

Cross Section (4)

See Supplementa
TQ6389SW
for Cross-Section

Cross Section (8)

See Supplementa
TQ6389SW
for Cross-Section

Cross Section (16)

See Supplementa
TQ6389SW
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Cross Section (7)

See Supplementa
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Cross Section (3)

See Supplementa
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Cross Section (10)

See Supplementa
TQ6389SW
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Cross Section (15)

See Supplementa
TQ6389SW
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Cross Section (14)

See Supplementa
TQ6389SW
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Cross Section (13)

See Supplementa
TQ6389SW
for Cross-Section

Cross Section (1)

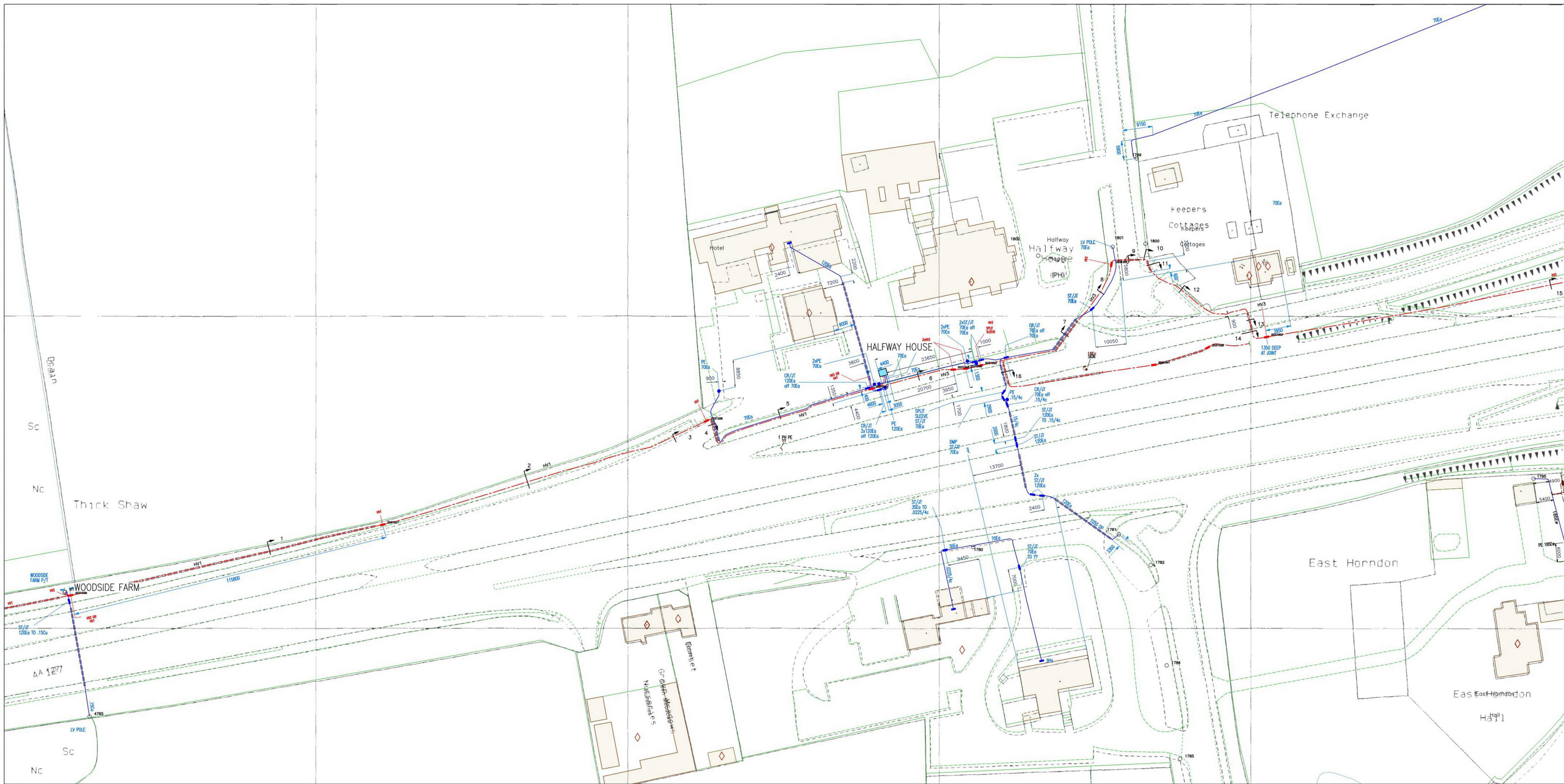
See Supplementa
TQ6389SW
for Cross-Section

Cross Section (2)

See Supplementa
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Cross Section (9)

See Supplementa
TQ6389SW
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Plotted On : 10/11/2016

Plotted By : Martin Johnson

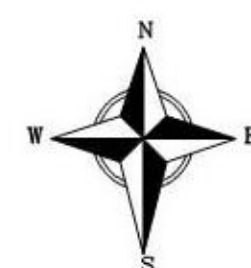
Plot Description: LAND OFF TILBURY ROAD, WEST HORNDON, BRENTWOOD CM13 3LJ

2016/2237717/ug_mains

Map Centre : TQ6389SW



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For details of the symbology please refer to <http://www.ukpowernetworks.co.uk/safety-emergencies/in-the-workplace/understanding-safety-symbols.shtml>

PRIMARY CABLES
EXTRA HIGH VOLTAGE CABLES (EHV) 22,000 TO 132,000 Volts

Depth normally 750mm cover in carriageway & 600mm cover in footway.

Before digging within one metre of these cable routes Telephone 0800 056 5866 in order that the Company's apparatus may be located on site and any necessary protection works agreed.

N.B. THRUST BORERS OR MOLES MUST NOT BE USED WITHIN THE VICINITY OF ANY CABLES BELONGING TO UK POWER NETWORKS WITHOUT FIRST CONTACTING THIS COMPANY.

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3. It is essential that trial holes are carefully made avoiding the use of mechanical tools or picks until the exact location of all cables have been determined.
4. It must be assumed that there is a service cable into each property, lamp column and street sign, etc.
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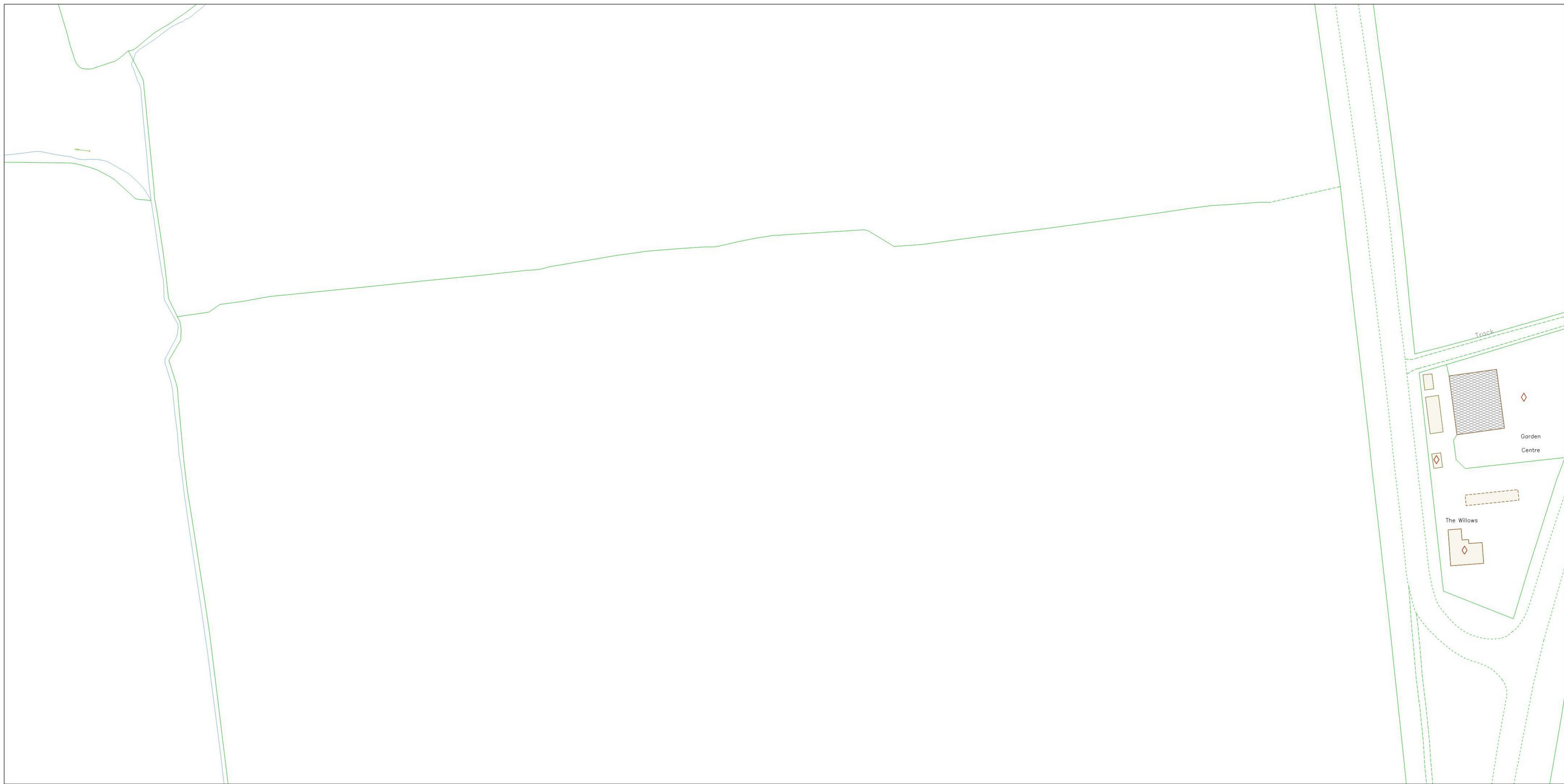
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EMERGENCY – If you damage a cable or line
Phone 0800 780 0780 (24hrs) URGENTLY

