL, to ascertain the validity of soakaways on site for detailed design purposes.

5.2.4 Given the recorded soil infiltration rates, the envisaged higher ground water level, and the depth of made ground on site, it is envisaged for this assessment that soakaways are not valid.

5.2.5 Existing ditches are present along the southern boundary to the site as noted previously within Section 2.3, Existing Watercourses.

5.2.6 It is therefore proposed to discharge the surface water runoff from site to the ditch system along the southern boundary.

5.2.7 The proposed surface water drainage design for the development is shown on drawing FC2781/02A, together with MicroDrainage results are included within Appendix B.

- 5.2.8 The storm water design criteria used for the developments are in line with DEFRA 'Non statutory technical standards'.
- 5.2.9 In addition, the proposed impermeable areas have been increased by 10% to allow for urban creep.
- 5.2.10 The proposed drainage strategy is that the site will drain by gravity via attenuation tanks and pipe drainage systems before discharging to the ditch along the site's southern boundary, with Hill Lane, with flows controlled by a hydrobrake flow control.

5.2.11 DEFRA Technical Standards S3 States that

'S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.'

- 4.2.5.1 A Hydrobrake or similar approved flow control system is proposed to restrict the discharge rate, from site to the ditch system to 2l/s up to the 1 in 100 storm return period plus allowance for climate change rainfall event.
- 4.2.5.2 The equivalent 1 in 1-year greenfield runoff rate (0.3l/s) for the site is lower than the rate that is considered acceptable under current best practice whilst satisfactorily managing the risk of blockage (ref EA/DEFRA 'Preliminary Rainfall Runoff Management for Developments Rev E' Report).
- 4.2.5.3 The minimum rate considered under best practice to be achievable whilst managing the risk of blockage of the flow control device to an acceptable level is 5l/s.
- 4.2.5.4 However, discussions with HRD Hydrobrake suggest that flow controls with a minimum orifice of 75mm will have acceptable blockage risks. Thus given the proposed storage head within the attenuation tank, a HRD Hydrobrake flow control having an orifice of 75mm will be able to restrict flows to 2l/s, and therefore this rate will be used as the maximum discharge rate from the site to comply with Standard S3 above.
- 4.2.5.5 This is significantly lower than the standard default discharge flow of 5l/s approved by DEFRA and is intended to alleviate the impact on the offsite ditch system.
- 4.2.5.6 As the proposed impermeable area within the site has been significantly reduced from the existing situation, and therefore the proposed storm water runoff from site is envisaged to be reduced accordingly.

4.2.6 Runoff Volume Calculations

4.2.6.1 DEFRA Technical Standards S5 and S6 state that:

***S5** Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*

***S6** Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.'*

4.2.6.2 The greenfield and proposed runoff volumes for the 100year, 6 hour rainfall event have been calculated using MicroDrainage, appendix B, and the results as summarised below.

Greenfield Run-off Volume	= 45m ³
Proposed Run-off Volume	= 29m ³

4.2.6.3 It can be seen that the development's 1 in 100 year, 6 hour runoff volume is significantly lower than the greenfield runoff volume for this site.

4.2.7 **Residual Risks and Exceedance Flows and Runoff in Excess of Design Criteria**

4.2.7.1 DEFRA Technical Standards S7-S9 state that:

***S7** The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.*

***S8** The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.*

***S9** The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.*

4.2.7.2 The proposed development is residential and is considered to have a lifetime of 100 years. The climate change allowances to be considered for the proposed development is between 20-40% in accordance with EA 'Flood risk assessments – climate change allowances' guidance released in Feb 2016.

4.2.7.3 In line with normal planning requirements, a climate change allowance of 40% is to be used.

4.2.7.4 The proposed surface water drainage system has been designed with no flooding up to the 1 in 100 annual probability rainfall event in accordance with S7 and S8 above (see MicroDrainage results in Appendix B), with a climate change allowance of 40% taken into account.

4.2.7.5 It is difficult to completely guard against flooding during extreme events which are greater than the design standard event. It is practicable to minimise the risk by careful design of the layout, with falls away from the buildings, such that internal flooding is avoided.

4.2.7.6 The proposed finished floor levels and external levels indicated on the External Layout plans FC2781/05A, Appendix B, show that the risk can be minimised with falls away from buildings, directed to on site highways and parking areas, with further overland flood flow routes to the highway Hill Lane and the off site ditches located along the southern boundary.

4.2.8 Water Quality

- 4.2.8.1 Paved areas are proposed to be discharged to trapped road gullies/channel drains prior to discharging to the below ground drainage system. Roof drainage will discharge direct to the below ground drainage system.
- 4.2.8.2 This standard arrangement is generally regarded as adequate to ensure that the water runoff quality is sufficiently treated to enter a ditch system, given the proposed low risk uses of the development.

4.2.9 Off Site Ditch Works

- 4.2.9.1 The proposed drainage design relies on the ability to discharge the surface water runoff into the ditches along the southern boundary with Hill Lane.
- 4.2.9.2 Discussions with the LPA/LLFA and flood maps as per Section 2.6 'Indicative Flood Risk' note that the existing ditch system within Hill Lane is in a very poor state, having been neglected for many years.
- 4.2.9.3 It is clear that significant remedial work to the ditch network and culverted sections at highway crossings is required in order to enable this system to function as intended. The LPA/LLFA are aware that these works need to be undertaken under riparian responsibilities, and where these are not undertaken in a timely manner the LPA have powers to legally enforce action.
- 4.2.9.4 Following a site visit and detailed discussions with the LPA/LLFA drainage engineer Laura Gibbons, we have agreed in outline the proposed works that are required to be undertaken to the ditch system within Hill Lane adjacent to the site. These works are shown on drawings FC2781/03A & 04A, Appendix B.
- 4.2.9.5 These works also indicate the areas of work that will be undertaken by our Client as part of this development, and other areas where riparian owners need to meet their obligations, and other areas where ADC are able to assist as part of their LLFA responsibilities.
- 4.2.9.6 It is our understanding that the proposed work that our client has agreed to undertake as part of this development is deemed adequate by the LLFA in assisting, and resolving the flooding issues that currently occur within Hill Lane due to poorly maintained ditch system along a privately maintained road, thus providing significant betterment and addressing the offsite flood related issues.
- 4.2.9.7 It should also be noted that the proposed storm water flow off site is significantly lower at 2l/s than default flow rates (5l/s), and is in part an acknowledgement of the condition and limited capacity of the ditch system, currently and following remediation.

4.2.10 General Maintenance Regime

4.2.10.1 The surface water drainage proposals for this site should include the following maintenance measures:

- Cleaning of the catchpits of roof drainage runs to improve the quality of the water
- Cleaning and maintenance of the flow control system and its catchpits to maintain effective drainage
- Cleaning and maintenance of the attenuation tanks to maintain effective drainage

4.2.10.2 The actual cleaning and maintenance regime to be adopted is proposed to be set out within a 'Drainage Maintenance Strategy Report' following detailed design of the drainage system, following planning approval.

5. Summary

- 5.1 This report has been prepared to outline the proposed foul and surface water arrangements for the development of the site at 37 Hill Lane, Barnham, Bognor Regis, West Sussex, PO22 0BL.
- 5.2 The western side of the site comprising No 37 Hill Lane will be retained as a residential dwelling with both front and rear garden areas.
- 5.3 The eastern portion of the site will be developed to form 2 No detached dwellings with associated shared driveways, parking and garages.
- 5.4 Given the recorded soil infiltration rates, the envisaged higher ground water level, and the depth of made ground on site, it is envisaged for this assessment that soakaways are not valid.
- 5.5 It is proposed that detailed soil infiltration rate testing to BRE365 and ground water monitoring will be undertaken during the winter months (Dec-Feb) at shallower depths, typically 1m BGL, to ascertain the validity of soakaways on site for detailed design purposes.
- 5.6 It is therefore proposed to discharge the surface water runoff from site to the ditch system along the southern boundary.
- 5.7 Storm water flows will be restricted to 2l/s from the whole site, for storm return periods up to 100 years whilst taking into account a climate change allowance of 40%.
- 5.8 The surface water drainage design proposed complies with the local planning guidance and the DEFRA 'Non statutory technical standards'.
- 5.9 The proposed storm water drainage layout and calculations have demonstrated that the site can be redeveloped without increasing the risk of surface water flooding in or around the development, whilst not increasing the load on the existing sewer system.
- 5.10 Although the proposed foul flows from the development will increase, capacity or flooding issues within the adopted sewer network are not envisaged given that the head of the sewer starts at No 36 Hill Lane.
- 5.11 On this basis it is not envisaged that Southern Water will not have any concerns with the proposed foul flows from the development, subject to a S106 sewer connection application.
- 5.12 It is therefore considered that the proposed drainage strategy for the surface water and foul drainage are accepted as part of the planning application for this development.

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Site Location Plan Plan BIS 1088/DPA01
Topographical Survey by JBP Surveys, Oct 18 – Ref 18197A Rev A
Client CCTV survey
Existing Drainage Layout Plan ABMH FC2781/01
SW Sewer Records dated 11/04/18
Geotechnical Soil Infiltration Testing and Groundwater Monitoring
CE dated 23/04/18



location plan (existing)

1:1250@A3

bis design

01243 850411 07887 777085 ben@bisdesign.co.uk www.bisdesign.co.uk

1088/DPA01
Land Adjacent 37 Hill Lane
revision 02

Tree List

Set Name	Team	Size	Goal	Start	Goal	End	Points
Set-1	CHERRY	10	10	3	2	1	9
Set-2	CHERRY	10	5	2	1	1	9
Set-3	CHERRY	10	5	2	1	1	9
Set-4	PRAT	40	5	5	5	5	13
Set-5	CHERRY	10	10	3	2	1	9
Set-6	CHERRY	10	5	2	1	1	9
Set-7	CHERRY	10	5	2	1	1	9
Set-8	CHERRY	10	5	2	1	1	9
Set-9	CHERRY	10	5	2	1	1	9
Set-10	CHERRY	10	5	2	1	1	9
Set-11	CHERRY	10	5	2	1	1	9
Set-12	CHERRY	10	5	2	1	1	9
Set-13	CHERRY	10	5	2	1	1	9
Set-14	CHERRY	10	5	2	1	1	9
Set-15	CHERRY	10	5	2	1	1	9
Set-16	CHERRY	10	5	2	1	1	9
Set-17	CHERRY	10	5	2	1	1	9
Set-18	CHERRY	10	5	2	1	1	9
Set-19	CHERRY	10	5	2	1	1	9
Set-20	CHERRY	10	5	2	1	1	9
Set-21	CHERRY	10	5	2	1	1	9
Set-22	CHERRY	10	5	2	1	1	9
Set-23	CHERRY	10	5	2	1	1	9
Set-24	CHERRY	10	5	2	1	1	9
Set-25	CHERRY	10	5	2	1	1	9
Set-26	CHERRY	10	5	2	1	1	9
Set-27	CHERRY	10	5	2	1	1	9
Set-28	CHERRY	10	5	2	1	1	9
Set-29	CHERRY	10	5	2	1	1	9
Set-30	CHERRY	10	5	2	1	1	9

[illegible]

Line types

The diagram illustrates various line types used in technical drawing, categorized into two main groups: standard line types and multi-directional tree canopy representation.

Standard Line Types:

- Fences:** Represented by a solid line with short, perpendicular dashes.
- Kerb:** Represented by a solid line with short, perpendicular dashes.
- Walls:** Represented by a solid line with short, perpendicular dashes.
- Stairs:** Represented by a solid line with short, perpendicular dashes.
- Change of Surface:** Represented by a solid line with short, perpendicular dashes.
- Footpaths:** Represented by a solid line with short, perpendicular dashes.
- Bank Top:** Represented by a solid line with short, perpendicular dashes.
- Bank Bottom:** Represented by a solid line with short, perpendicular dashes.
- Building:** Represented by a solid line with short, perpendicular dashes.
- Building Overhead:** Represented by a solid line with short, perpendicular dashes.
- Road Heights:** Represented by a solid line with short, perpendicular dashes.
- Flower Bed:** Represented by a solid line with short, perpendicular dashes.
- Overhead Cable:** Represented by a solid line with short, perpendicular dashes.
- Road Edge:** Represented by a solid line with short, perpendicular dashes.
- Driveway Flow:** Represented by a solid line with short, perpendicular dashes.
- Canopy:** Represented by a solid line with short, perpendicular dashes.
- Edge of vegetation:** Represented by a solid line with short, perpendicular dashes.

Multi-directional tree canopy:

The diagram shows a tree canopy with a central point labeled "Trunk position at ground level". The canopy is represented by a series of concentric, irregular lines. The lines are labeled as follows:

- Trunk position at ground level:** The central point of the canopy.
- Edge of canopy:** The outermost line of the canopy.
- Multi-side:** The lines between the trunk position and the edge of the canopy.
- Tree number:** The number "10" is placed near the center of the canopy.

[illegible]

37 Hill Lane Barnham PO22 0BL
Drainage Map



Please refer to sections on report & CCTV.

Project

Project Name: 37 Hill Lane

Project Description: WinCan Import in Miraculix WRc4 Standard

Project Date: 22/10/2018

Scoring Summary

Project Name
37 Hill Lane

Project Number

Project Date
22/10/2018

Structural Defects

Section	PLR	Grade	Description
---------	-----	-------	-------------

All inspected pipes are in an acceptable structural condition (< grade 3).

Service / Operational Condition

Grade 3: Best practice suggests consideration should be given to maintenance activities in the medium term.

Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potential blockages.

Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Section	PLR	Grade	Description
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1	MH1	3	Settled deposits, fine, 10% cross-sectional area loss
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Abandoned Surveys

Section	PLR	Description
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All inspections complete, none are abandoned.

Information

These scoring summaries are based on the SRM grading from the WRc.

Project Information

Project Name
37 Hill Lane

Project Number

Project Date
22/10/2018

Client

Contact: Jeremy Napthine
Street: 37 Hill Lane
Town or City: Barnham

Contractor

Company: Drainage Plus
Contact: Charlie Todd
Street: 30 Aldwick Fields
Town or City: Bognor Regis
County: West Sussex
Post Code: PO21 3ST
Phone: 

Section Inspection - 22/10/2018 - MH1

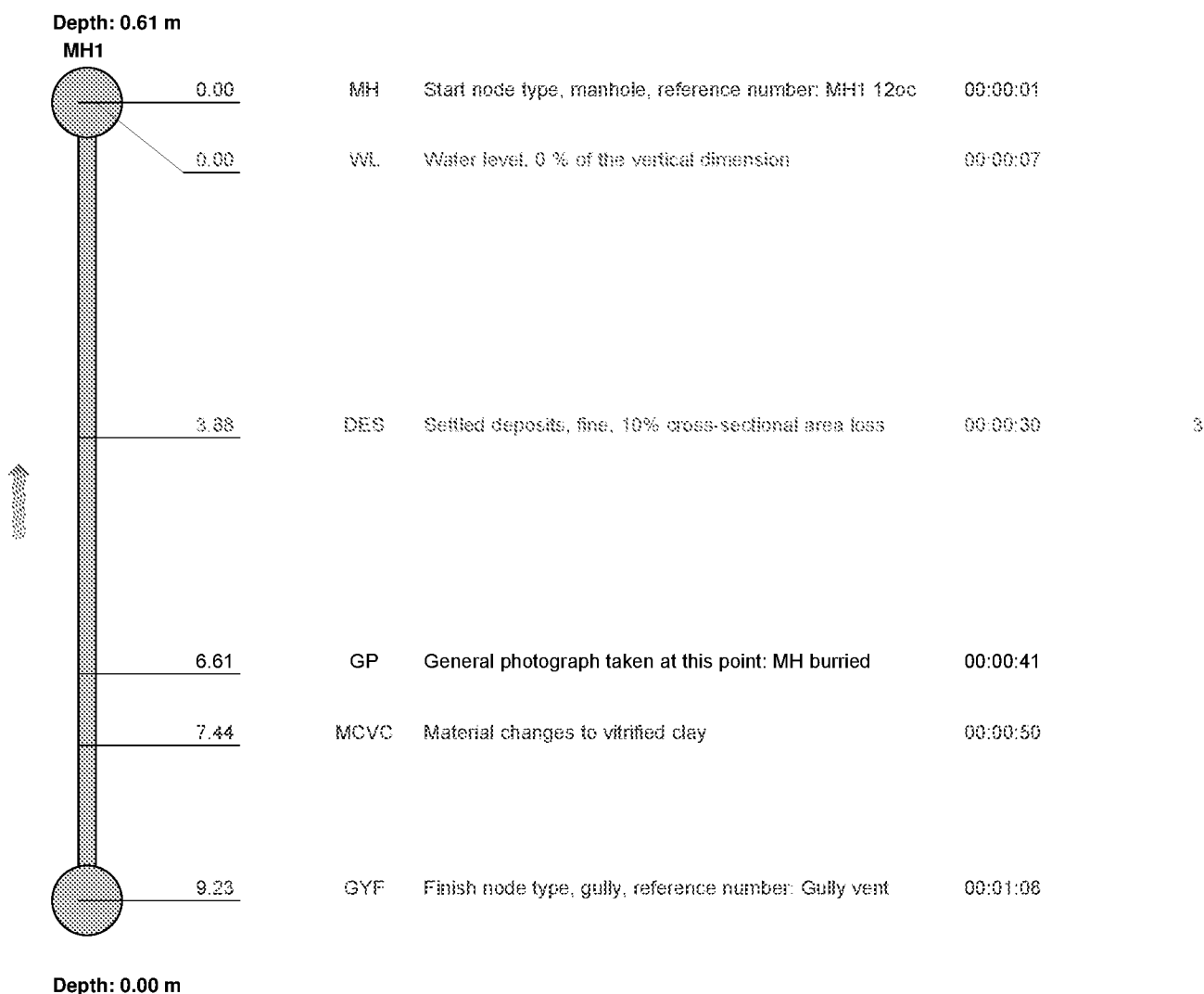
Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
1	1	22/10/18	8:40	01	No Rain Or Snow	No	MH1
Operator		Vehicle		Camera	Preset Length	Criticality Grade	Alternative ID
Charlie							