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Plot Description: LAND OFF TILBURY ROAD, WEST HORNDON,
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2016/2237717/ug_mains

Map Centre : TQ6388NW



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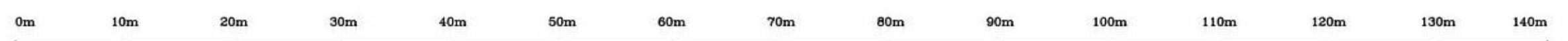
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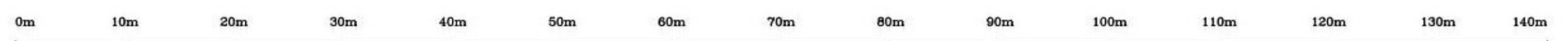
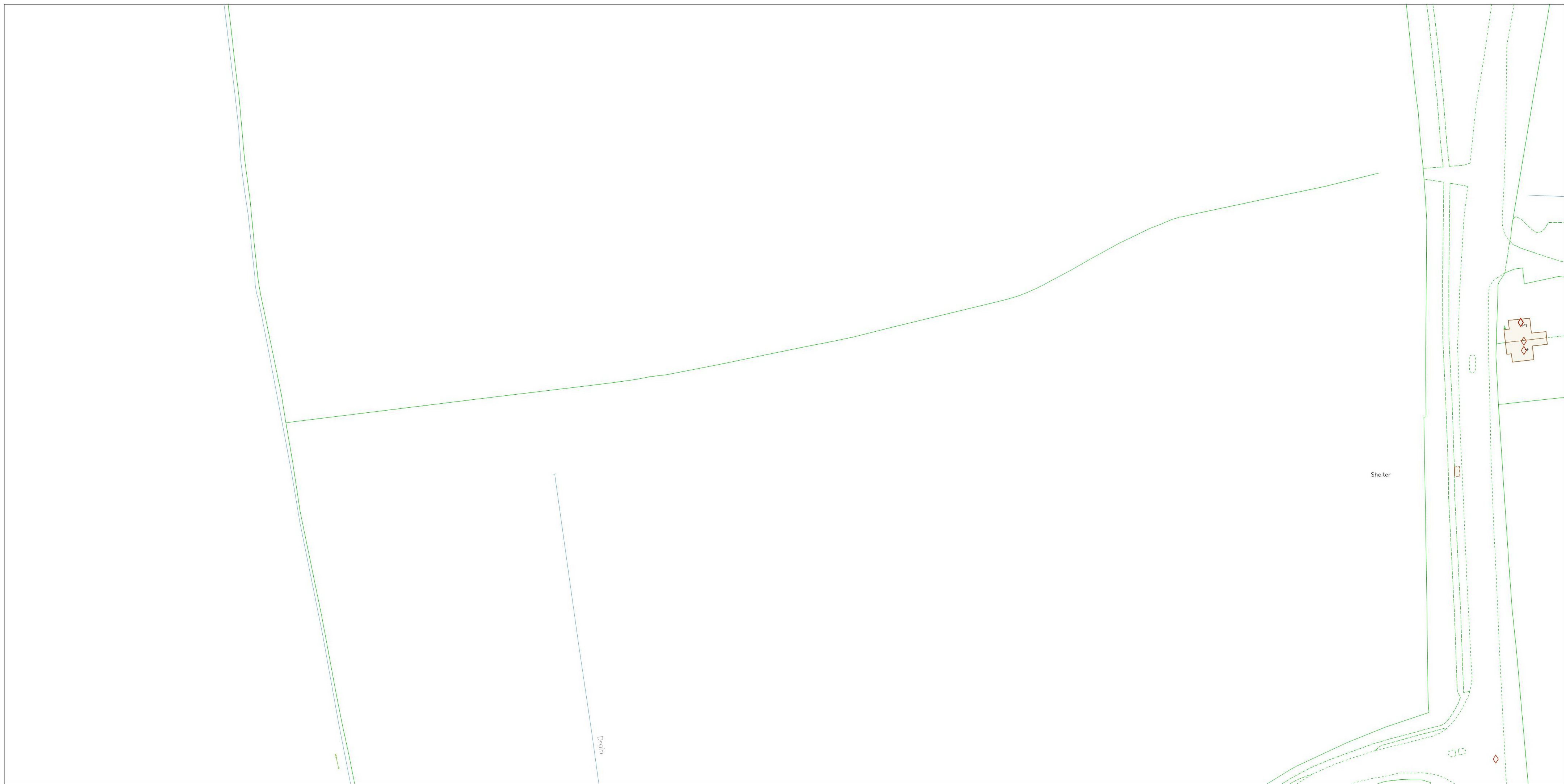
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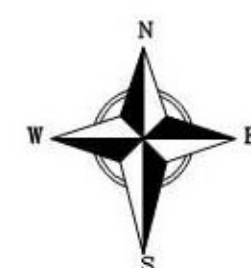
Plot Description: LAND OFF TILBURY ROAD, WEST HORNDON, BRENTWOOD CM13 3LJ