Town or Village:	Barnham	Inspection Direction:	Upstream	Upstream Node:	
Road:	37 Hill Lane	Inspected Length:	9.23 m	Upstream Pipe Depth:	0.000 m
Location:	Other (state in comments)	Total Length:	9.23 m	Downstream Node:	MH1
Surface Type:		Joint Length:	0.00 m	Downstream Pipe Depth:	0.610 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:			
Inspection Purpose:	Routine inspection of condition	Lining Material:			

Comments:

Recommendations:

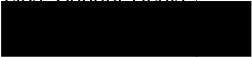
Scale: 1:81 Position [m] Code Observation MPEG Photo Grade



Structural Defects					Construction Features				
Service & Operational Observations					Miscellaneous Features				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	2.0	0.2	2.0	3.0

37 Hill Lane

1



Section Pictures - 22/10/2018 - MH1

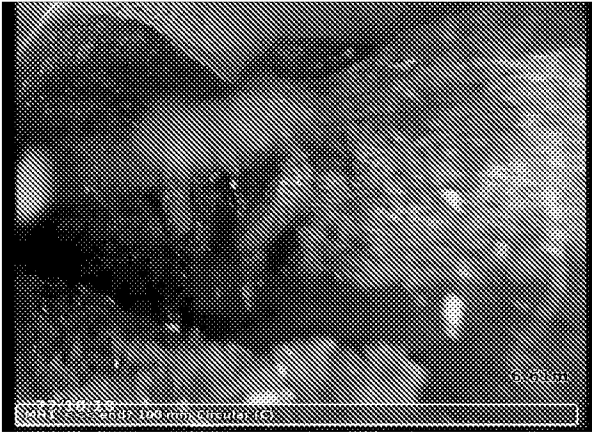
Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Upstream	MH1	01	



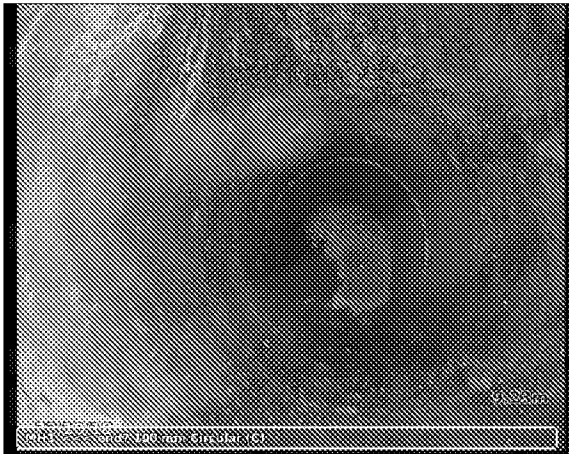
20181022-084759-snap0000.jpg, 00:00:01, 0.00 m
Start node type, manhole, reference number: MH1 12oc



X_186b6554-4b67-40cc-a5d0-0c324681b8c7_20181025_200526_755.jpg, 00:00:30, 3.88 m
Settled deposits, fine, 10% cross-sectional area loss



X_cb325c1f-952b-4fcf-b65b-896e3dd2f7f6_20181025_200637_293.jpg, 00:00:41, 6.61 m
General photograph taken at this point



20181022-084759-snap0001.jpg, 00:01:08, 9.23 m
Finish node type, gully, reference number: Gully vent

Section Inspection - 22/10/2018 - MH1 9OC

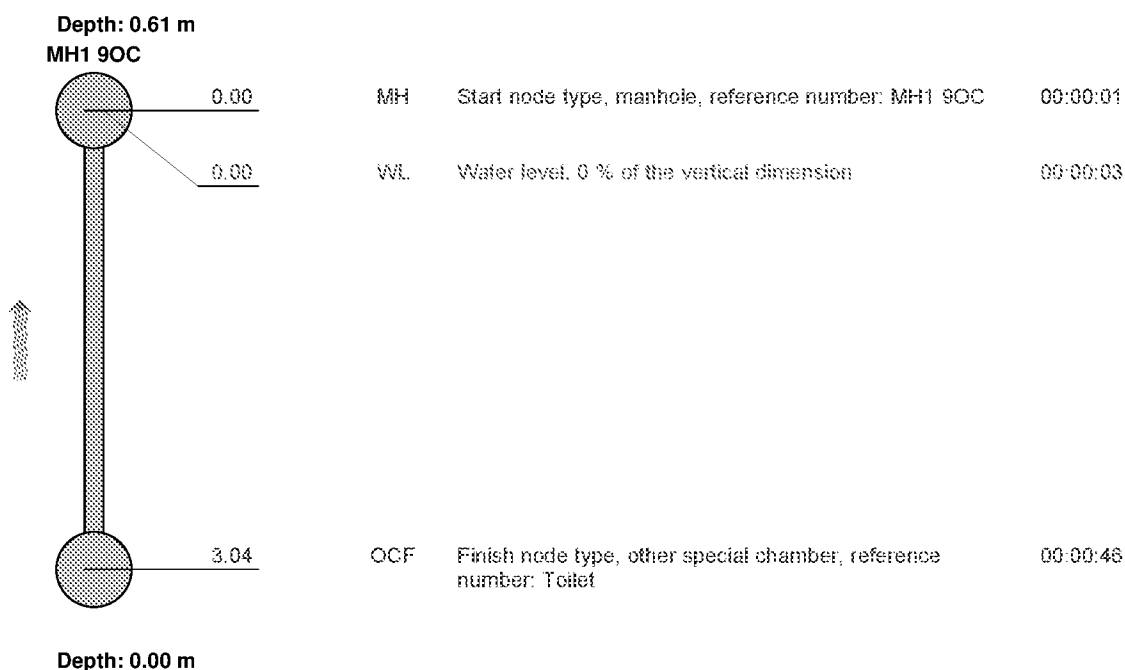
Section 2	Inspection 2	Date 22/10/18	Time 8:55	Client's Job Ref 01	Weather No Rain Or Snow	Pre Cleaned No	PLR MH1 9OC
Operator Charlie		Vehicle		Camera	Preset Length	Criticality Grade	Alternative ID

Town or Village:	Barnham	Inspection Direction:	Upstream	Upstream Node:	
Road:	37 Hill Lane	Inspected Length:	3.04 m	Upstream Pipe Depth:	0.000 m
Location:	Other (state in comments)	Total Length:	3.04 m	Downstream Node:	MH1 9OC
Surface Type:		Joint Length:	0.00 m	Downstream Pipe Depth:	0.610 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Pitch fibre		
Flow Control:	No flow control	Lining Type:			
Inspection Purpose:	Routine inspection of condition		Lining Material:		

Comments:

Recommendations:

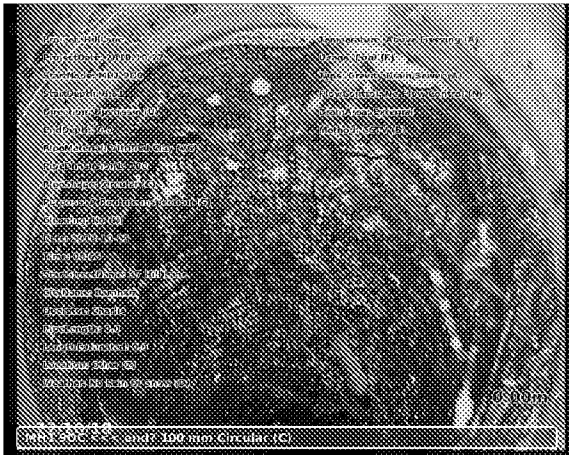
Scale: 1:50 Position [m] Code Observation MPEG Photo Grade



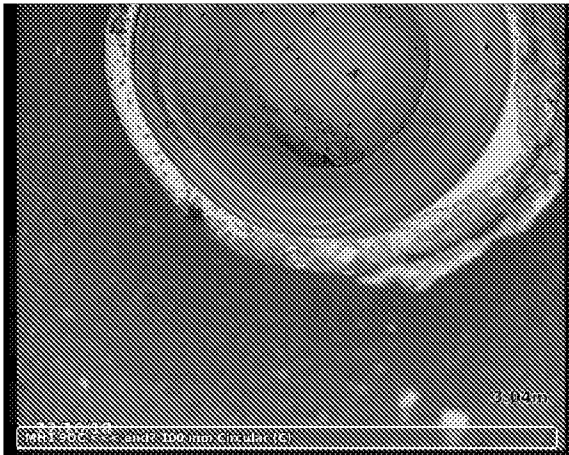
Structural Defects					Construction Features				
Service & Operational Observations					Miscellaneous Features				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Pictures - 22/10/2018 - MH1 9OC

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Upstream	MH1 9OC	01	



20181022-085634-snap0000.jpg, 00:00:01, 0.00 m
Start node type, manhole, reference number: MH1 9OC



20181022-085634-snap0001.jpg, 00:00:46, 3.04 m
Finish node type, other special chamber, reference number:
Toilet

Section Inspection - 22/10/2018 - MH1 6OC

Section 3	Inspection 3	Date 22/10/18	Time 8:58	Client's Job Ref 01	Weather No Rain Or Snow	Pre Cleaned No	PLR MH1 6OC
Operator Charlie		Vehicle		Camera	Preset Length	Criticality Grade	Alternative ID

Town or Village:	Barnham	Inspection Direction:	Upstream	Upstream Node:	
Road:	37 Hill Lane	Inspected Length:	4.83 m	Upstream Pipe Depth:	0.000 m
Location:	Other (state in comments)	Total Length:	4.83 m	Downstream Node:	MH1 6OC
Surface Type:		Joint Length:	0.00 m	Downstream Pipe Depth:	0.610 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Pitch fibre		
Flow Control:	No flow control	Lining Type:			
Inspection Purpose:	Routine inspection of condition	Lining Material:			

Comments:

Recommendations:

Scale: 1:50 Position [m] Code Observation MPEG Photo Grade

Depth: 0.61 m

MH1 6OC



0.04

MH

Start node type, manhole, reference number: MH1 6OC

00:00:04

0.04

WL

Water level, 0 % of the vertical dimension

00:00:06

4.83

GYF

Finish node type, gully, reference number: Gully

00:00:40

Depth: 0.00 m

Structural Defects

Construction Features

Service & Operational Observations

Miscellaneous Features

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Pictures - 22/10/2018 - MH1 6OC

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
3	Upstream	MH1 6OC	01	



20181022-085911-snap0000.jpg, 00:00:04, 0.04 m
Start node type, manhole, reference number: MH1 6OC



20181022-085911-snap0001.jpg, 00:00:40, 4.83 m
Finish node type, gully, reference number: Gully

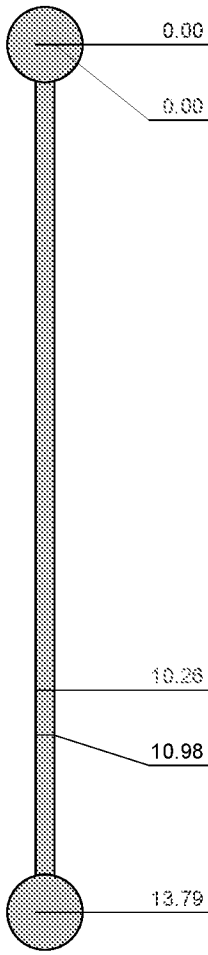
Section Inspection - 22/10/2018 - MH1 X

Section 4	Inspection 4	Date 22/10/18	Time 9:01	Client's Job Ref 01	Weather No Rain Or Snow	Pre Cleaned No	PLR MH1 X
Operator Charlie		Vehicle		Camera	Preset Length	Criticality Grade	Alternative ID

Town or Village:	Barnham	Inspection Direction:	Downstream	Upstream Node:	MH1
Road:	37 Hill Lane	Inspected Length:	13.79 m	Upstream Pipe Depth:	0.610 m
Location:	Other (state in comments)	Total Length:	13.79 m	Downstream Node:	
Surface Type:		Joint Length:	0.00 m	Downstream Pipe Depth:	0.000 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:			
Inspection Purpose:	Routine inspection of condition	Lining Material:			

Comments:

Recommendations:

Scale: 1:120	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: 0.61 m MH1 						
	0.00	MH	Start node type, manhole	00:00:01		
	0.00	WL	Water level, 0 % of the vertical dimension	00:00:03		
	10.26	OJL	Open joint, large	00:00:52		1
	10.98	GP	General photograph taken at this point: Covered MH	00:00:56		
	13.79	OCF	Finish node type, other special chamber, reference number: Main Drain	00:01:14		
Depth: 0.00 m						

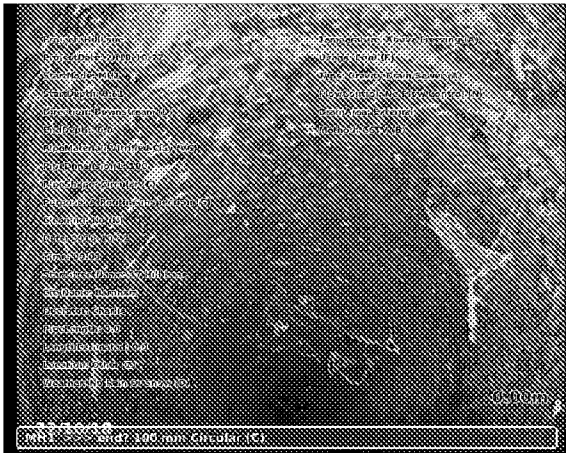
Structural Defects					Construction Features				
Service & Operational Observations					Miscellaneous Features				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
1	2.0	0.1	2.0	1.0	0	0.0	0.0	0.0	1.0

37 Hill Lane

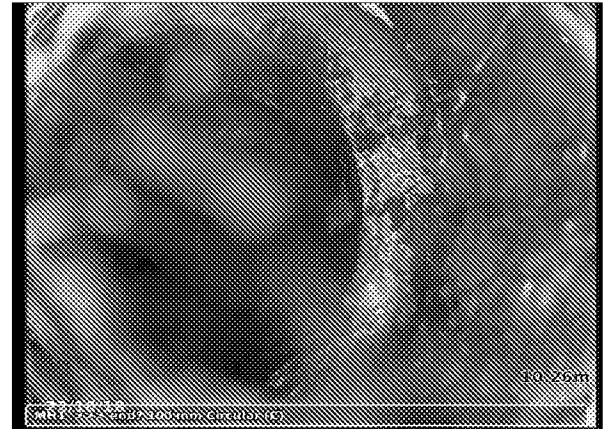
7

Section Pictures - 22/10/2018 - MH1 X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
4	Downstream	MH1 X	01	