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Map Centre : TQ6388NW



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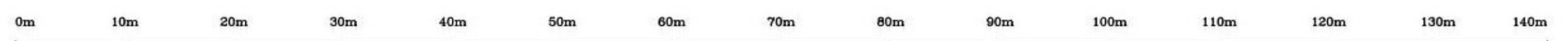
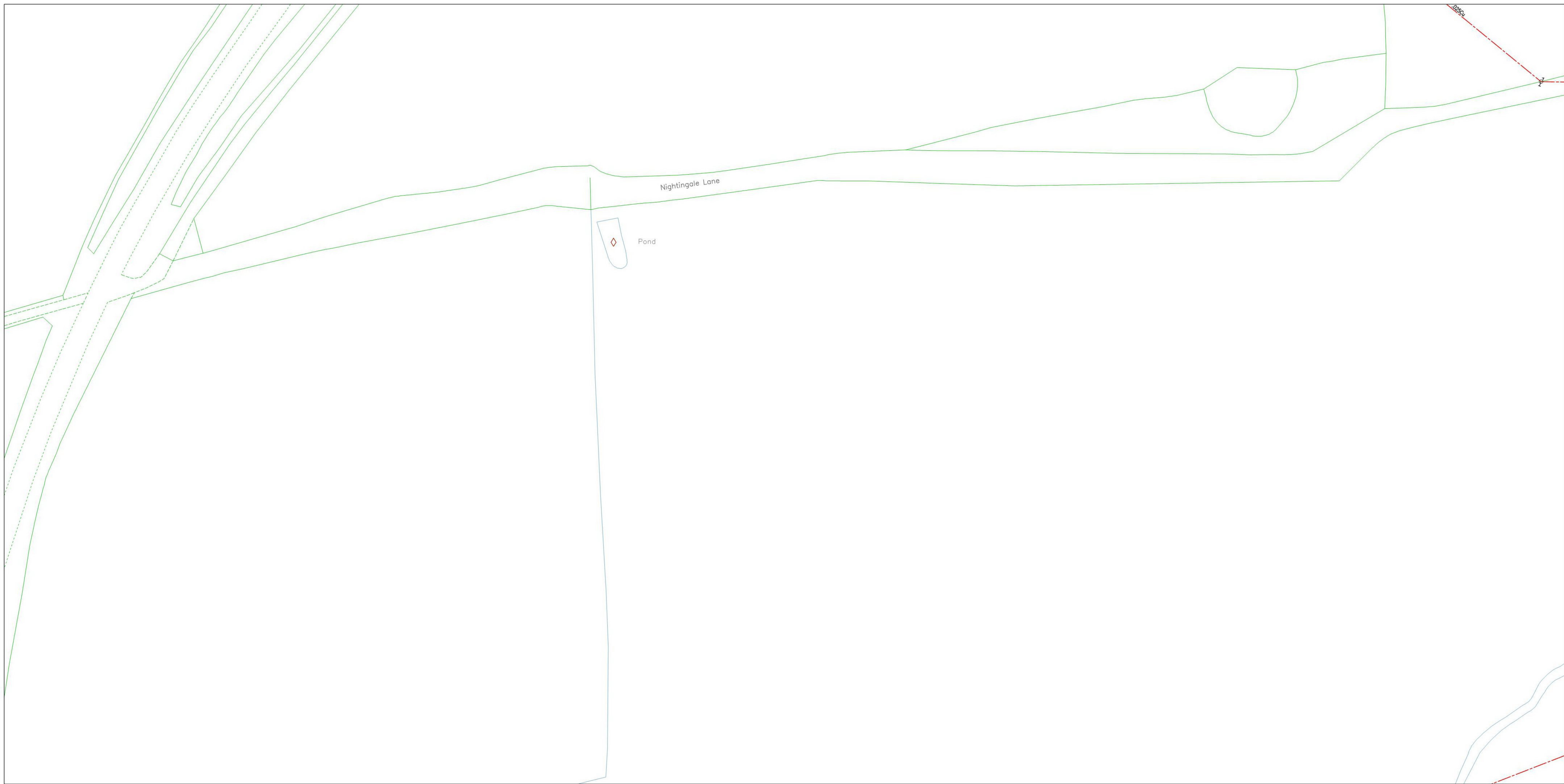
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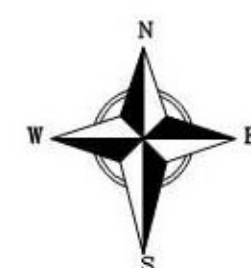
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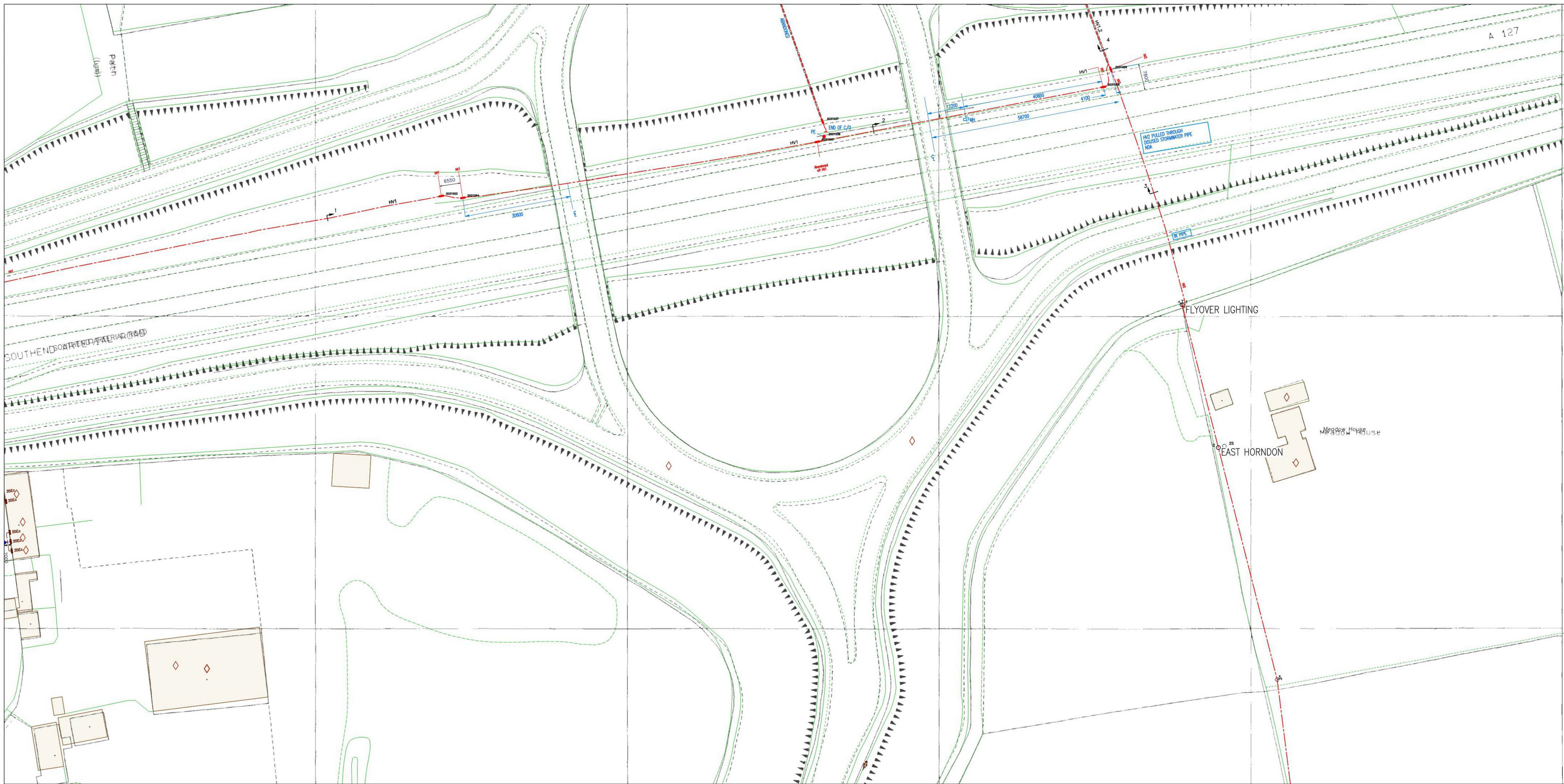
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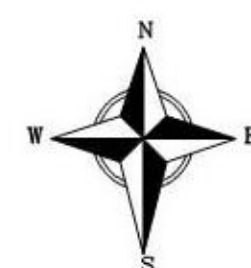
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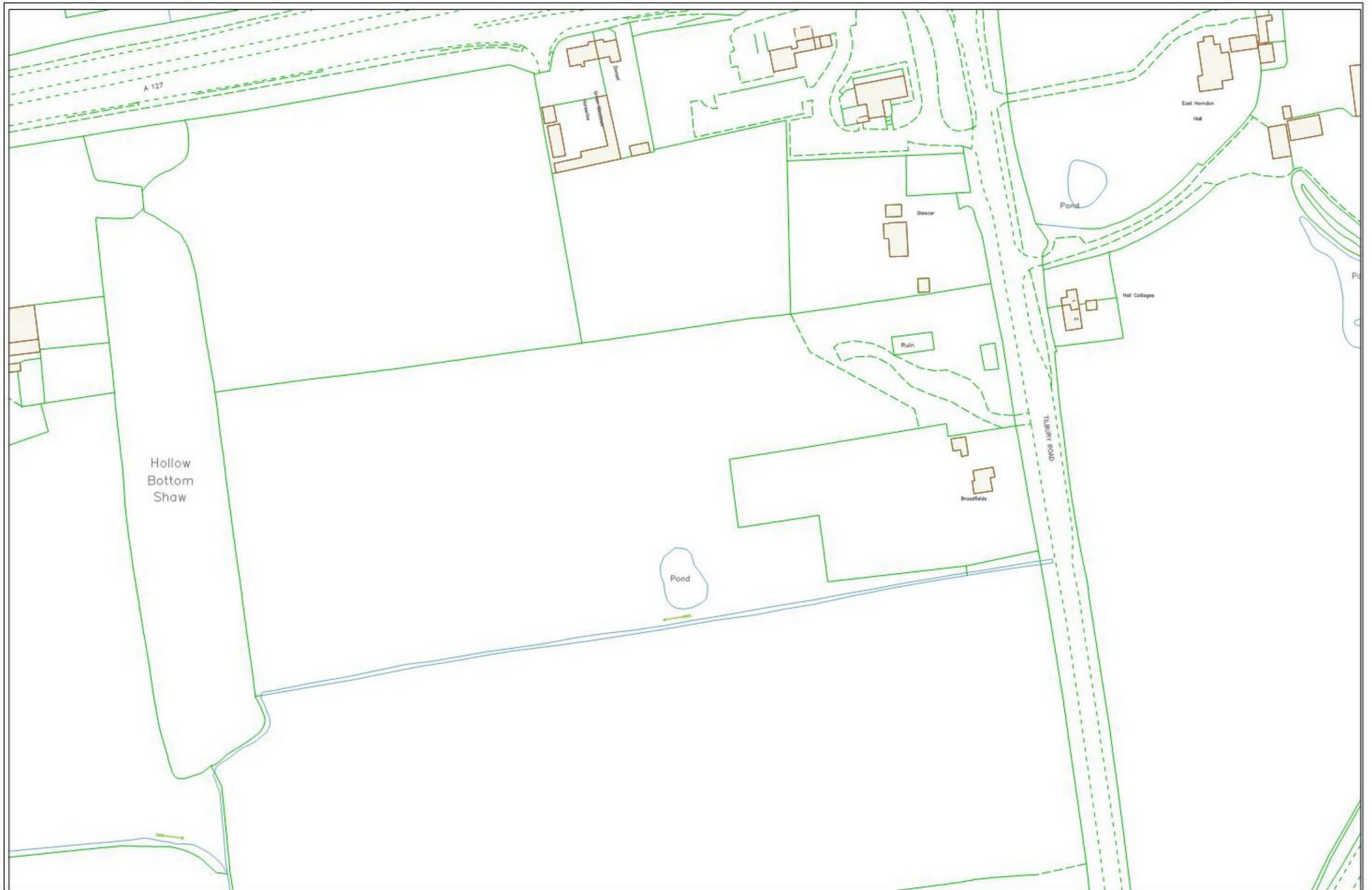
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EMERGENCY – If you damage a cable or line
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These basic safety precautions are explained in detail in the HSE booklet, HS(G)47 – Avoiding Danger from Underground Services, a copy of which may be obtained from your supervisor or HMSO.

Please be aware that electric lines belonging to other owners of licensed electricity distribution systems may be present and it is your responsibility to identify their location.





Plotted On : 10/11/2016

Plotted By : Martin Johnson

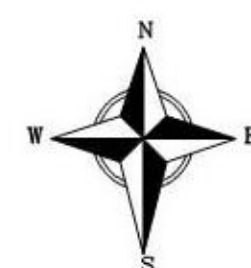
Plot Description: LAND OFF TILBURY ROAD, WEST HORNDON, BRENTWOOD CM13 3LJ

2016/2237717/ug_mains

Map Centre : TQ6389SW



UK Power Networks
Plan Provision
Fore Hamlet
IPSWICH
Suffolk
IP3 8AA
Tel 0800 0565 866
Fax 08701 963782



For details of the symbology please refer to <http://www.ukpowernetworks.co.uk/safety-emergencies/in-the-workplace/understanding-safety-symbols.shtml>

PRIMARY CABLES
EXTRA HIGH VOLTAGE CABLES (EHV) 22,000 TO 132,000 Volts

Depth normally 750mm cover in carriageway & 600mm cover in footway.
Before digging within one metre of these cable routes
Telephone 0800 056 5866 in order that the Company's apparatus may be located on site and any necessary protection works agreed.

N.B. THRUST BORERS OR MOLES MUST NOT BE USED WITHIN THE VICINITY OF ANY CABLES BELONGING TO UK POWER NETWORKS WITHOUT FIRST CONTACTING THIS COMPANY.

1. The position of the apparatus shown on this drawing is believed to be correct but the original landmarks may have been altered since the apparatus was installed.
2. The exact position of the apparatus should be verified – use approved cable avoidance tools prior to excavation using suitable hand tools.
3. It is essential that trial holes are carefully made avoiding the use of mechanical tools or picks until the exact location of all cables have been determined.
4. It must be assumed that there is a service cable into each property, lamp column and street sign, etc.
5. All cables must be treated as being live unless proved otherwise by UK Power Networks.
6. The information provided must be given to all people working near UK Power Networks' plant & equipment. Do not use plans more than 3 months after the issue date for excavation purposes.
7. Please be aware that electric cables/lines belonging to other owners of licensed electricity distribution systems may be present and it is your responsibility to identify their location.

1. UK Power Networks Ltd does not warrant that the information provided to you is correct. You rely upon it at your own risk.
2. UK Power Networks Ltd does not exclude or limit its liability if it causes the death of a person or causes personal injury to a person where such death or personal injury is caused by its negligence.
3. Subject to paragraph 2, UK Power Networks Ltd has no liability to you in contract, in tort (including negligence), for breach of statutory duty or otherwise howsoever for any loss, damage, costs, claims, demands or expenses that you or any third party may suffer or incur as a result of using the information provided whether for physical damage to property or for any economic loss (including without limitation loss of profit, loss of opportunity, loss of savings, loss of goodwill, loss of business, loss of use) or any special or consequential loss or damage whatsoever.

Reproduced by permission of Ordnance Survey on behalf of HMSO. (c) Crown copyright and database right 2016. All rights reserved. Ordnance Survey Licence number 100019626. Data has been added to the Ordnance Survey base map; all proprietary rights in such additional data are and shall remain the exclusive property of (c) Eastern Power Networks plc or London Power Networks plc each being a distribution licensee under section 6(1)(c) of the Electricity Act 1989 for the relevant distribution services area as that term is defined in such licensee's distribution licence. All rights in such data reserved.

ADVICE TO CONTRACTORS ON AVOIDING DANGER FROM BURIED ELECTRICITY CABLES.

- 1) Do have cable drawings with you on site and check them before you start the excavation.
- 2) Do have a cable locator tool on site and use it to help you.
- 3) Mark out the location of electricity cables.
- 4) Do not use a mechanical excavator within 0.5m of electricity cables.
- 5) Use spades and shovels in preference to other tools.
- 6) Never disturb electricity cables and joints or their protective covers.

IF IN DOUBT – ASK! PHONE 0800 056 5866
EMERGENCY – If you damage a cable or line
Phone 0800 780 0780 (24hrs) URGENTLY

These basic safety precautions are explained in detail in the HSE booklet, HS(G)47 – Avoiding Danger from Underground Services, a copy of which may be obtained from your supervisor or HMSO.

Please be aware that electric lines belonging to other owners of licensed electricity distribution systems may be present and it is your responsibility to identify their location.

Utilities Report



Affected Utilities

Vodafone

Please accept this email as confirmation that Vodafone: Fixed **does** have apparatus within the vicinity of your proposed works.

Please see attached network information.

Note: Only affected parts are printed and our network is not present in the remaining areas of your proposed works.

IMPORTANT - PLEASE READ = Your Next Step?:

Where apparatus is affected and requires diversion, please send all the scheme related proposals that affects the Vodafone Network to c3requests@vodafone.com with a request for a 'C3 Budget Estimate'. Please ensure you include a plan showing proposed works. (A location plan is insufficient for Vodafone to provide a costing). These estimates will be provided by Vodafone directly, normally within 20 working days from receipt of your request. Please include proof of this C2 response when requesting a C3 (using the 'forward' option). Diversionary works may be necessary if the existing line of the highway/railway or its levels are altered.

Kind regards

Plant Enquiries Team

T: 01454 662881

E: osm.enquiries@atkinsglobal.com

ATKINS working on behalf of Vodafone: Fixed



This response is made only in respect to electronic communications apparatus forming part of the Vodafone: Fixed electronic communications network formerly being part of the electronic communications networks of Cable & Wireless UK, Energis Communications Limited, Thus Group Holdings Plc and Your Communications Limited.

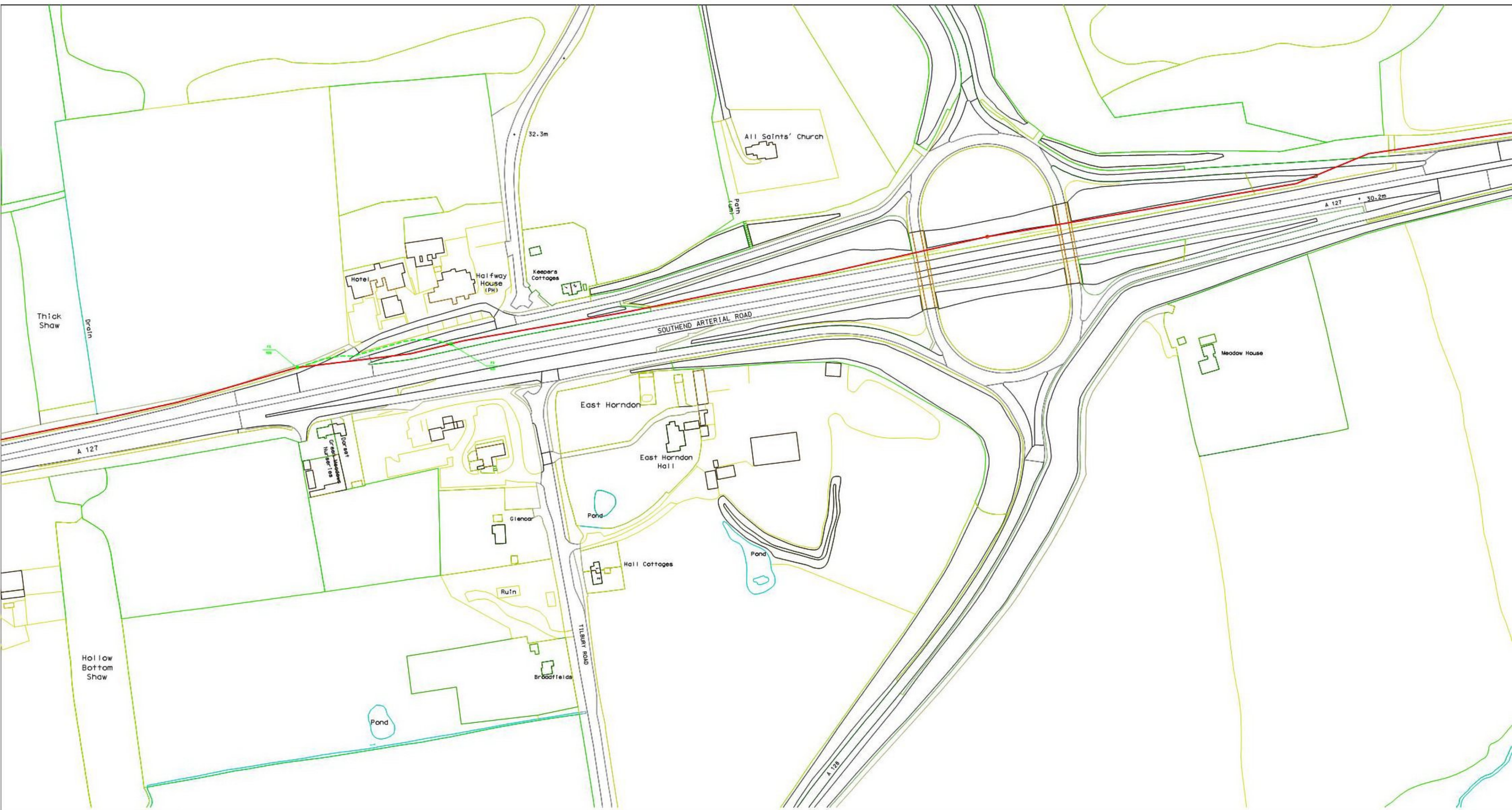
PLEASE NOTE: The information given is indicative only. No warranty is made as to its accuracy. This information must not be solely relied upon in the event of excavation or other works carried out in the vicinity of Vodafone plant. No liability of any kind whatsoever is accepted by Vodafone, its servants, or agents, for any error or omission in respect of information contained on this information. The actual position of underground services must be verified and established on site before any mechanical plant is used. Authorities and contractors will be held liable for the full cost of repairs to Vodafone's apparatus and all claims made against them by Third parties as a result of any interference or damage.