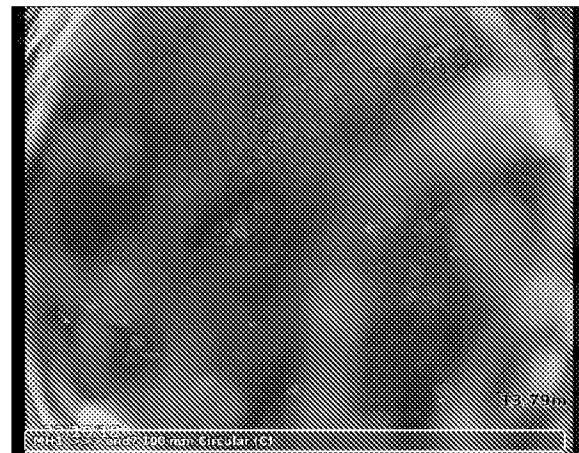
20181022-090126-snap0000.jpg, 00:00:01, 0.00 m
Start node type, manhole



MH1
X_ac8f92bb-75a7-4ee2-8795-35f5137b726e_20181025_2019
28_833.jpg, 00:00:52, 10.26 m



MH1
X_6223163b-1412-4727-aded-2ac05d088fd7_20181025_202
243_485.jpg, 00:00:56, 10.98 m



20181022-090126-snap0001.jpg, 00:01:14, 13.79 m
Finish node type, other special chamber, reference number:
Main Drain

Section Inspection - 22/10/2018 - MainX

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
5	5	22/10/18	9:10	01	No Rain Or Snow	No	MAINX
Operator		Vehicle		Camera	Preset Length	Criticality Grade	Alternative ID
Charlie							

Town or Village:	Barnham	Inspection Direction:	Downstream	Upstream Node:	MAIN
Road:	37 Hill Lane	Inspected Length:	23.26 m	Upstream Pipe Depth:	1.000 m
Location:	Other (state in comments)	Total Length:	23.26 m	Downstream Node:	
Surface Type:		Joint Length:	0.00 m	Downstream Pipe Depth:	0.000 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:			
Inspection Purpose:	Routine inspection of condition	Lining Material:			

Comments:

Recommendations:

Scale: 1:203 Position [m] Code Observation MPEG Photo Grade

Depth: 1.00 m

Main



13.76

MH

Start node type, manhole, reference number: Main

00:00:01

13.76

WL

Water level, 0 % of the vertical dimension

00:00:02

23.26

OCF

Finish node type, other special chamber, reference number: End

00:00:41

Depth: 0.00 m

Structural Defects

Construction Features

Service & Operational Observations

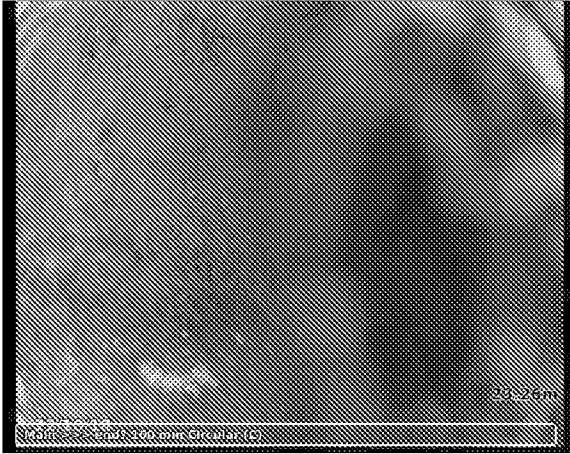
Miscellaneous Features

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

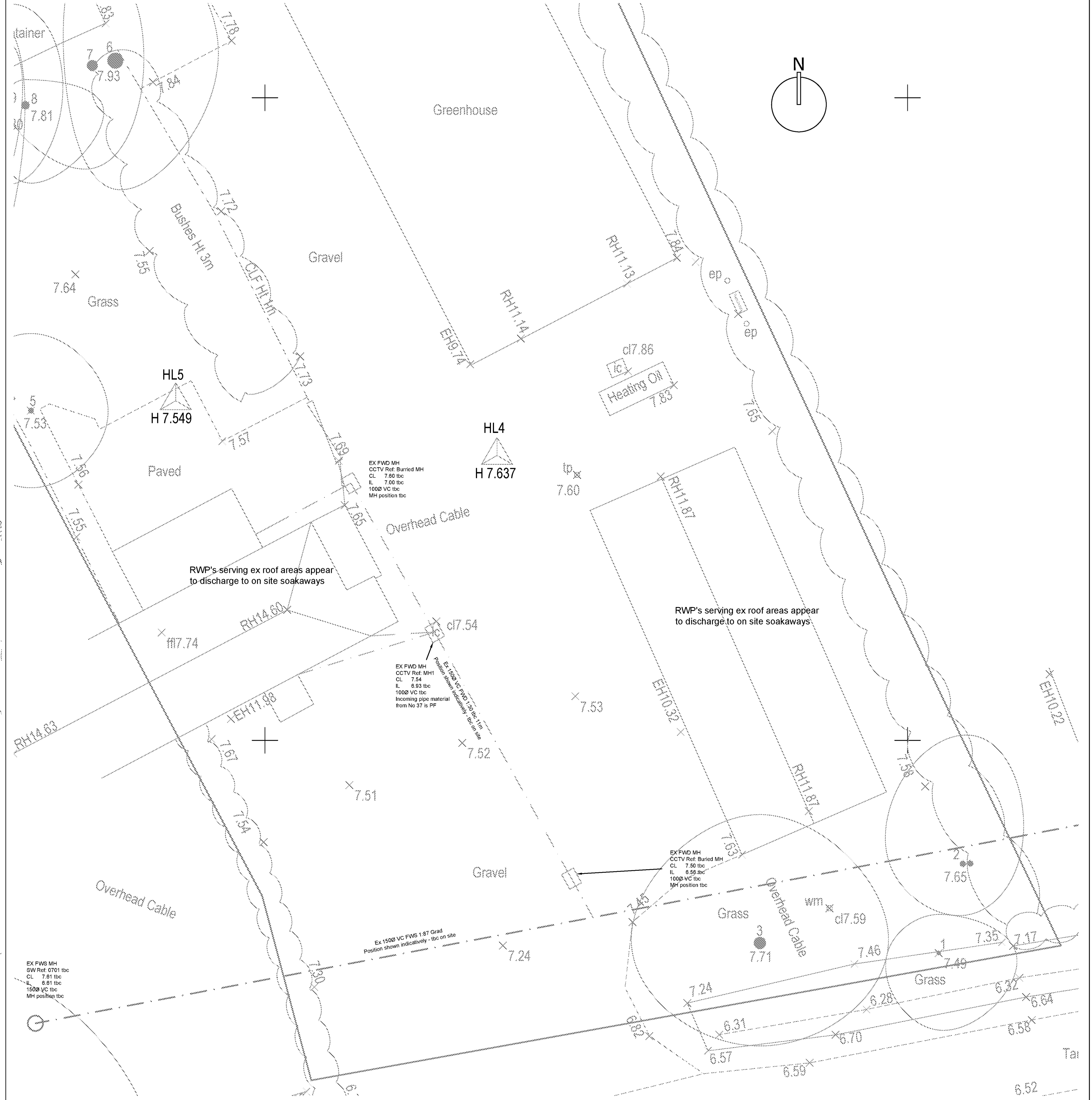
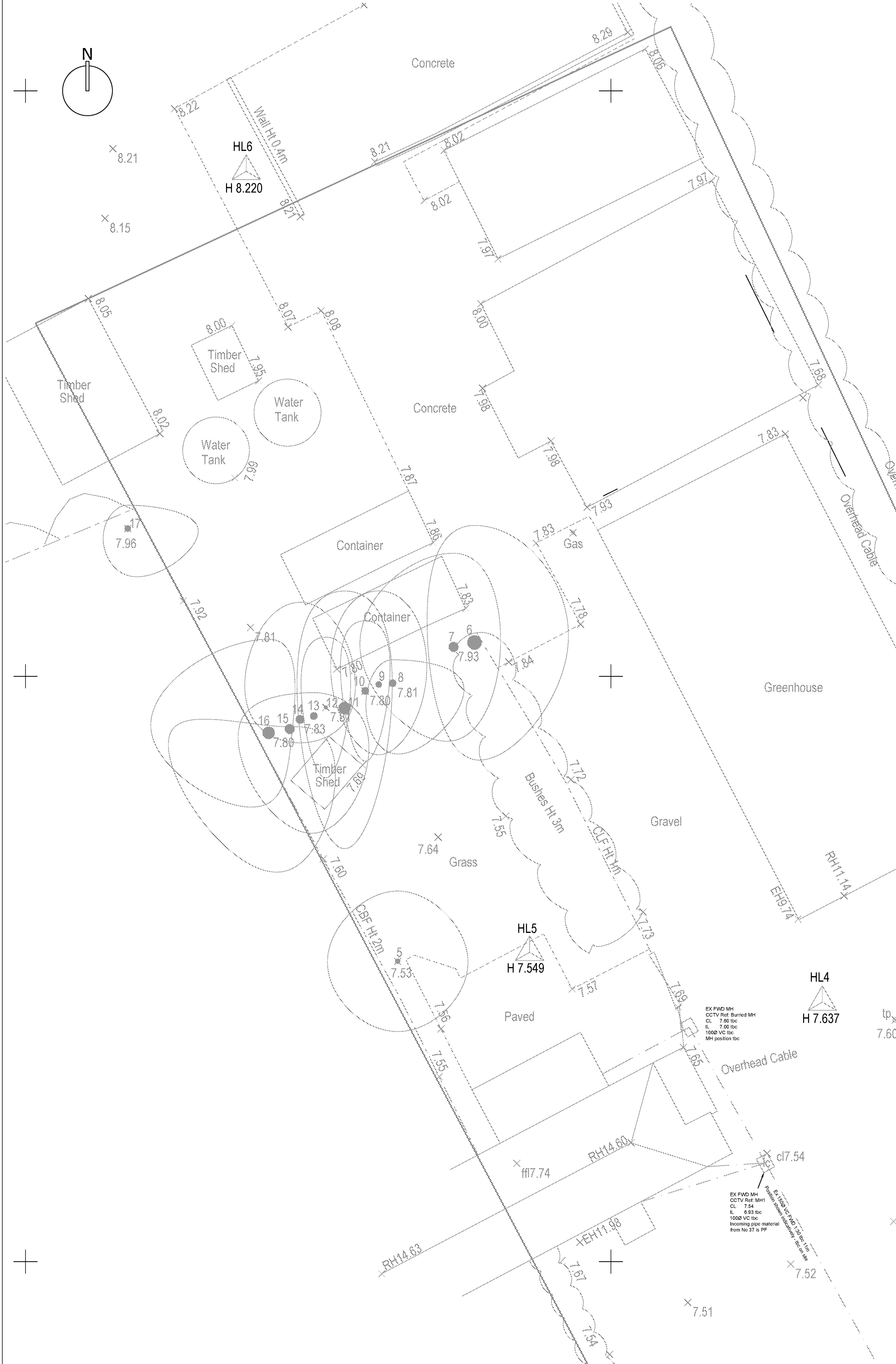
Section Pictures - 22/10/2018 - MainX				
Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
5	Downstream	MAINX	01	



20181022-091042-snap0000.jpg, 00:00:01, 13.76 m
Start node type, manhole, reference number: Main



20181022-091042-snap0001.jpg, 00:00:41, 23.26 m
Finish node type, other special chamber, reference number:
End



NOTE THE FOLLOWING:
Existing Drainage information based on the following:

- CCTV Report - Drainage Plus Report
1.1. Dated 22/10/2018
- Southern Water Sewer Records
2.1. SW Ref 288568 dated 11/04/2018

Legend

- Existing Foul Sewer
- Existing Surface Sewer
- Existing Foul Drain
- Existing Surface Drain

A	Issued For BUDGET/APPROVAL ONLY	31/10/18
REV	DESCRIPTION	DATE

abmh
ABMH Civils Ltd
1 The Grove, Felpham, Bognor Regis, West Sussex PO22 7EY
Mark Mob: 07781 950000
Email: mark@abmh.co.uk / Web: www.abmh.co.uk

PROJECT	RESIDENTIAL DEVELOPMENT 37 HILL LANE, BARNHAM BOGNOR REGIS, WEST SUSSEX PO22 0BL			
DRAWING	EXISTING DRAINAGE			
SCALE	1:100	DATE	OCT 18	INITIAL
REV	-	CHKD	-	REV

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Bis Design
61
Springfield Close
Chichester
WEst Sussex
PO18 0AZ

Your ref 1088
Our ref 288568
Date 11 April 2018
Contact 

Attention: Ben Smith

Dear Customer

Re: Provision of public sewer record extract

Location: 37 Hill Lane, Bognor Regis, West Sussex, PO22 0BL

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

VAT receipt

Ordered by:

Bis Design
Springfield Close
Chichester
WEst Sussex
PO18 0AZ

VAT registration number: 813 0378 56

Order reference:

Your reference:

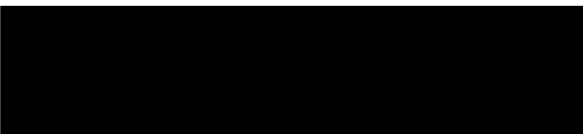
Receipt for provision of an extract from the public sewer and/or water main records.

Location	Costs
37 Hill Lane Bognor Regis West Sussex PO22 0BL	£41.60
Net total	£41.60
VAT	£8.32
Total	£49.92
Paid	Paid in full

Thank you for your payment:

Received on: 10 April 2018

For enquiries regarding the information provided in this receipt, please contact the LandSearch team:



Email: searches@southernwater.co.uk

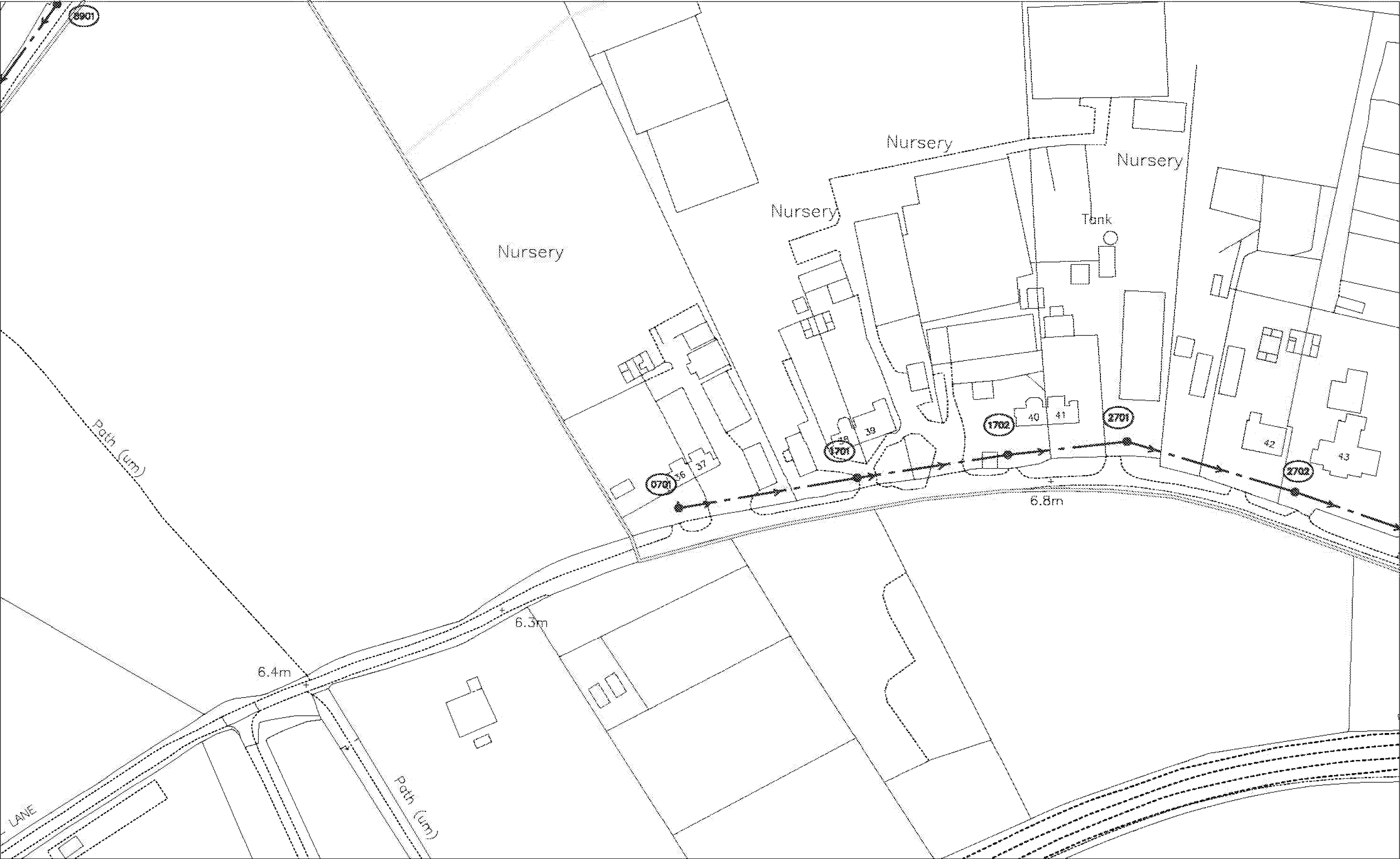
Web: www.southernwater.co.uk

LandSearch
Southern Water Services
Southern House
Capstone Road
Chatham
Kent
ME5 7QA



SEWER RECORDS PAGE 1 OF 2

103935



O.S. REF.