Please consider the environment before printing this e-mail

From: atkinsstatutory.enquiries@atkinsglobal.com [mailto:atkinsstatutory.enquiries@atkinsglobal.com]

Sent: 08 November 2016 09:47



Vodafone Network Colour:

	Ex•Cable&Wireless UK Network (now Vodafone)
	Planned & Approved Route
	Planned Route – Awaiting Approval
	Other Licensed Operator (OLO)
	Ex•Thus Network (now Vodafone)
	Ex•Energis Network (now Vodafone)
	OLO
Other:	
	Overhead Electricity Line (non Vodafone)
	Network Rail

Other Licensed Operator (OLO)

= Ex•Cable&Wireless UK, Energis and Thus fibre•optic cable within an OLO duct. Please contact all other operators for further details of their apparatus within that area.

Fibre Services

Special Requirements relating to the External Plant Network of Vodafone

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1. Introduction

This document sets out the procedure that will apply when Other Parties intend or are undertaking works in the vicinity of Vodafone apparatus.

2. Purpose of document

This document provides a means by which the Vodafone specific special requirements relating to their apparatus, regardless of it being situated in the public highway / road, private street, land or any other areas, is made aware to Other Parties.



3. Scope

This document will be presented to Other Parties or Contractors to encourage those undertaking works within the vicinity of Vodafone apparatus to refer to and comply with. This is in order to protect where necessary the Vodafone apparatus and to avoid damage to the apparatus and loss of service.

A National Joint Utilities Group (NJUG) document NJUG 9 titled "Recommendations for the Exchange of Records of Apparatus between Utilities" provides useful reference material.

It should be noted that, where appropriate, additional information on avoiding danger from underground apparatus is contained within the HSG47 guidance book titled "Avoiding Danger from Underground Services."

4. Vodafone Network and Apparatus

Damage to Vodafone apparatus is extremely disruptive and can be expensive to repair, especially where long lengths of cable have to be replaced.

In order to maintain the network integrity and minimise disruption to service, it is essential that disturbances are absolutely minimal. When working within the vicinity of Vodafone apparatus, extreme care is necessary in order to avoid costly repairs. The Other Parties / Contractor shall make every effort to ensure that disturbance of Vodafone apparatus is no more than is absolutely necessary for the completion of the works in accordance with their contract.

5. Plant records

It is the responsibility of the Other Parties undertaking works which may affect Vodafone apparatus to obtain all relevant Vodafone plant records from our agent Atkins Global prior to works commencing. This may be done by contacting the Atkins Global Plant Enquiries Team listed in Appendix B.

Plant records for such enquiries will generally be provided within 10 working days of receipt and in compliance with the New Roads and Street Works Act 1991 [NRSWA] requirements. If Vodafone plant is affected, the response will contain reference to this document. Other Parties and Contractors are advised to refer to the National Joint Utilities Group [NJUG] 9 Document which outlines recommendations for the exchange of records of apparatus between utilities.

6. Definitions

The following definitions are applicable in this document:

- a) **Apparatus** means all electronic communications apparatus above surface, at the surface or sub-surface apparatus, Cable, Jointing Chamber and plant formerly being apparatus owned or used by the Code Operators Cable & Wireless UK, Energis Communications Limited, Thus Group Holdings Plc and Your Communications Limited including any associated cables or ducts owned, leased or rented by the said Code Operators now owned and used by the Code Operator Vodafone Limited ("Vodafone").
- b) **Cable** means any polythene or other sheath containing optical fibres or metallic conductors.
- c) **Depth of cover** means the depth from the surface to the topmost barrel of the duct nest, in the case of ducts encased in concrete, to the top of the concrete, and in the case of directly buried cable, the top of the cable.
- d) **Jointing chamber** means any manhole, surface box or other chamber giving access to Vodafone apparatus or their network.
- e) **Utility** means an organisation licensed to provide gas, water, electricity, Cable TV or telecommunications services.
- f) **Developer** means an organisation licensed to develop industrial/residential premises or given license to connect to utility apparatus.



- g) **Contractor** means the individual, firm or company contracted to undertake the work for a Utility or Other Parties.
- h) **Other Parties** means the Utilities, Highway Authorities, Developers, Street Authority (Roads Authority - Scotland).
- i) **Site** means the location of, or in the vicinity of, the various works.

7. Requirements

Prior to commencing any work or moving heavy plant or equipment over any portion of the site, the Other Parties or Contractor shall notify Vodafone of their intentions. This may be done by contacting Atkins Global, contact listed in Appendix B.

Upon receipt of this notification, Atkins Global will identify if Vodafone apparatus is affected. If any Vodafone apparatus is affected by the works then Atkins Global will provide necessary records and confirm details of Vodafone apparatus and network operated within the affected area or adjacent to the proposed work site.

7.1 Location of Plant

It is the responsibility of the Other Parties or Contractors to undertake adequate plant location procedures. These may include searches for metallic cables which must be performed by actively inducing a signal in a cable conductor via a transmitter. A passive search is not considered sufficient.

Before applying a tracing signal to the Vodafone apparatus, the Other Parties or Contractors shall seek confirmation from Atkins Global that the Vodafone apparatus will not suffer any disruption to its networks normal workings as a result of the nature of the signal being induced.

7.2 Trial excavations

Optic fibre cables are very susceptible to damage from excavation tools. They are not electrically conductive and cannot be located by radio induction methods. Once an approximate location is known, the exact location must be ascertained by means of hand dug pilot holes. Where the work to be carried out by the Other Party or Contractor involves excavation in the vicinity of our apparatus, the Other Party or Contractor shall, by trial excavation at his own expense, determine the exact location and depth of the Cable & Wireless Worldwide apparatus. All excavations adjacent to the Vodafone apparatus are to be carried out by hand until the extent and /or location of the apparatus is known.

All excavation work shall be executed in accordance with the current issue of Health and Safety series booklet HSG47, Avoiding danger from underground services.

8. Depths of cover

The Other Party or Contractor should note that the minimum depths of cover for Vodafone apparatus shall be maintained together with specified separation requirements. Where the minimum depths of cover specified by Vodafone cannot be maintained, the Other Party or Contractor shall at their own expense, carry out the instructions of Vodafone requirements for the protection or diversion of their apparatus.

The Other Party or Contractor should have particular regard to the possibility of encountering Vodafone apparatus (including ducts and cables), at depths of cover other than that reported.

Surface cables (such as cables on bridges or walls) which are liable to be placed in danger from the Other Parties or Contractors works shall be protected, at the Other Parties expense, as directed by the Vodafone representative.

9. Separation

Reference should be made to HSG47 to ensure that adequate separation is achieved. The following details outline the specific requirements of Vodafone and capture the HSG47 requirements.



Fibre Services

Special Requirements relating to the External Plant Network of Vodafone

9.1 High voltage cables

High voltage single core cables of 1000 V and above shall have a minimum clearance from Company Apparatus of 500 mm.

High voltage multi-core cables of 1000 V and above shall have a minimum clearance from Company Apparatus of 350 mm.

In exceptional circumstances where the above clearances cannot be maintained, the separating distance may be reduced to a minimum of 175 mm. In such circumstances, concrete, of a quality as directed by the Company Representative, must be inserted to completely fill the space between the High Voltage cable and the Company Apparatus, in accordance with the requirements of the Company Representative. Any further services must have a minimum clearance of 250 mm from the concrete.

9.2 Low voltage cables

Low voltage cables of less than 1000 V shall have a minimum clearance from Company Apparatus of 180 mm. In exceptional circumstances where the above clearance cannot be maintained, the separating distance may be reduced to a minimum of 75 mm. In such circumstances, concrete, of a quality as directed by the Company Representative, must be inserted to completely fill the space between the services, in accordance with the requirements of the Company Representative. Any further services must have a minimum clearance of 250 mm from the concrete.

9.3 Ancillary electrical apparatus

Lamp posts, traffic posts and other such ancillary electrical apparatus shall have a minimum clearance of 150 mm from underground Company Apparatus and 600mm clearance from above ground Company Apparatus.

9.4 High pressure gas mains and other Undertakers plant/equipment

High pressure gas mains shall have a minimum clearance of 450 mm from Company Apparatus. All other undertakers' plant and equipment, when running in parallel with Company Apparatus, shall have a minimum clearance of 200mm. Where gas mains cross Company Apparatus, the minimum clearance shall be 200mm. All other undertakers' plant and equipment, when running across Company Apparatus, shall have a minimum clearance of 100 mm.

9.5 Other Undertakers plant

Other undertakers' plant and equipment which runs in parallel with Company Apparatus shall have a minimum clearance of 200mm. All other undertakers' plant and equipment when running across Company Apparatus shall have a minimum clearance of 100mm.

9.6 Tramways

Each separating distance shall be individually agreed with the Company Representative.



10. Jointing chambers

10.1 Protection

Footway type jointing chambers are not designed to withstand carriageway loadings.

Where such chambers are liable to be placed at risk, either temporarily or permanently, from vehicular traffic or from the movement of plant and/or equipment, they will need to be adequately protected. Alternatively, they may have to be demolished and rebuilt to carriageway standards, at the Other Parties or Contractors expense under supervision of Vodafone representative.

All Vodafone jointing chambers and / or other access points shall be kept clear and unobstructed. Access for vehicles, winches, cable drums and / or any further equipment required by Vodafone for the maintenance of its apparatus, must be maintained at all reasonable times.

10.2 Access

The covers to Vodafone jointing chambers and / or apparatus shall only be lifted by means of the appropriate keys and under the direct supervision of a Cable & Wireless Worldwide representative. Other Parties or Contractors shall not enter any Vodafone jointing chamber and / or apparatus unless under the supervision of a Vodafone representative and in any case not before the mandatory gas test has been carried out in the presence of Vodafone representative and such checks have shown it to be safe to enter the Vodafone chamber and / or apparatus. The Other Parties or Contractors shall be given reasonable access to Vodafone apparatus and chambers when required.

11. Notification periods

Where the Other Parties or Contractors works or the movement of plant or equipment may endanger Vodafone apparatus, the Other Party or Contractor shall give the Vodafone agent Atkins Global [as indicated at Appendix B] **at least 7 working days** notice in writing of the intended date to commence operations.

No excavation should be made without first consulting the relevant Vodafone apparatus layout drawings, which will be made available from the Vodafone agent Atkins Global on request and allowing 28 working days for processing the relevant drawings. However, should this not be possible, direct contact should be made to the Atkins Global Bristol Plant Enquiries Team as soon as possible to assess the situation.

When excavating, moving or backfilling (including use of Foamed Concrete for Reinstatements – FCR) around Vodafone apparatus, Atkins Global (as agent for Vodafone) shall be given adequate prior written notice of the Other Parties or Contractors intentions, in order that the works may be adequately supervised. Such notice shall not be less than 3 working days.

12. Excavation and backfill

All excavations adjacent to Vodafone apparatus are to be carried out by hand until the extent and or location of the Vodafone apparatus is known.

Use of mechanical borers and / or excavators shall not be used without the supervisory presence of a Vodafone representative or a given exemption.

Shuttering of the excavation or support to Vodafone apparatus, at the Other Parties or Contractors expense, shall be used as directed by the Vodafone representative.

At least 7 working days notice must be given to Vodafone in order that any special protective measures which may be required to protect Vodafone apparatus, at the Other Parties or Contractors expense, when equipment such as pile driving, explosives, laser cutting high powered RF equipment or RF test gear, is to be used in conjunction with the works.

Other Parties or Contractors are advised to refer to the National Joint Utilities Group [NJUG] 4 Document which outlines the identification of small buried mains and services.



13. Foam concrete

If foam concrete is being used as the backfill material, it shall not be used either above or within 500 mm of any Company Apparatus. A suitable material in accordance with the specification for the Reinstatement of Openings in Highways shall be substituted.

14. Attendance of Company Representative

If a situation requires the attendance on site of a Vodafone representative for a continuous period of more than 6 hours, suitable facilities shall be provided by the Other Party or Contractor, at their expense, to meet the office and ablution requirements.

15. Damage reports

In the event of any damage whatsoever occurring to Vodafone apparatus, the Other Party or Contractor shall immediately inform Vodafone by contacting Julia Burgoyne, (for contact details please refer to Appendix B).

All relevant costs of any subsequent repair and / or removal of the Vodafone apparatus shall be charged to the Other Party or Contractor, irrespective of who affects the repair.

The above requirements do not relieve the Other Party or Contractor of any of their obligations under their contract.



Appendix A - office address details

Glasgow Office

Vodafone
Pavillion 1
1 - 2 Berkeley Square
99 Berkeley Street
Glasgow
G3 7HR

Bristol Office

Vodafone
Unit 1,
Tamar Road
St Philips
Bristol
BS2 0TY

Manchester Office

Vodafone
Unit M
Atlas Business Park
Wythenshawe
Manchester
M22 5RR



Appendix B – Street Works Team Contacts for Vodafone

Function	Name	Job Title	Address	Phone	Mobile	Fax	Email Address
Co-ordination	Sandra Semple	National Street Works Manager	Glasgow Office (see above)	0141 303 2857	07775 792133	0141 300 9611	sandra.semple@cw.com
Customer Complaints	CMC	Customer Management Centre	n/a	08456 021585	n/a	n/a	n/a
Liability Claims	Julia Burgoyne	Major Incident Resolution Coordinator	Bristol Office (see above)	01454 895114	07803 259857	n/a	julia.burgoyne@cw.com
Diversionary Works	Samantha Wilkinson	C3 Diversionary Works Project Controller	Manchester Office (see above)	0161 423 2740	n/a	n/a	samantha.wilkinson@cw.com
Emergencies (24 Hour)	CMC	Customer Management Centre	n/a	08456 021585	n/a	n/a	n/a
Plant Enquiries- Including Thus Plc, (formerly Scottish Telecom), Your Comms (formerly Norweb), Energis & Mercury Communications	Plant Enquiries Team	n/a	Atkins Global PO Box 290 500 Aztec West, Almondsbury, Bristol, BS32 4RZ	01454 662881	n/a	01454 663330	Osm.Enquiries@atkinsglobal.com



16. About this Document

Content Owner

Price, David J

Changes since last version

Reformatted using the current Vodafone template.

End of Document



Utilities Report



Not Affected Utilities

Some Utility Companies have replied to confirm they would not be affected by work on, or close to, the search area. Their responses are enclosed in the following pages for your records.



We have checked CityFibre's website and in this instance your area is not affected.

Dear Sir/Madam,

Thank you for submitting your recent plant enquiry.

Based on the information provided, I can confirm that Energetics does not have any plant within the area(s) specified in your request.

Please be advised that it may take around 10 working days to process enquiries. In the unlikely event that you have been waiting longer than 10 working days, or require further assistance with outstanding enquiries, please call 01698 404945.

Please ensure all plant enquiries are sent to plantenquiries@energetics-uk.com

Regards

Plant Enquiries

T: 01698 404949
E: plantenquiries@energetics-uk.com
W: www.energetics-uk.com

energetics

International House, Stanley Boulevard, Hamilton International Technology Park, Glasgow



-----Original Message-----

From: atkinsstatutory.enquiries@atkinsglobal.com [mailto:atkinsstatutory.enquiries@atkinsglobal.com]

Sent: 08 November 2016 04:17

To: plantenquiries@catelecomuk.com; Plant Enquiries; enquiries@environment-agency.gov.uk; plantenquiries@instalcom.co.uk; plantenquiries@mcnicholas.co.uk; plantenquiries@mcnicholas.co.uk; opburiedservicesenquiries@networkrail.co.uk; interoute.enquiries@plancast.co.uk; nrswa@sky.uk; osp-team@uk.verizon.com; osp-team@uk.verizonbusiness.com; osm.enquiries@atkinsglobal.com

Cc: atkinsstatutory.enquiries@atkinsglobal.com

Subject: Plant Enquiry - 50340 - Land off Tilbury Road, West Horndon, BRENTWOOD - Please respond by 11/11/2016

This email and any attached files are confidential and copyright protected. If you are not the addressee, any dissemination of this communication is strictly prohibited. Unless otherwise expressly agreed in writing, nothing stated in this communication shall be legally binding.

The ultimate parent company of the Atkins Group is WS Atkins plc. Registered in England No. 1885586. Registered Office Woodcote Grove, Ashley Road, Epsom, Surrey KT18 5BW. A list of wholly owned Atkins Group companies registered in the United Kingdom and locations around the world can be found at <http://www.atkinsglobal.com/site-services/group-company-registration-details>



GTC Apparatus Not Found In Search Area

Our Plant Enquiry Service Ref: 328570

Your Enquiry Ref: LM 50340/SuG

Dear Chrissy,

Thank you for your enquiry concerning apparatus in the vicinity of your proposed work. GTC can confirm that we have no apparatus in the vicinity but please note that other asset owners may have and ensure all utility owners have been consulted. For your records, the search area is shown in the attached map.