SU9603NW

Title: 288588_37 Hill Lane, Bognor Re

Drawn by: yadavsa

Scale: 1:1250

Date: 11/04/2018

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 determined on site.

WARNING: (SAC) pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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496309

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0701X	7.61	6.61	150	VC	CIRC																		
1701X	7.55	5.82	150	VC	CIRC																		
1702X	7.77	5.35	150	VC	CIRC																		
2701X	7.75	5.03	150	VC	CIRC																		
2702X	6.84	4.8	150	VC	CIRC																		
8901X	5.6	4.14	175	VC	CIRC																		

LINE STYLES / COLOURS

Brown	-----	Final
	-----	Final Siphon Cover
	-----	Final Vacuum Main
	-----	Final Rising Main
Red	-----	Combined
	-----	Combined Siphon Sewer
	-----	Combined Rising Main
	-----	Lateral Drain
Orange	-----	Building Over Agreement Area
Dark Blue	-----	Treated Effluent
Purple	-----	Sludge
	-----	Sewer Collector
	-----	Sanitary 104 Area
Light Blue	-----	Surface Water
	-----	Surface Water Rising Main
Yellow	-----	Private
Green	-----	Access Drift
	-----	Decorative

MATERIALS

AK	Aluminium
BAC	Bonded Polymer Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Duct Iron
CO	Concrete (in-situ)
CP	Concrete (Pre-Cast)
CS	Concrete Slagcrete (hotter)
CSU	Concrete Slagcrete (hotter)
DI	Ductile Iron
GR	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
SMC	Masonry in regular Course
MAR	Masonry in random Course
PE	Polyethylene
PF	Plastic Film
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Mells
SI	Steel Iron
BT	Brick
VC	Vitrified Clay
XOC	Other
ZZZ	Unknown

	Manhole (SR)
	Manhole (FAC)
	Lamp hole (SR)
	Lamp hole (FAC)
	Pumping Station (SR)
	Pumping Station (FAC)
	Side entry Manhole (SR)
	Side entry Manhole (FAC)
	Blind shaft (SR)
	Blind shaft (FAC)
	Exterior station (SR)
	Exterior station (FAC)
	Manhole door (SR)
	Manhole door (FAC)
	Flushing v/s Man (SR)
	Flushing v/s Man (FAC)
	Flushing v/s Man (SR)
	Flushing v/s Man (FAC)
	Denatation Chamber

LEGEND - SEWERS

	Workout (SR)
	Workout (FAC)
	Building Eye (SR)
	Building Eye (FAC)
	Gasping point (SR)
	Gasping point (FAC)
	Intersect chamber (SR)
	Intersect chamber (FAC)
	Storm Tank (SR)
	Storm Tank (FAC)
	Vertical chamber (SR)
	Vertical chamber (FAC)
	Label office
	Downsight manhole
	Cutback
	Perforated chamber
	Darkwater
	Storm Overflow
	Backstop manhole

	Other (t)
	Other
	Change in sewer (t)
	Change in sewer
	Reflex valve
	Flag valve
	Cutback
	Arched
	Valve
	Closed Valve
	Storm Tank (SR)
	Storm Tank (FAC)
	Vertical chamber (SR)
	Vertical chamber (FAC)
	Direction arrow
	Outfall
	Perforated chamber
	Darkwater
	Storm Overflow
	Backstop manhole

	Wastewater treatment works
	Marine treatment works
	Cutback headworks
	Valve
	Valve column
	Tidal sewage tank
	Blank end
	Head of Public Sewer
	Micro Pumping Station
	SHAPES (S)
A	Arched
B	Blind
C	Circle
E	Ellipse
H	Hexagon
R	Rectangle
S	Square
T	Triangle
U	U-shape
X	Other
	MODE REFERENCING SYSTEM
1st digit	hundred metre ending identifier
2nd digit	hundred metre ending identifier
3rd digit	0-4 = Public Sewer
4th digit	rest of sewer

Drawn by: yadavsa

Title: 288568_37 Hill Lane, Bognor Re

Date: 11/04/2018





23rd April 2018
Our Ref: 18.9837

37 Hill Lane
Barnham
West Sussex
PO22 0BL

FAO Jeremy Naphine

Soil Infiltration Testing and Groundwater Monitoring – 37 Hill Lane, Barnham

Dear Jeremy,

I write further to the completion of soil infiltration testing (in accordance with BRE 365) and subsequent groundwater level monitoring at the above referenced site. Trial pitting works and the installation of the standpipes were carried out between the 9th and 12th March 2018, with groundwater level monitoring carried out weekly from this date, for 5 weeks until the 13th April 2018. The following factual report describes the work undertaken and presents copies of the test data obtained.

Scope

The primary aim of the investigation was to provide an assessment of the underlying ground conditions to assess the current drainage conditions on site, as well as to establish a groundwater level, and any groundwater level fluctuations, with a view to future development of the site.

Site Works

Intrusive site works were completed over two days; Friday 9th and Monday 12th March 2018, supervised by an Engineering Geologist from CE. Photographs of the works can be viewed to the rear of this report.

Two trial pits (TP1 and TP2) were advanced by way of a mini-excavator to a maximum depth of 2.20mbgl. Following this, both pits were then rapidly filled with potable water from a trailer mounted bowser. Data loggers were then placed within the pits to monitor the fall in water level over time.

Two windowless sample boreholes (WS1 and WS2) were drilled to a maximum depth of 5.00mbgl, with the soil conditions logged by the Engineering Geologist on site. Standpipe piezometers (50mm diameter black plastic plain and slotted pipework) were then installed to 3.90-4.40mbgl to enable future groundwater level monitoring.

Ground Conditions

Below the surface covering of pea shingle, the soils were described as a black/ dark brown sandy Gravel of flint and occasional brick and tarmac. This was encountered to depths between 0.20mbgl in TP1, TP2 and WS2, however an extended thickness of 1.50mbgl in WS1. This material is considered to be Made Ground.



The initial natural soils are described as a soft to firm becoming firm brown slightly sandy silty Clay, with rare to occasional gravels of flint. This material was encountered to a maximum excavated depth of 2.10-2.30mbgl in TP1/TP2 and a 5.00mbgl in WS2. Within WS1, this material was proven to a maximum depth of 3.80mbgl. Below 3.80mbgl in WS1, soils were described as a soft pale brown gravelly Silt/Clay from 3.80mbgl to 4.30mbgl. This material is considered representative of River Terrace Deposits, or formerly 'Brickearth'.

The underlying Chalk was encountered in WS1 below 4.30mbgl. This was described as a structureless chalk, composed of a white slightly gravelly Silt and proven to a maximum drilled depth of 5.00mbgl. This material is considered representative of the Upper Chalk.

A groundwater seepage was noted in WS1 3.60m during the investigation. WS2 was recorded as dry.

Detailed soil logs can be observed at the rear of this report.

Infiltration Testing (BRE 365)

Testing was conducted in both pits (TP1 and TP2) in locations as per the site plan attached and was carried out in general accordance with BRE 365 methods; following the mechanical excavation, squaring of the pit sides, the trial pit was filled rapidly with potable water and the subsequent fall in water level monitored over time. The aim of the test is to reach the 25% fill depth marker to determine an infiltration rate for the soil.

TP1 was filled with a 1.52m deep column of water and recorded a fall in water level of 1.43m over a monitoring period of 4347 minutes. SA2 was filled with a 1.45m deep column of water and recorded a fall in water level of 0.79m over a monitoring period of 4077 minutes.

Results

The 25% marker was reached in TP1 only, over the time period tested. On this basis, a soil infiltration rate for TP1 of 1.02×10^{-6} has been calculated. TP2 did not reach the 25% marker during the allotted time, due to slower infiltration, however an extrapolated soil infiltration rate of 3.5×10^{-7} has been calculated on the review of the data.

These results generally correlate to 'poor' drainage conditions (Ref: 'Soil Mechanics in Engineering Practice' Terzaghi *et al*; Table 14.1 Permeability and drainage characteristics of soils (after Casagrande and Fadum 1940)).

In ideal conditions, subsequent testing should be carried out to simulate saturated conditions, however due to time constraints this isn't always possible. As such, soil infiltration rates within saturated conditions will likely be slower and therefore this should be taken into consideration during any designs.

Please refer to infiltration test sheets appended to the rear of this report.

Groundwater Monitoring

Follow-on groundwater monitoring was conducted over a five week period following the infiltration testing, within the installed standpipes in WS1 and WS2



Results

Groundwater monitoring results are presented in the table overleaf.

Hole Ref	W51	W52
Depth of install	3.80m	4.40
16/03/2018	3.60m	Dry
22/03/2018	3.70m	Dry
04/04/2018	No access*	4.38m
10/04/2018	3.80m	4.39m
18/04/2018	3.80m	Dry

*A pallet was put over the installation position.

I trust the above information is sufficient for your requirements in this matter, should you have any queries please do not hesitate to contact me.

Shaun Gilbrook BSc FGS
Engineering Geologist
Constructive Evaluation Limited

Enclosed: Photographs
 Soil Logs
 Site Plan
 Infiltration (BRE 365) Test Sheets

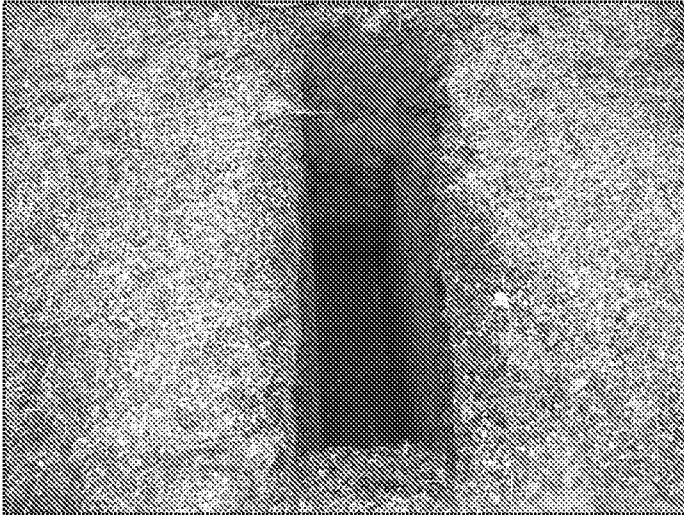


Investigation Photographs

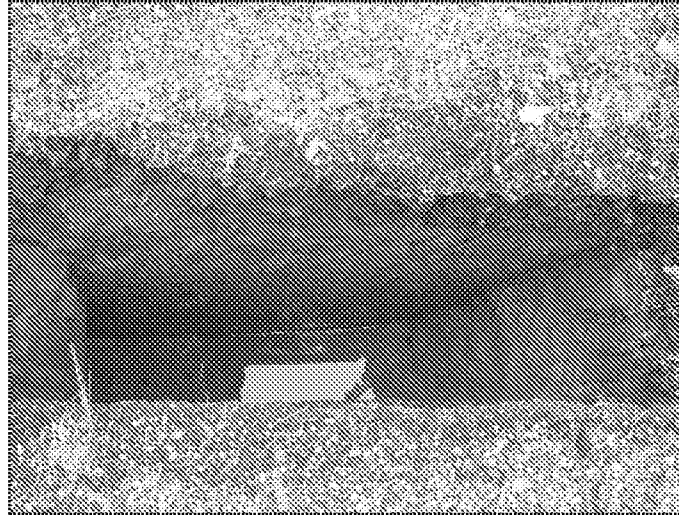
Project Ref: 18.9837

Site Name: 37 Hill Lane

1.



2.



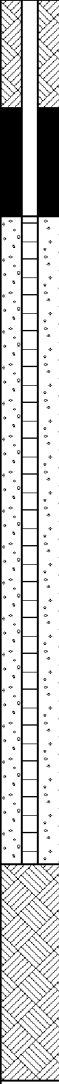
- 1) TP1
- 2) TP1
- 3) TP2

3.



constructiveevaluation
site investigation • building pathology

 constructiveevaluation site investigation • building pathology				Borehole Log			Borehole No. WS1 Sheet 1 of 1	
Project Name: 37 Hill Lane, Barnham				Project No. 18.9837		Co-ords:		Hole Type WLS
Location: Barnham, West Sussex				Level:		Scale 1:35		
Client: Salt Earth Ltd				Dates: 09/03/2018		Logged By SG		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10		(MADE GROUND) Pea shingle. (MADE GROUND) Black/ dark brown sandy fine to coarse Gravel of flint, with occasional brick and tarmac. Sand is fine to coarse.	1	
		1.60	D		1.50		Firm becoming firm to stiff brown slightly sandy silty CLAY. Sand is fine. Rare to occasional fine sub-angular to sub-rounded gravels of flint. Frequent black mottling. (RIVER TERRACE DEPOSITS)	2	
		2.00	D					3	
		2.50 - 3.00	D					4	
		4.00	D		3.80		Soft pale brown gravelly SILT/CLAY. Gravel is fine to medium sub-angular to sub-rounded chalk. (RIVER TERRACE DEPOSITS)	5	
		4.50	D		4.30		Recovered as: Structures Chalk, composed of a white slightly gravelly SILT. Gravel is fine to coarse angular to sub-rounded weak, low density chalk. Frequent brown/ orange brown staining. (LEWES NODULAR/ SEAFORD/ NEWHAVEN/ CULVER/ PORTSDOWN CHALK FORMATIONS (UNDIFFERENTIATED))	6	
				5.00		End of Borehole at 5.000m	7		

Remarks
 Hand excavated pit to 1.00mbgl. Windowless sample borehole completed in base of pit to 5.00mbgl. Standpipe installed to 3.80mbgl (0.80m plain, 3.00 slotted; 50mm HDPE). Groundwater reading at 3.61mbgl, 20 mins after install)





Borehole Log

Borehole No.