Please note our assets now include those owned and operated by:

- GTC Pipelines Limited
- Independent Pipelines Limited
- Quadrant Pipelines Limited
- Electricity Network Company Limited
- Independent Power Networks Limited
- Independent Water Networks Limited
- Independent Fibre Networks Limited
- Independent Community Heating Limited

If you have any queries or require any further information please do not hesitate to contact us.

Your sincerely,

GTC Plant Enquiry Service.

GTC
Energy House
Woolpit Business Park
Woolpit
Bury St Edmunds
Suffolk, IP30 9UP
Tel: 01359 240363
plant.enquiries@gtc-uk.co.uk

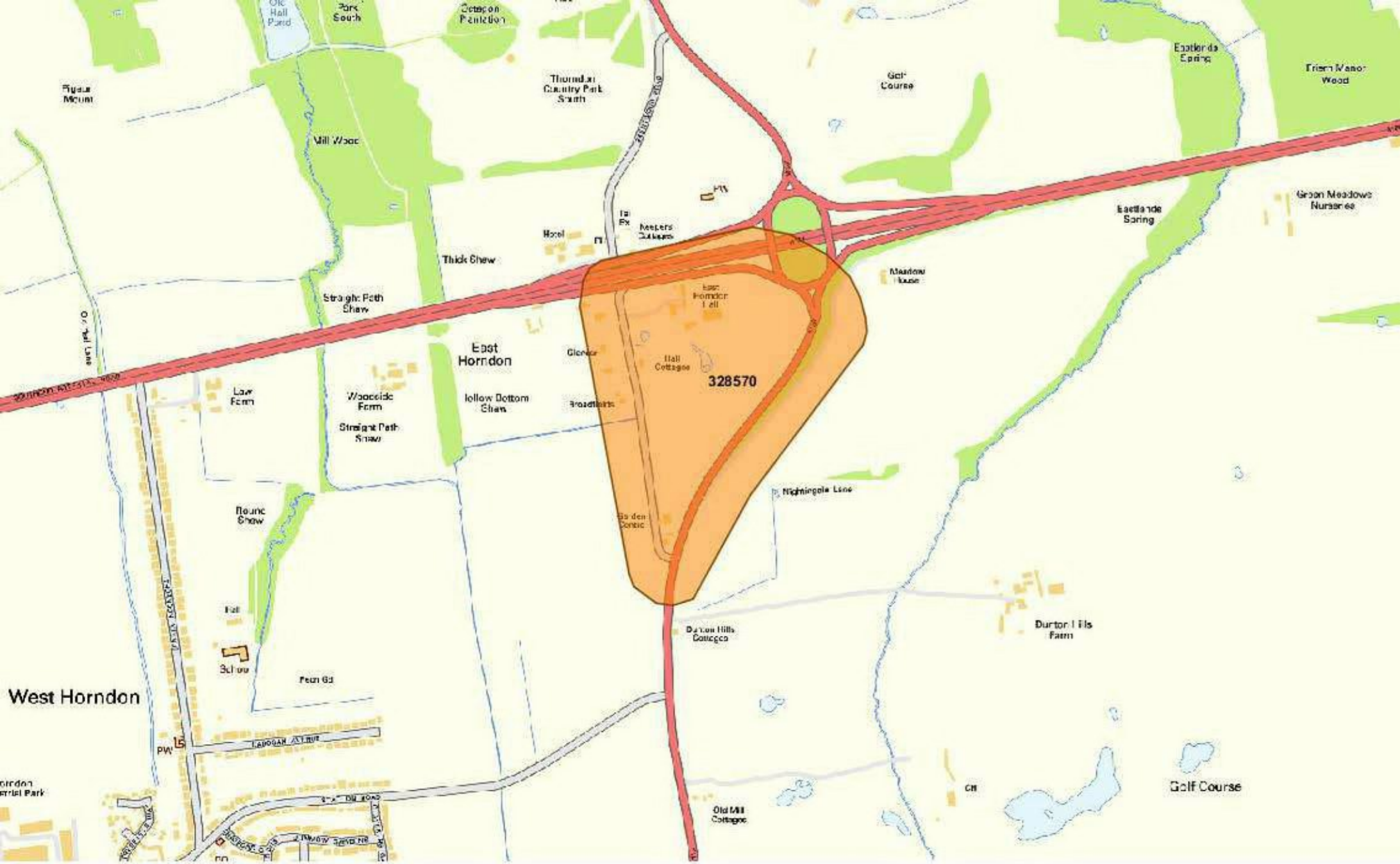
NOTE:

This E-Mail originates from GTC, Energy House, Woolpit Business Park, Woolpit, Bury St Edmunds, Suffolk, IP30 9UP

VAT Number: GB688 8971 40. Registered No: 029431.

DISCLAIMER

The information in this E-Mail and in any attachments is confidential and may be privileged. If you are not the intended





On 10/11/2016 Interoute Vtesse's plant information system was checked to ascertain if your area of interest is affected by Interoute Vtesse plant. In this instance your area of interest was shown to be 'not affected' by Interoute Vtesse plant.

No liability of any kind whatsoever is accepted by Landmark Information Group, its servants or agents, for any error or omission in respect of information contained in this report. The underground services must be verified and established on site before any excavation is carried out.



REFERENCE: LM 50340

Route: Land off Tilbury Road, West Horndon,
BRENTWOOD

KCOM Group PLC
5th Floor Prospect House
Prospect Street
Hull
HU2 8PU

Tel: 01482 603479

Fax:

highwaysadmin@kcom.com

Date:

Our Ref:

Your Ref:

Dear Sirs

Please note this is a standard response made on behalf of the KCOM Group by Atkins.

With regards to your request for details of existing services in the search area supplied, we can confirm that based on the details provided to us, we have no buried plant or equipment in the identified area.

This is valid for 3 months from the date of receipt of this email. If any further information is required, please call 01482 603479, or email our group email address -

highwaysadmin@kcom.com

For clarity, the KCOM group consists of KCOM, Affiniti, Torch Telecom, DRL & Kingston Communications.

Yours faithfully

Enc.

Please quote our reference number in all replies



Dear Sir/Madam,

With regards to your enquiry, Network Rail does not believe there is any Network Rail owned apparatus or underground services within the area you have defined. As there is always the possibility that new works could be planned and undertaken in this area by Network Rail this information is valid as at today's date and is supplied for general guidance only.

Please be aware that this response is based on Network Rail's records and knowledge and no guarantee can be given regarding accuracy or completeness. CAT scans, safe digging practices (as contained in HSE publications) and other appropriate investigative techniques should always be carried out.

There may be other apparatus or underground services owned or operated by Utility Companies and accordingly you should contact individual utilities for information.

If, in connection with your investigations and/or work, you become aware of Network Rail apparatus or underground services within your area of work, please ensure these are notified to our Asset Protection team via the following link as a matter of urgency so that appropriate measures for avoidance of risk and damage can be put in place.

https://urldefense.proofpoint.com/v2/url?u=http-3A__www.networkrail.co.uk_aspx_1758.aspx-3Fcd-3D1&d=DQIFAw&c=cUkzcZGZt-E3UgRE832-4A&r=cWjpnr1Nvb5GpbBsY43xvGOqQ_3PdNa9KLbP1Zgk_oio_5lXI2DtWBcADHfise3Q&m=IMLHhqM1P6dPiiEQpDncMPRJGepOFqXHOSRwMSqfDwo&s=ZiuN9enFFe7VmApXNP5Rsza_24Xal4dlqLbxEliuIM&e=

If you require any further clarification on any of the information please contact opburiedservicesenquiries@networkrail.co.uk.

Regards,

Richard Purser
Distribution Administrator (Underground Services), Asset Information Services

Asset Information Services: to inspire & enable through the power of data National Records Group, Audax Road, Clifton Moor York YO30 4US

T: 01904 386 388
E: richard.purser@networkrail.co.uk

-----Original Message-----

From: atkinsstatutory.enquiries@atkinglobal.com [mailto:atkinsstatutory.enquiries@atkinglobal.com]

Sent: 08 November 2016 04:17

To: plantenquiries@catelecomuk.com; plantenquiries@energetics-uk.com; enquiries@environment-agency.gov.uk; plantenquiries@instalcom.co.uk; plantenquiries@mcnicholas.co.uk; plantenquiries@mcnicholas.co.uk; OP Buried



We have checked SSE's website and in this instance your area is not affected.

telent
Mayne House
Fenton Way
Basildon
Essex
SS15 6TD
United Kingdom

Telephone: +44 (0)800 526 015

www.telent.com

Date 08/11/2016
Our Ref LPENQ0000083565

Dear Sir/Madam

Teliasonera Line Plant Enquiry.

Thank you for your correspondence enclosing details of your proposals as per your reference below.

50340 – Land off Tilbury Road, West Horndon, Brentwood

Our client's apparatus, Teliasonera, is not located within the vicinity of the above reference and we therefore have no further interest in this current location.