WS2

Sheet 1 of 1

Project Name: 37 Hill Lane, Barnham

Project No.
18.9837

Co-ords:

Hole Type
WLS

Location: Barnham, West Sussex

Level:

Scale
1:35

Client: Salt Earth Ltd

Dates: 09/03/2018

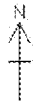
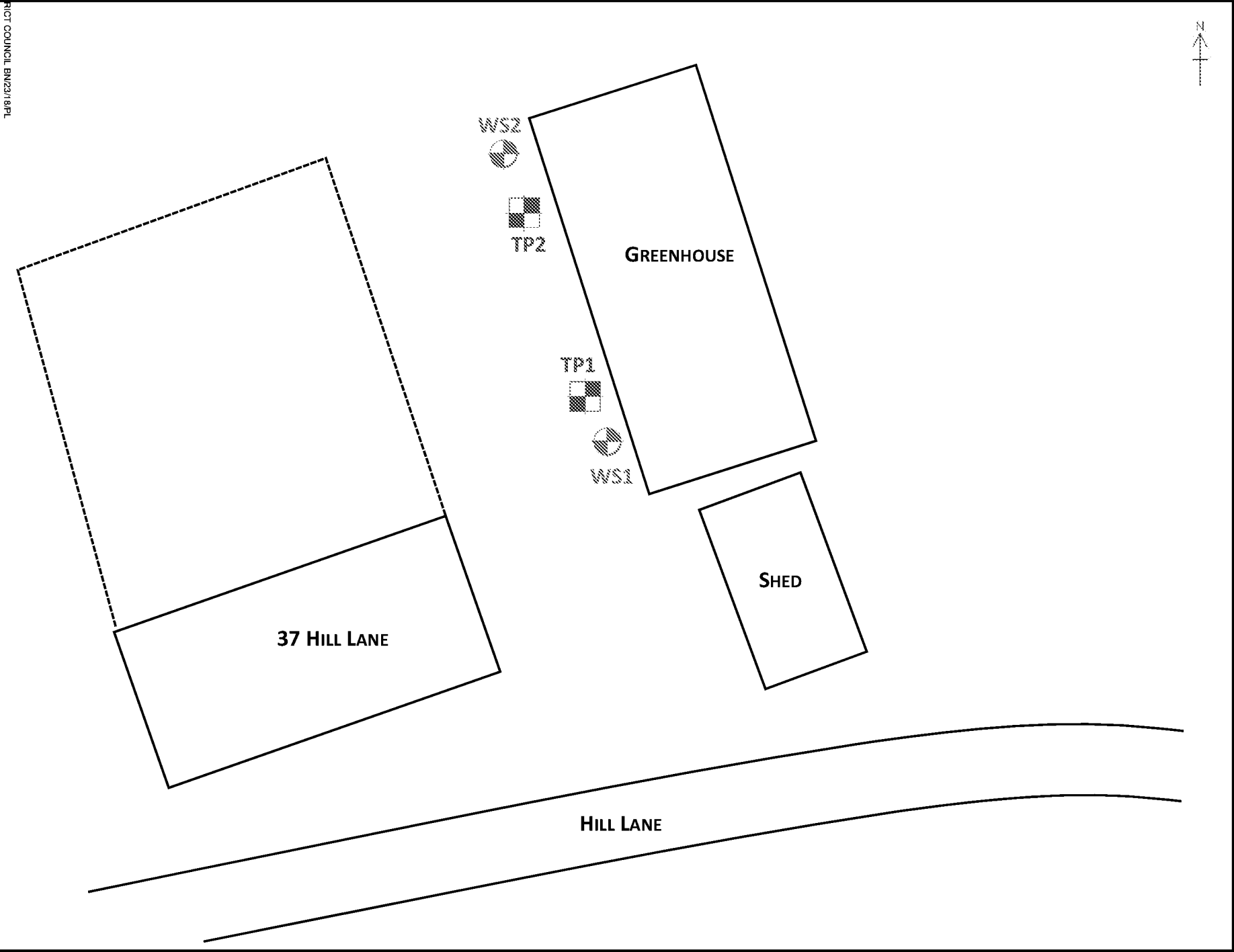
Logged By
SG

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05			(MADE GROUND) Pea shingle.	
					0.40			(MADE GROUND) Black/ dark brown sandy fine to coarse Gravel of flint, with occasional brick and tarmac. Sand is fine to coarse.	
								Firm becoming firm to stiff brown slightly sandy silty CLAY. Sand is fine. Rare to occasional fine sub-angular to sub-rounded gravels of flint. Becoming gravelly with depth. Frequent black mottling. (RIVER TERRACE DEPOSITS)	1
									2
									3
									4
								... 3.90-4.20mbgl Orange brown fine to medium SAND.	
								... 4.20-4.40mbgl Firm mottled grey green sandy CLAY.	
					5.00			End of Borehole at 5.000m	5
									6
									7

Remarks

Hand excavated pit to 1.00mbgl. Windowless sample borehole completed in base of pit to 5.00mbgl. Standpipe installed to 4.40mbgl (0.90m plain, 3.00 slotted; 50mm HDPE). Borehole dry 20mins after install.





- Notes:
1. Do not scale from this drawing.
 2. All dimensions must be checked on site prior to commencement of work.
 3. Where applicable this drawing is to be read in conjunction with other consultants drawings.
 4. This drawing is the copyright of Constructive Evaluation Ltd.

Drawing Title:

Site Investigation Plan

Project Reference:

18.9837

Site Name:

37 Hill Lane, Barnham

Revision: 0
Drawn by: SG
Scale: Not to Scale



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Trial Hole: TP1

Test 1

INSULISATION CALCULATED FROM 75%-75% WATER DEPTH RANGE

Infiltration Rate

from 75%-25%

1.02006E-06

Soakaway Test Results & Soil Infiltration Rate

Site: 37 Hill Lane, Barnham

Job No: 18.9837

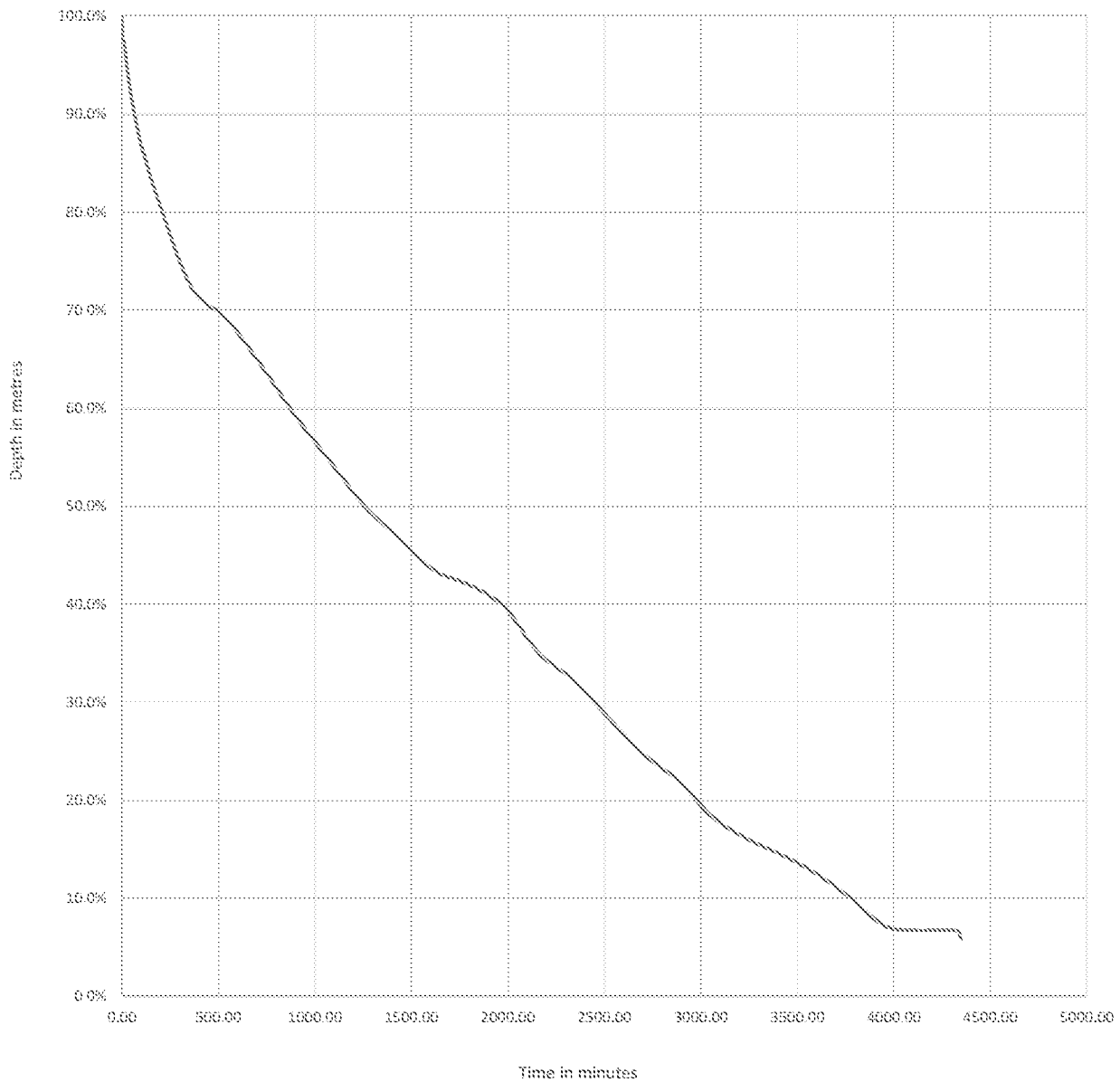


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site investigation & auditing services

Trial Hole: TP1

Test 1

Permeability Graph



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Trial Hole: TP2

Test 1

INSULISATION CALCULATED FROM 75%-75% WATER DEPTH RANGETime in mins

1260 75%

25%*

*estimated from graph. use with caution

from 75%-25%

3.50952E-07

Soakaway Test Results & Soil Infiltration Rate

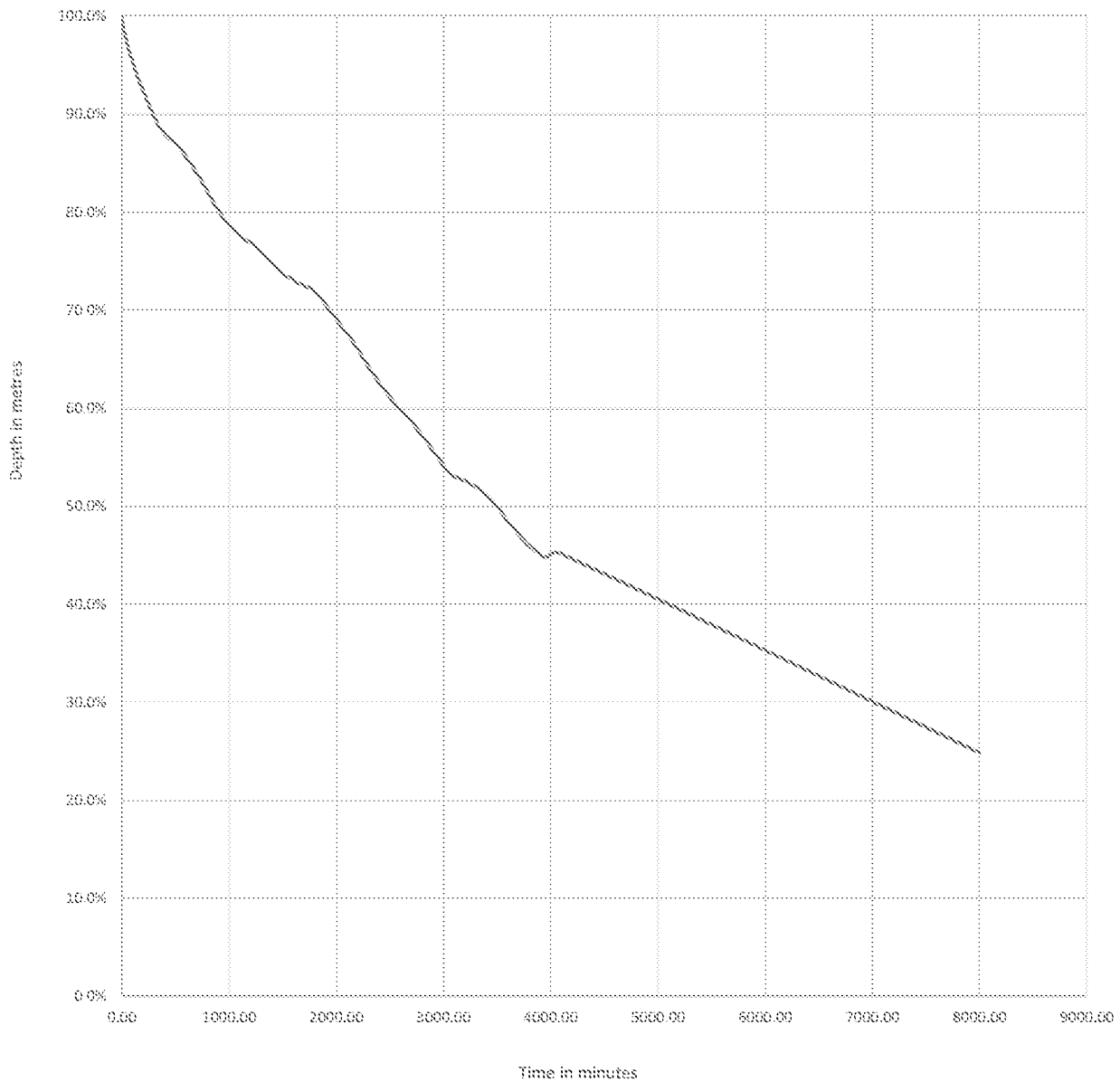
Site: 37 Hill Lane, Barnham

Job No: 18.9837

Trial Hole: TP2

Test 1

Permeability Graph



Basic view



Detailed view

Location

Enter a place or postcode in England



Flood risk from rivers
or the sea



Extent of flooding



Flood risk from surface
water



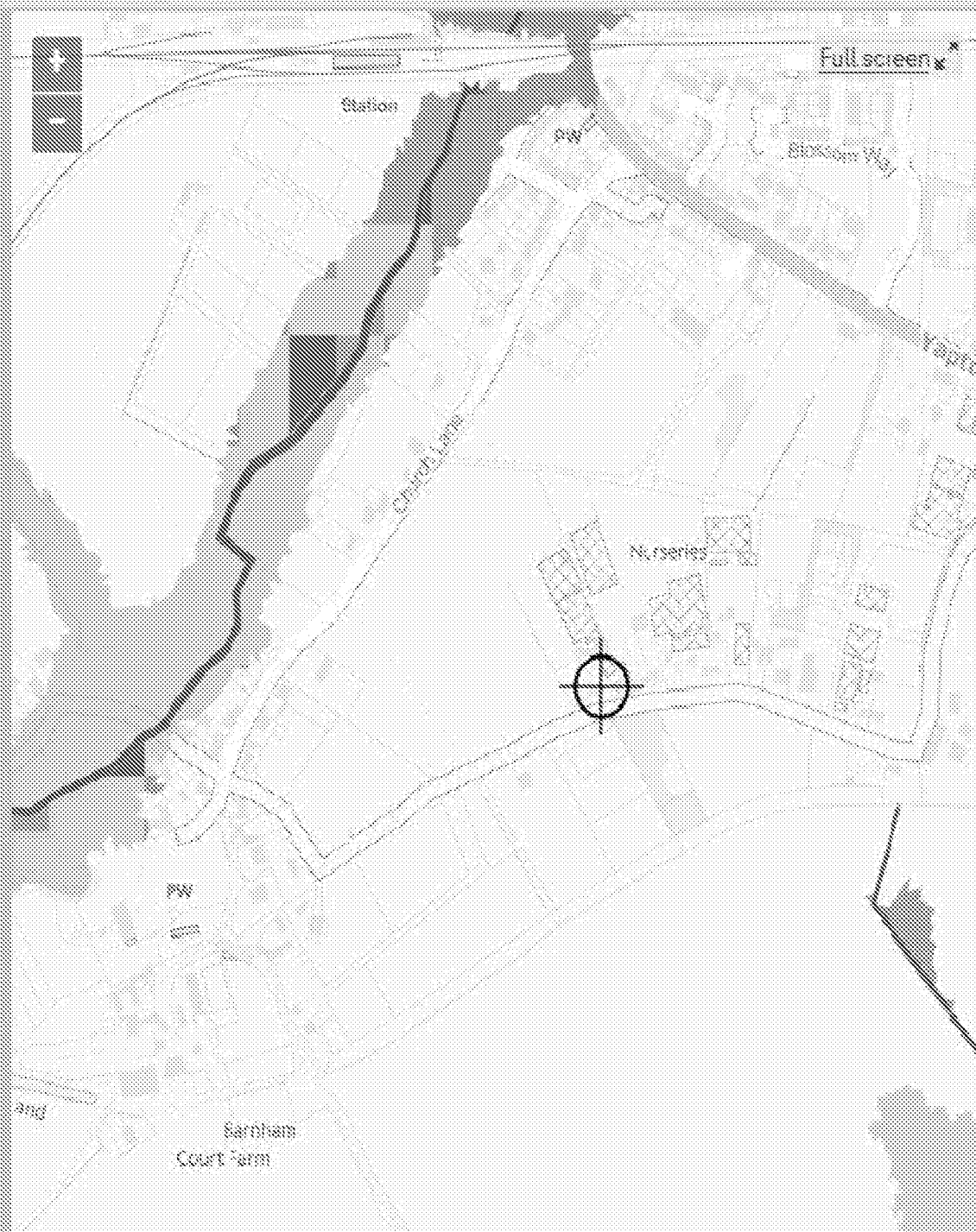
Extent of flooding



Flood risk from
reservoirs



Extent of flooding



Flood risk



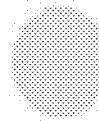
High



Medium



Low



Very low



Location you
selected

Basic view



Detailed view

Location

Enter a place or postcode in England



Flood risk from rivers
or the sea



Extent of flooding



Flood risk from surface
water



Extent of flooding



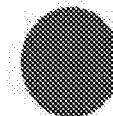
Flood risk from
reservoirs



Extent of flooding



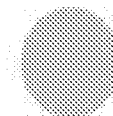
Flood risk



High



Medium



Low



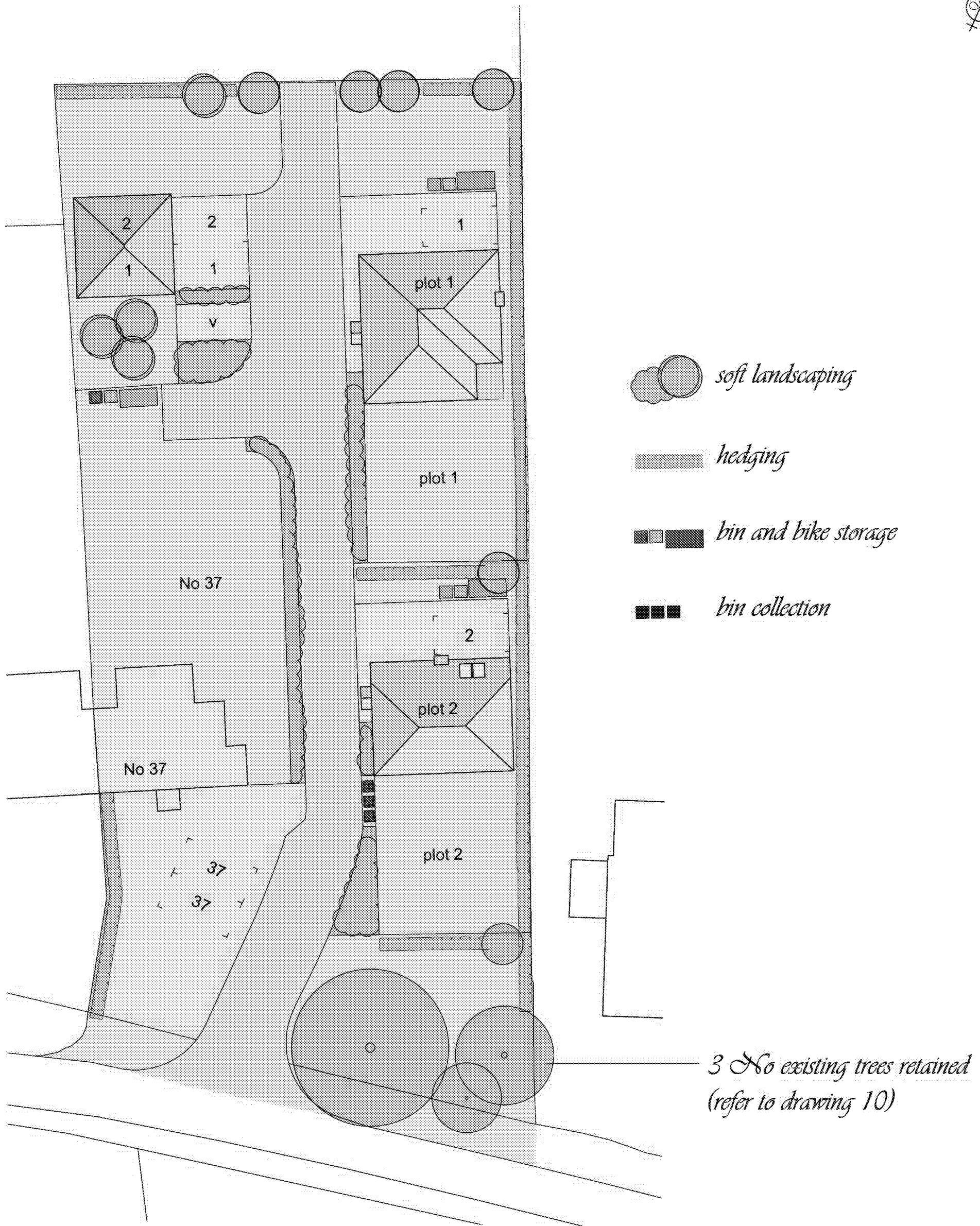
Very low



Location you
selected

B

Proposed Site Plan BIS 1088/DPA04
Proposed Drainage Layout Plan ABMH FC2781/02A
Greenfield Runoff Rates (HR Wallingford)
Greenfield/Proposed Runoff Volume Rates (Windes Calculations)
Windes Calculations 100year SRP + 40%CC
Proposed External Levels & Finishes ABMH FC2781/05A
Proposed Off Site Drainage Works ABMH FC2781/03A & 04A



proposed site plan

1:250@A3

bis design

01243 850411

07887 777085

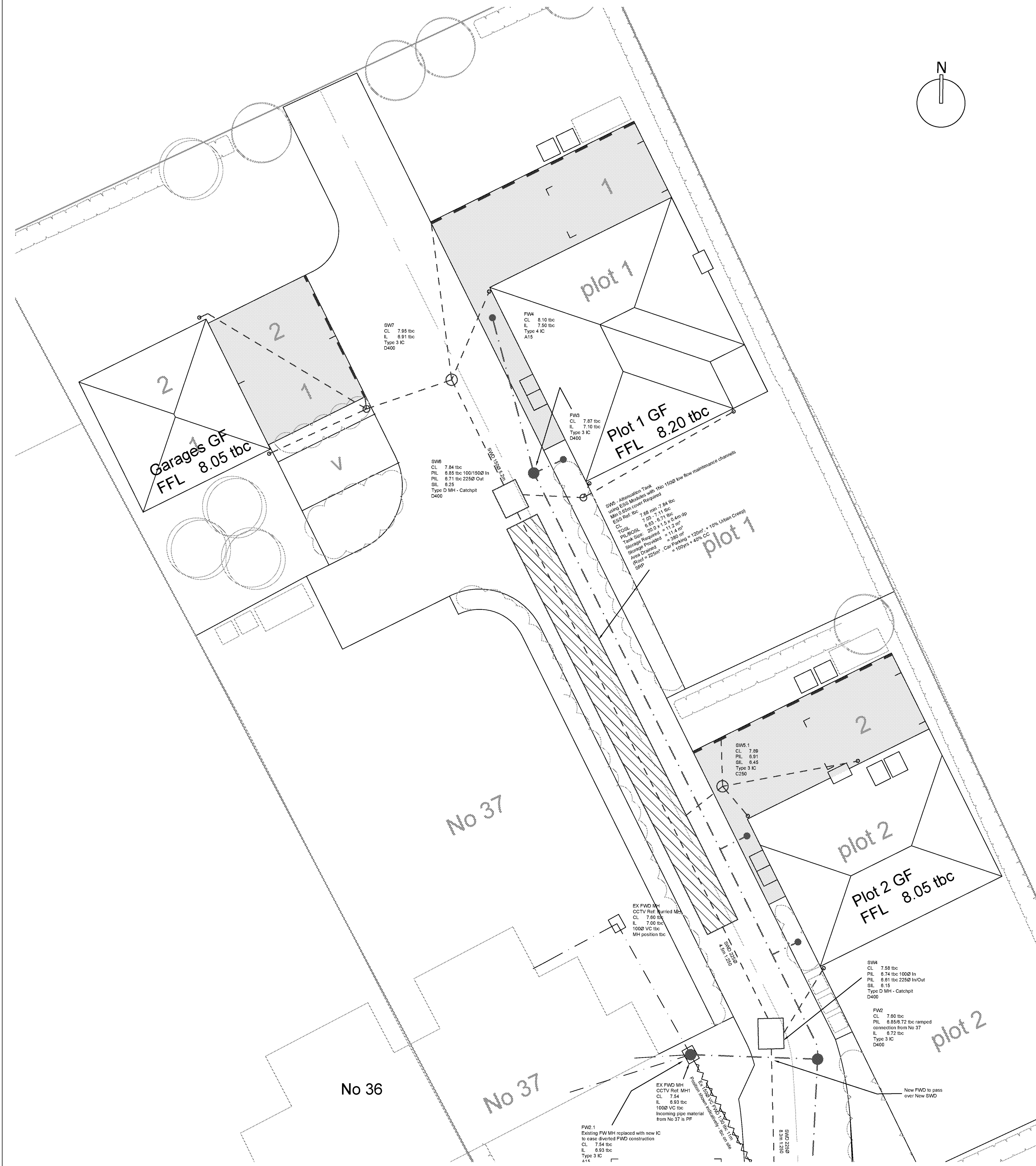
ben@bisdesign.co.uk

www.bisdesign.co.uk

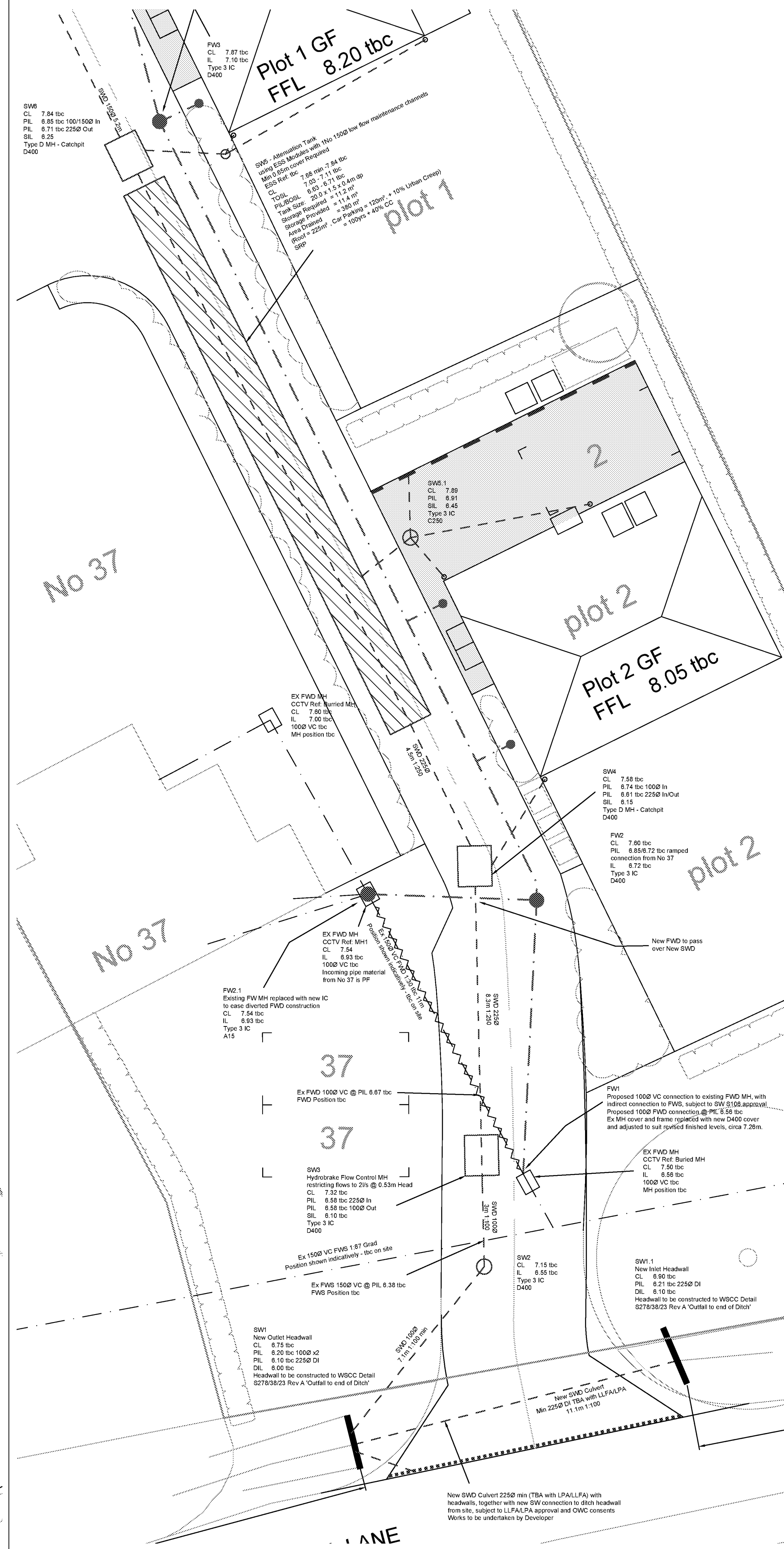
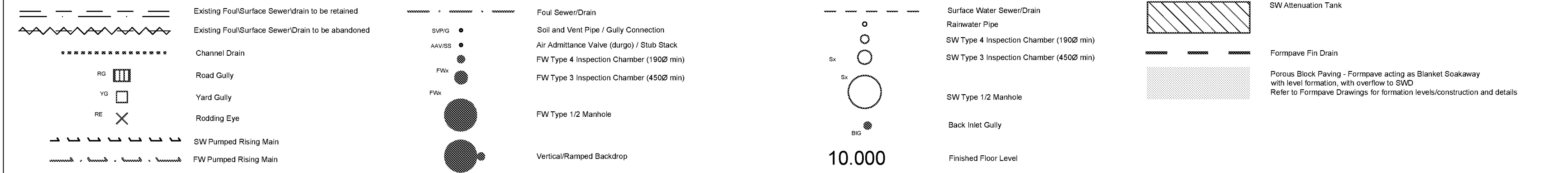
1088/DPA04

Land Adjacent 37 Hill Lane

revision 03



Legend (Scale 1:100)



NOTE THE FOLLOWING:

1. SW Attenuation
Refer to EGG Design & Details dated xxx
Dwg Ref: xxx
2. HRD Flow Control
Refer to HRD Quote and Spec dated xxx
3. Fompage Porous Paving
3.1. Refer to Fompage Design and Spec dated xxx

SW DRAINAGE DESIGN BASED ON:

- Assumed Soakaways not viable, but to be confirmed/determined through testing to BRE365 and ground water monitoring during winter months Dec-Feb following planning approval/permission, via planning condition.
 - Area Drained = 380m² (Roof = 225m², Parking = 120m², plus 10% urban creep)
 - SRP = 100m² + 40%CC
 - Flows restricted from site to 28l/s, using HRD Hydrokrake flow control, to existing land drainage ditch system, subject to OVC consents from LPA/LLFA
- FW DRAINAGE DESIGN BASED ON:
- Existing FW flows entering FWS = 0.045l/s Ex Dwelling No 37
 - FW peak Flow from 2No New & 1No Dwelling = 0.139l/s (SFA7)
 - This is an increase in FW flows to the FWS network of 0.094l/s (SFA7)

NOTES

1. This drawing is to be read in conjunction with drawing Nos. FC2781/01-25.
2. Existing on-site drainage is shown on drawing F02781/01.
3. All adopted drainage and connections to the sewer system are to be constructed in accordance with 'Sewers for Adoption' 8/7th Edition or as stipulated in the Southern Water Addendum.
4. Connections to the adopted drainage system are subject to the approval of Southern Water the Drainage Authority. Diverted, diverted, build close to sewer, and new sewers are subject to SW approval. All other drainage is to remain private.
5. All pipes to be adopted, or connecting to adopted sewers, and/or situated under highway to be verified clay to BS EN 295 & BS65 (SWs only), or Concrete pipes to BS EN 1916 & BS5911 Part 1, or Thermoplastic Structural wall sewer pipes to WIS 4-35-01 (class 8kN/m²) and be capable of withstanding 4000 PSI jetting pressure.
6. Cover levels shown are approximate. Covers and frames shall be set to finished ground levels and falls.
7. All drainage to be constructed to BS EN 752:1999 and subject to the approval of Building Control/LPA and the Environment Agency.
8. Gully and channel drain positions are liable to amendment when the design levels have been determined.
9. All downpipes are to be sealed, ie connected directly to the stormwater drain. Access points to be provided 1m above ground level for external RWPs and 1m above FFL for internal RWPs.
10. All below ground connects to accord with AGO site classification of AGO 4 tbc, as per Geotechnical Report.
11. Aco channel drain to be K100S with grade C250 Quicklock 'Hesguard' cast iron grating or equivalent, where adjacent to kerbing or within pedestrian areas. Elsewhere Aco channel drain to be Road Drain 100 Class F. All channel drain outlets to have oil traps.
12. The Contractor should construct works in accordance with the Local Authority specification for the works they are to undertake.
13. Road gully pipes are to be 150mm dia. with concrete surround and flexible joints. All other un-referenced pipes are assumed to be 100mm dia.
FW min gradient - 1 in 40 (100 dia) no WC's connected
FW min gradient - 1 in 80 (100 dia) min 1 WC connected
FW min gradient - 1 in 150 (150 dia) min 5WC's
SW min gradient - 1 in 100 (100/150 dia)
14. If any sub soil drainage systems are uncovered during the Works contact the Engineer for instructions. Generally sub soil drains affected are to be diverted around new Works and connected into the surface water drainage system. Pipe diameters and gradients are to be maintained.
15. Before commencing construction the Contractor must check the invert levels of existing sewers to which connections are made. In addition the Contractor must locate and determine invert levels of the existing spurs to which connections are proposed. Additional spur/manhole connections are to be agreed with the relevant adopting authority. Any discrepancies are to be notified to the Engineer immediately, prior to construction.
16. Road reinstatements are to be to the Highway Authority approval.
17. No private areas are to drain onto adoptable areas and vice versa.
18. All redundant drainage to be abandoned once the Contractor and Client have satisfied themselves that no connections remain live. Drains and sewers less than 1.5m deep which are in open ground should as far as is practicable be removed. Other pipes should be sealed at both ends and at any other point of connection and solidly filled at intervals not exceeding 25m with Class G3 or G4).

SUBJECT TO CONFIRMATION OF:
Proposed Ext Levels
RWP/SVP/ISS positions
Landscaping
ESS Design
HRD Flow Control
BRE365 Testing and GW monitoring in Dec to LPA approval

SUBJECT TO THE APPROVAL OF:
LPA/LLFA
BUILDING CONTROL/NHBC

For PLANNING ONLY

REV	DESCRIPTION	DATE
A	Issued For BUDGET/APPROVAL ONLY	31/10/18
B	Issued For BUDGET/APPROVAL ONLY	16/10/18

ABMH Civils Ltd
1 The Grove, Felpham, Bognor Regis, West Sussex PO22 7EY
Mark Mob: 07781 950000
Email: mark@abmh.co.uk / Web: www.abmh.co.uk

PROJECT	37 HILL LANE, BARNHAM BOGNOR REGIS, WEST SUSSEX PO22 0BL
DRAWING	PROPOSED DRAFT SW DRAINAGE LAYOUT
SCALE	1:100
DATE	OCT 18
INITIAL	MH
CHNG	-
REV	A

This drawing is produced using AutoCAD. Only written dimensions are to be respected.
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Removal of this title block also removes all warranties and liabilities copyright.

Calculated by: Mark Hobbs

Site name: Hill Lane

Site location: 37 Hill Lane

Site coordinates

Latitude: 50.82549° N

Longitude: 0.63783° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", WS-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6450666

Date: 2018-10-20T14:24:12

Methodology	IH124
-------------	-------

Site characteristics

Total site area (ha)	18
----------------------	----

Methodology

Qbar estimation method	Calculate from SPR and SAAR	
SPR estimation method	Calculate from SOIL type	
	Default	Edited
SOIL type	2	2
HOST class	---	---
SPR/SPRHOST	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm)	741	741
Hydrological region	7	7
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Notes:

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

Normally limiting discharge rates which are less than 2.0 l/s/ha are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consents are usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	0.35	0.35
1 in 1 year (l/s)	0.3	0.3
1 in 30 years (l/s)	0.81	0.81
1 in 100 years (l/s)	1.12	1.12

ABMH		Page 1																										
1 The Grove Felpham West Sussex PO22 7EY	37 Hill Lane Greenfield Volume Runoff																											
Date 20/10/2018 14:46 File	Designed by MH Checked by																											
Micro Drainage Source Control 2017.1.2																												
<u>Greenfield Runoff Volume</u> FSR Data <table> <tr> <td>Return Period (years)</td> <td>100</td> </tr> <tr> <td>Storm Duration (mins)</td> <td>360</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.300</td> </tr> <tr> <td>Ratio R</td> <td>0.336</td> </tr> <tr> <td>Areal Reduction Factor</td> <td>1.00</td> </tr> <tr> <td>Area (ha)</td> <td>0.180</td> </tr> <tr> <td>SAAR (mm)</td> <td>766</td> </tr> <tr> <td>CWI</td> <td>113.516</td> </tr> <tr> <td>Urban</td> <td>0.000</td> </tr> <tr> <td>SPR</td> <td>37.000</td> </tr> </table> Results <table> <tr> <td>Percentage Runoff (%)</td> <td>38.40</td> </tr> <tr> <td>Greenfield Runoff Volume (m³)</td> <td>44.863</td> </tr> </table>			Return Period (years)	100	Storm Duration (mins)	360	Region	England and Wales	M5-60 (mm)	19.300	Ratio R	0.336	Areal Reduction Factor	1.00	Area (ha)	0.180	SAAR (mm)	766	CWI	113.516	Urban	0.000	SPR	37.000	Percentage Runoff (%)	38.40	Greenfield Runoff Volume (m³)	44.863
Return Period (years)	100																											
Storm Duration (mins)	360																											
Region	England and Wales																											
M5-60 (mm)	19.300																											
Ratio R	0.336																											
Areal Reduction Factor	1.00																											
Area (ha)	0.180																											
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CWI	113.516																											
Urban	0.000																											
SPR	37.000																											
Percentage Runoff (%)	38.40																											
Greenfield Runoff Volume (m³)	44.863																											
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ABMH		Page 1			
1 The Grove Felpham West Sussex PO22 7EY	37 Hill Lane SW Design				
Date 19/10/2018 18:49 File	Designed by MH Checked by				
Micro Drainage					
Source Control 2017.1.2					
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	6.902	0.252	2.0	7.0	O K
30 min Summer	6.963	0.313	2.0	8.8	O K
60 min Summer	6.988	0.338	2.0	9.5	O K
120 min Summer	6.980	0.330	2.0	9.2	O K
180 min Summer	6.957	0.307	2.0	8.6	O K
240 min Summer	6.923	0.273	2.0	7.6	O K
360 min Summer	6.859	0.209	2.0	5.8	O K
480 min Summer	6.804	0.154	2.0	4.3	O K
600 min Summer	6.759	0.109	2.0	3.0	O K
720 min Summer	6.725	0.075	2.0	2.1	O K
960 min Summer	6.683	0.033	1.9	0.9	O K
1440 min Summer	6.656	0.006	1.6	0.2	O K
2160 min Summer	6.650	0.000	1.2	0.0	O K
2880 min Summer	6.650	0.000	1.0	0.0	O K
4320 min Summer	6.650	0.000	0.7	0.0	O K
5760 min Summer	6.650	0.000	0.6	0.0	O K
7200 min Summer	6.650	0.000	0.5	0.0	O K
8640 min Summer	6.650	0.000	0.4	0.0	O K
10080 min Summer	6.650	0.000	0.4	0.0	O K
15 min Winter	6.941	0.291	2.0	8.2	O K
30 min Winter	7.015	0.365	2.0	10.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	124.866	0.0	8.8	17	
30 min Summer	84.554	0.0	12.0	31	
60 min Summer	54.663	0.0	15.6	52	
120 min Summer	34.089	0.0	19.5	86	
180 min Summer	25.450	0.0	21.7	122	
240 min Summer	20.520	0.0	23.4	154	
360 min Summer	15.162	0.0	26.0	218	
480 min Summer	12.213	0.0	27.8	280	
600 min Summer	10.318	0.0	29.4	338	
720 min Summer	8.984	0.0	30.7	392	
960 min Summer	7.215	0.0	32.9	502	
1440 min Summer	5.285	0.0	36.1	736	
2160 min Summer	3.862	0.0	39.6	0	
2880 min Summer	3.088	0.0	42.2	0	
4320 min Summer	2.247	0.0	46.1	0	
5760 min Summer	1.792	0.0	49.0	0	
7200 min Summer	1.505	0.0	51.5	0	
8640 min Summer	1.305	0.0	53.6	0	
10080 min Summer	1.157	0.0	55.4	0	
15 min Winter	124.866	0.0	9.9	17	
30 min Winter	84.554	0.0	13.5	31	
©1982-2017 XP Solutions					

ABMH		Page 2			
1 The Grove Felpham West Sussex PO22 7EY	37 Hill Lane SW Design				
Date 19/10/2018 18:49 File	Designed by MH Checked by				
Micro Drainage					
Source Control 2017.1.2					
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	7.050	0.400	2.0	11.2	O K
120 min Winter	7.033	0.383	2.0	10.7	O K
180 min Winter	6.996	0.346	2.0	9.7	O K
240 min Winter	6.947	0.297	2.0	8.3	O K
360 min Winter	6.842	0.192	2.0	5.4	O K
480 min Winter	6.761	0.111	2.0	3.1	O K
600 min Winter	6.706	0.056	2.0	1.6	O K
720 min Winter	6.675	0.025	1.9	0.7	O K
960 min Winter	6.656	0.006	1.6	0.2	O K
1440 min Winter	6.650	0.000	1.2	0.0	O K
2160 min Winter	6.650	0.000	0.9	0.0	O K
2880 min Winter	6.650	0.000	0.7	0.0	O K
4320 min Winter	6.650	0.000	0.5	0.0	O K
5760 min Winter	6.650	0.000	0.4	0.0	O K
7200 min Winter	6.650	0.000	0.3	0.0	O K
8640 min Winter	6.650	0.000	0.3	0.0	O K
10080 min Winter	6.650	0.000	0.3	0.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
60 min Winter	54.663	0.0	17.5	58	
120 min Winter	34.089	0.0	21.7	92	
180 min Winter	25.450	0.0	24.4	132	
240 min Winter	20.520	0.0	26.2	170	
360 min Winter	15.162	0.0	29.0	232	
480 min Winter	12.213	0.0	31.2	290	
600 min Winter	10.318	0.0	32.9	340	
720 min Winter	8.984	0.0	34.4	384	
960 min Winter	7.215	0.0	36.8	500	
1440 min Winter	5.285	0.0	40.5	0	
2160 min Winter	3.862	0.0	44.4	0	
2880 min Winter	3.088	0.0	47.3	0	
4320 min Winter	2.247	0.0	51.7	0	
5760 min Winter	1.792	0.0	54.9	0	
7200 min Winter	1.505	0.0	57.6	0	
8640 min Winter	1.305	0.0	60.0	0	
10080 min Winter	1.157	0.0	62.0	0	
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ABMH		Page 3
1 The Grove Felpham West Sussex PO22 7EY	37 Hill Lane SW Design	
Date 19/10/2018 18:49 File	Designed by MH Checked by	
Micro Drainage Source Control 2017.1.2		

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.335	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.038

Time (mins)	Area
From:	To: (ha)
0	4 0.038

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Model Details

Storage is Online Cover Level (m) 7.670

Tank or Pond Structure

Invert Level (m) 6.650

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	28.0	2.800	0.0	5.600	0.0	8.400	0.0
0.400	28.0	3.200	0.0	6.000	0.0	8.800	0.0
0.401	0.0	3.600	0.0	6.400	0.0	9.200	0.0
1.200	0.0	4.000	0.0	6.800	0.0	9.600	0.0
1.600	0.0	4.400	0.0	7.200	0.0	10.000	0.0
2.000	0.0	4.800	0.0	7.600	0.0		
2.400	0.0	5.200	0.0	8.000	0.0		

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0074-2000-0530-2000

Design Head (m) 0.530

Design Flow (l/s) 2.0

Flush-Flo™ Calculated

Objective Minimise upstream storage

Application Surface

Sump Available Yes

Diameter (mm) 74

Invert Level (m) 6.580

Minimum Outlet Pipe Diameter (mm) 100

Suggested Manhole Diameter (mm) 1200

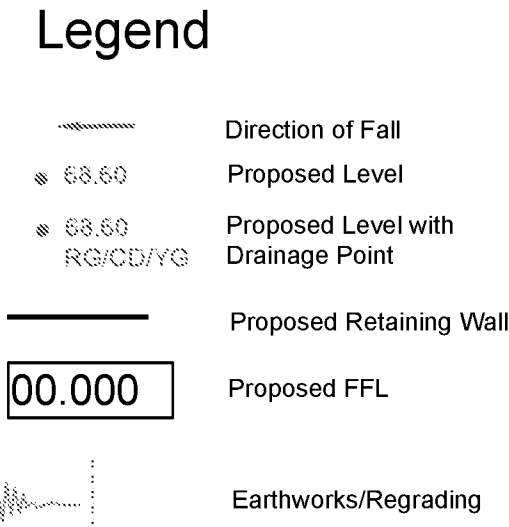
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.530	2.0
Flush-Flo™	0.157	2.0
Kick-Flo®	0.359	1.7
Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.9	3.000	4.4	7.000	6.6
0.200	2.0	1.400	3.1	3.500	4.8	7.500	6.9
0.300	1.9	1.600	3.3	4.000	5.1	8.000	7.1
0.400	1.8	1.800	3.5	4.500	5.4	8.500	7.3
0.500	1.9	2.000	3.7	5.000	5.6	9.000	7.5
0.600	2.1	2.200	3.8	5.500	5.9	9.500	7.8
0.800	2.4	2.400	4.0	6.000	6.2		
1.000	2.7	2.600	4.2	6.500	6.4		

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1. This drawing is to be read in conjunction with drawing Nos. FC2781/01-25.



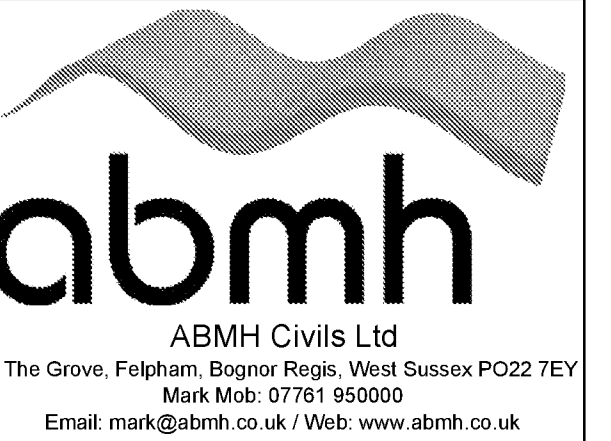
HB2	PCC Half Battered Kerb to match existing heights
BN	PCC Bullnosed Kerb with 50mm upstand
DK	Dropped Kerb (PCC Bullnosed Kerb/Block Key Kerb) with 0-6mm upstand for pedestrian areas and 25mm for vehicular crossings. Dropper kerbs to be laid either side
EF	PCC Edging
KK	PCC Block Key Kerb (50 denotes upstand)

SHARED DRIVE - Porous Construction
Crushed Limestone Chippings within Cellweb Construction
TBC by Architect/Client

CAR PARKING
Porous Block Paving - Formpave
TBC by Architect/Client

VEHICLE CROSSOVER
TARMAC Construction to WSCC Details
TBC by Client/Architect

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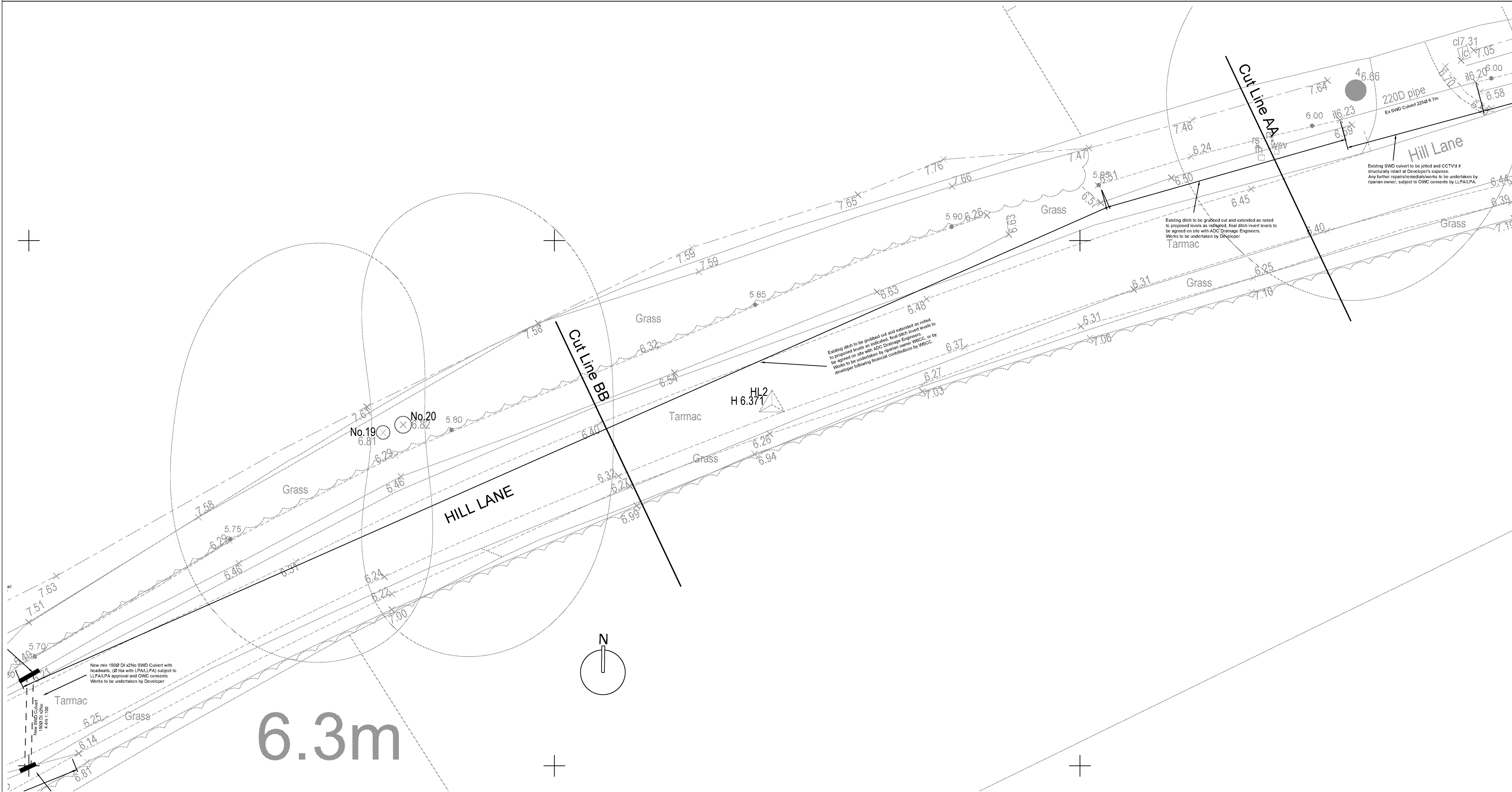
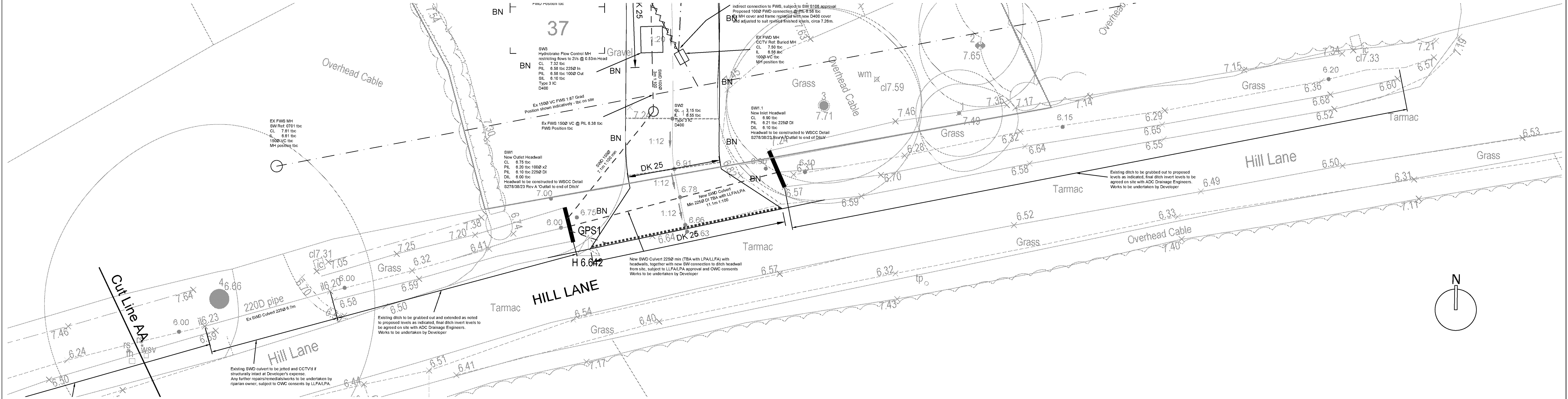


RESIDENTIAL DEVELOPMENT
37 HILL LANE, BARNHAM
BOGNOR REGIS, WEST SUSSEX
PO22 0BL

PROPOSED DRAFT EXTERNAL LEVELS & CONSTRUCTION FINISHES

FC2781/05					REV	A
Varies	DATE	OCT 18	INITIAL	MH	CHKD	-

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- This drawing is to be read in conjunction with drawing Nos. FC2781/01-25.
 - Existing on-site drainage is shown on drawing FC2781/01-25.
 - Refer to drawing FC2781/02 for notes and legend.

SUBJECT TO CONFIRMATION OF:
Proposed Easement Levels
RWP/SP/ISS positions
Landscaping
ESS Design
HRD Flow Control
BRE365 Testing and GW monitoring in Dec to LPA approval

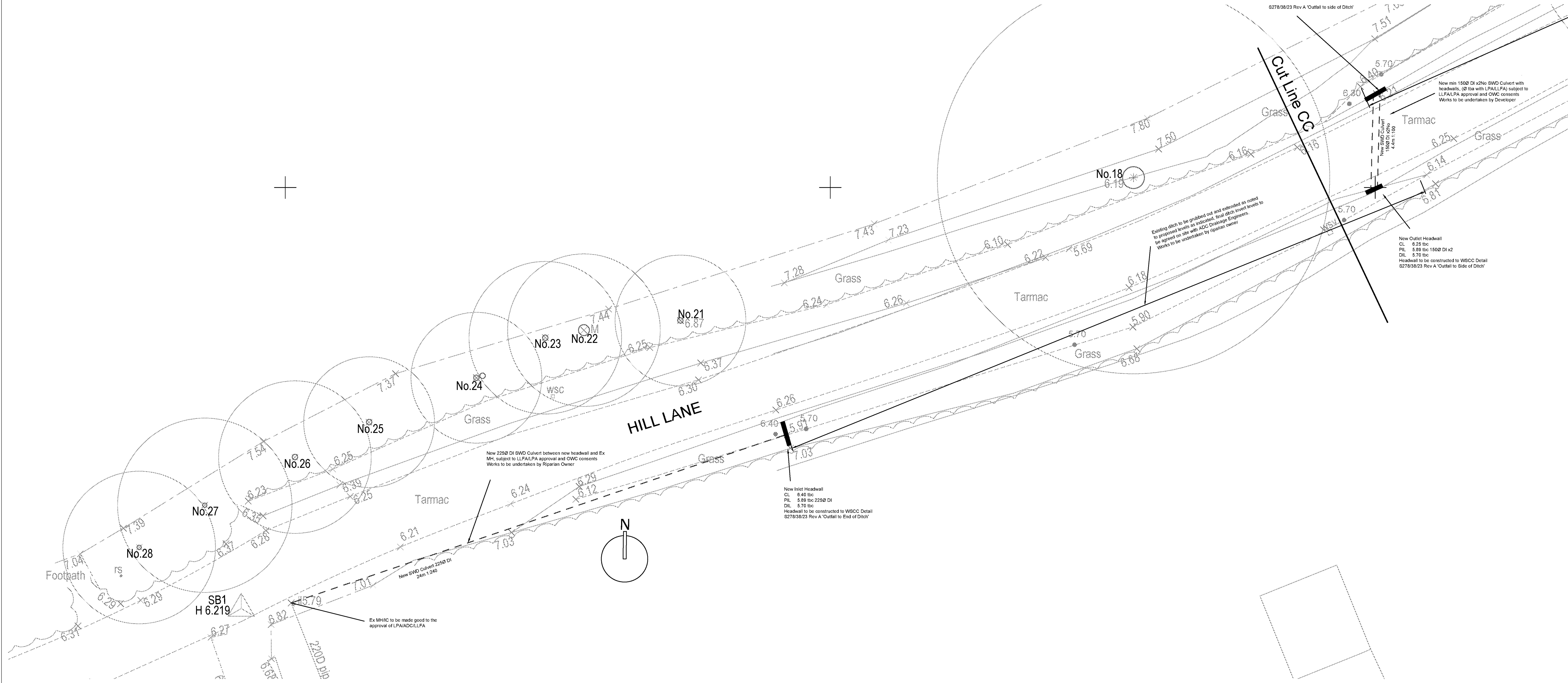
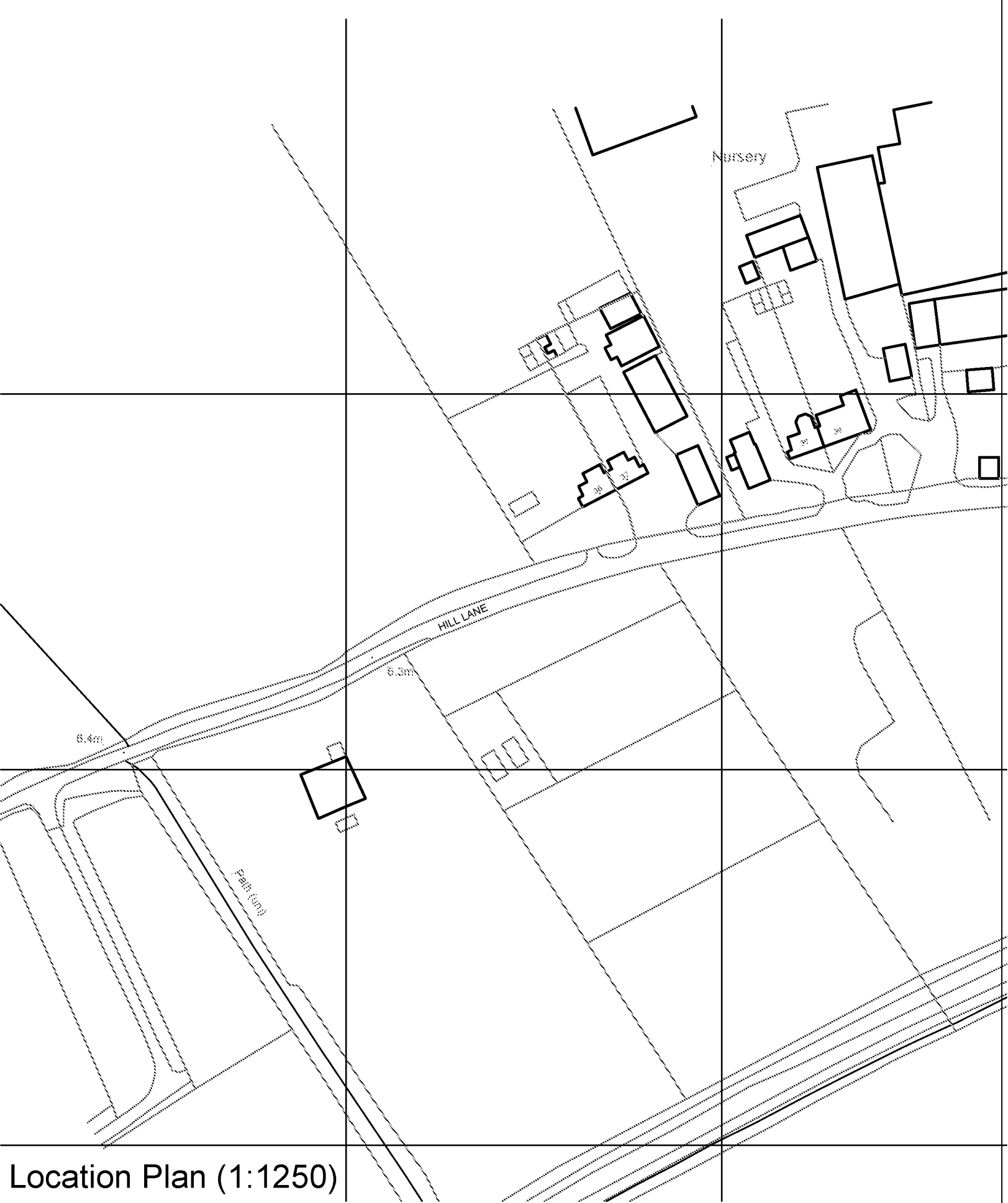
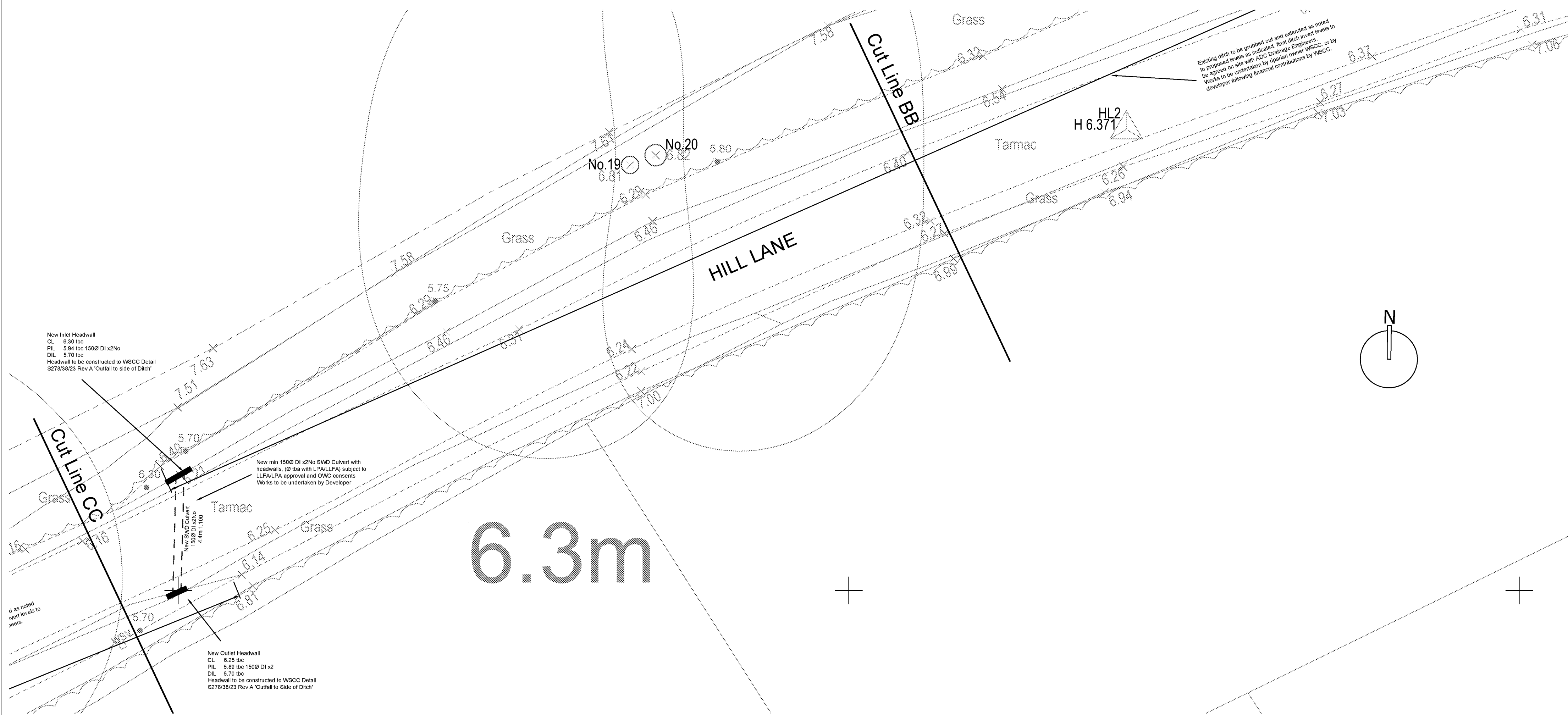
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PROJECT	37 HILL LANE, BARNHAM BOGNOR REGIS, WEST SUSSEX PO22 0BL
DRAWING	PROPOSED DRAFT SW DRAINAGE LAYOUT Sheet 1 of 2 OFF SITE WORKS
SCALE	1:100
DATE	OCT 18
INITIAL	MH
REV	A
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- Existing on-site drainage is shown on drawing FC2781/01-25.
- Refer to drawing FC2781/02 for notes and legend.

SUBJECT TO CONFIRMATION OF:
Proposed Ext Levels
RWP/SVP/SS positions
Landscaping
ESS Design
HRD Flow Control
BRE365 Testing and GW monitoring in Dec to LPA approval

SUBJECT TO THE APPROVAL OF:
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REV	DESCRIPTION	DATE

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PROJECT	RESIDENTIAL DEVELOPMENT 37 HILL LANE, BARNHAM BOGNOR REGIS, WEST SUSSEX PO22 0BL		
DRAWING	PROPOSED DRAFT SW DRAINAGE LAYOUT Sheet 2 of 2 OFF SITE WORKS		
SCALE	1:100	DATE	OCT 18
REV	INITIAL	MH	CHNG
FC2781/04			A

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