Please note that all enquiries relating to the Teliasonera line plant should be forwarded to:

By post – to, telent,
 Teliasonera line plant enquiries,
 Mayne House,
 Fenton Way,
 Basildon,
 Essex
 SS15 6TD

By email - to, telenttelia.plantenquiries@telent.com

By phone – to, 01268 412670

Yours faithfully

Telent CCO

Basildon



We have checked Trafficmaster's website and in this instance your area is not affected.

Dear Sir/Madam

Verizon is a licensed Statutory Undertaker.

We have reviewed your plans and have determined that Verizon (Formally known as MCI WorldCom, MFS) has no apparatus in the areas concerned.

If you have any further queries please do not hesitate to get in touch.

Yours faithfully

Plant Protection Officer (GB) Email osp-team@uk.verizon.com

-----Original Message-----

From: atkinsstatutory.enquiries@atkinglobal.com [mailto:atkinsstatutory.enquiries@atkinglobal.com]

Sent: 08 November 2016 04:17

To: plantenquiries@catelecomuk.com; plantenquiries@energetics-uk.com; enquiries@environment-agency.gov.uk; plantenquiries@instalcom.co.uk; plantenquiries@mcnicholas.co.uk; plantenquiries@mcnicholas.co.uk; opburiedservicesenquiries@networkrail.co.uk; interoute.enquiries@plancast.co.uk; nrswa@sky.uk; UK OSP-Team; UK OSP-Team; osm.enquiries@atkinglobal.com

Cc: atkinsstatutory.enquiries@atkinglobal.com

Subject: Plant Enquiry - 50340 - Land off Tilbury Road, West Horndon, BRENTWOOD - Please respond by 11/11/2016

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Important Consumer Protection Information

This search has been produced by Landmark Information Group Ltd, Imperium, Imperial Way, Reading, Berkshire, RG2 0TD.

Tel: 0844 844 9966
Fax: 0844 844 9980
Email: helpdesk@landmark.co.uk

Landmark Information Group Ltd is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

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

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

The Code's core principles

Firms which subscribe to the Search Code will:

- Display the Search Code logo prominently on their search reports.
- Act with integrity and carry out work with due skill, care and diligence.
- At all times maintain adequate and appropriate insurance to protect consumers.
- Conduct business in an honest, fair and professional manner.
- Handle complaints speedily and fairly.
- Ensure that products and services comply with industry registration rules and standards and relevant laws.
- Monitor their compliance with the Code.

Complaints

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

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

TPOs Contact Details:

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP

Tel: 01722 333306
Fax: 01722 332296
Web site: www.tpos.co.uk
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk.
PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

Complaints Procedure

If you want to make a complaint, we will:

- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

Complaints should be sent to:

Landmark Information Group Ltd
Landmark UK Property
Imperium
Imperial Way
Reading
RG2 0TD

Tel: 0844 844 9966
Email: helpdesk@landmark.co.uk
Fax: 0844 844 9980

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman Scheme (TPOs):

Tel: 01722 333306
Email: admin@tpos.co.uk

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision.

Appendix D

Environment Agency Correspondence

Date: 05/02/2021

Datasheet Reference: EAN/2020/202310



Defence Information

Asset Reference	Maintainer	Bank	Asset Type	Asset Description	Standard of Protection	Overall Condition Grade	Crest Level
14542	Environment Agency	left	embankment	Mar Dyke Sluice	1000.0	2	
146054	Environment Agency	coastal	embankment	Earthen Embankment	1000.0	3	6.980

Grade	Rating	Description
1	Very Good	Cosmetic Defects that will have no effect on performance.
2	Good	Minor defects that will not reduce the overall performance of the asset.
3	Fair	Defects that could reduce performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation.
5	Very Poor	Severe defects resulting in complete performance failure.

Use of Environment Agency Information for Flood Risk Assessments

Important

The Environment Agency are keen to work with partners to enable development which is resilient to flooding for its lifetime and provides wider benefits to communities. If you have requested this information to help inform a development proposal, then we recommend engaging with us as early as possible by using the pre-application form available from our website:

<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

We recognise the value of early engagement in development planning decisions. This allows complex issues to be discussed, innovative solutions to be developed that both enables new development and protects existing communities. Such engagement can often avoid delays in the planning process following planning application submission, by reaching agreements up-front. We offer a charged pre-application advice service for applicants who wish to discuss a development proposal.

We can also provide a preliminary opinion for free which will identify environmental constraints related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In preparing your planning application submission, you should refer to the Environment Agency's Flood Risk Standing Advice and the Planning Practice Guidance for information about what flood risk assessment is needed for new development in the different Flood Zones. This information can be accessed via:

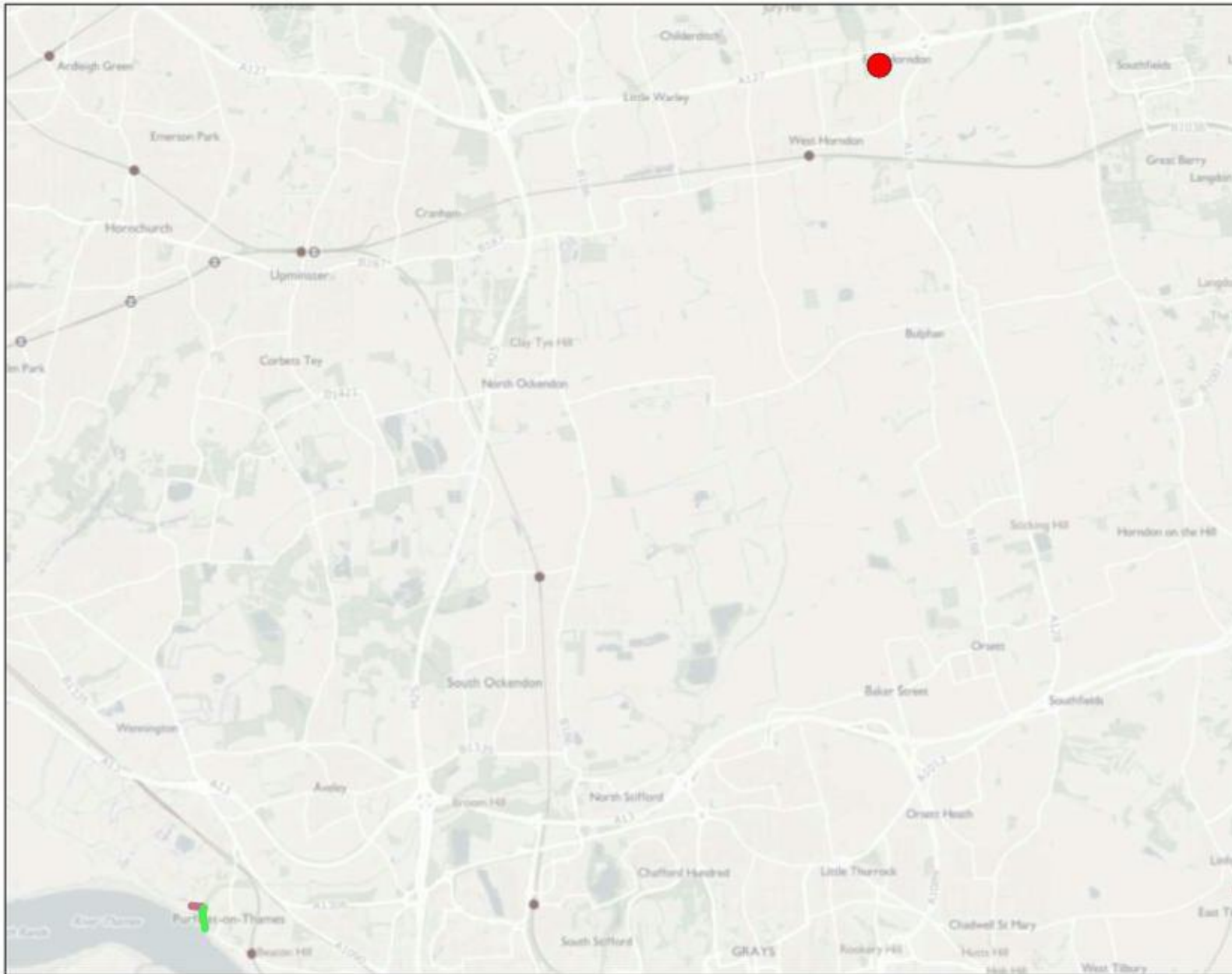
<https://www.gov.uk/flood-risk-assessment-standing-advice>
<http://planningguidance.planningportal.gov.uk/>

You should also consult the Strategic Flood Risk Assessment or other relevant materials produced by your local planning authority.

You should note that:

1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk Assessment (FRA) where one is required, but does not constitute such an assessment on its own.
2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or surface water runoff. Information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires an FRA and this is not submitted or is deficient, the Environment Agency may raise an objection.

**Flood Defence Location Map showing Broadfields Farmyard, Tilbury Road, West Horndon, CM13 3LS
Ref: EAN/2021/202316**



Legend

 Site

Defences

ASSET_ID


 14542

 146054



Appendix E

Greenfield Run-off Calculations

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ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 600 Urban 0.000
Area (ha) 6.020 Soil 0.450 Region Number Region 6

Results l/s

QBAR Rural 22.1
QBAR Urban 22.1

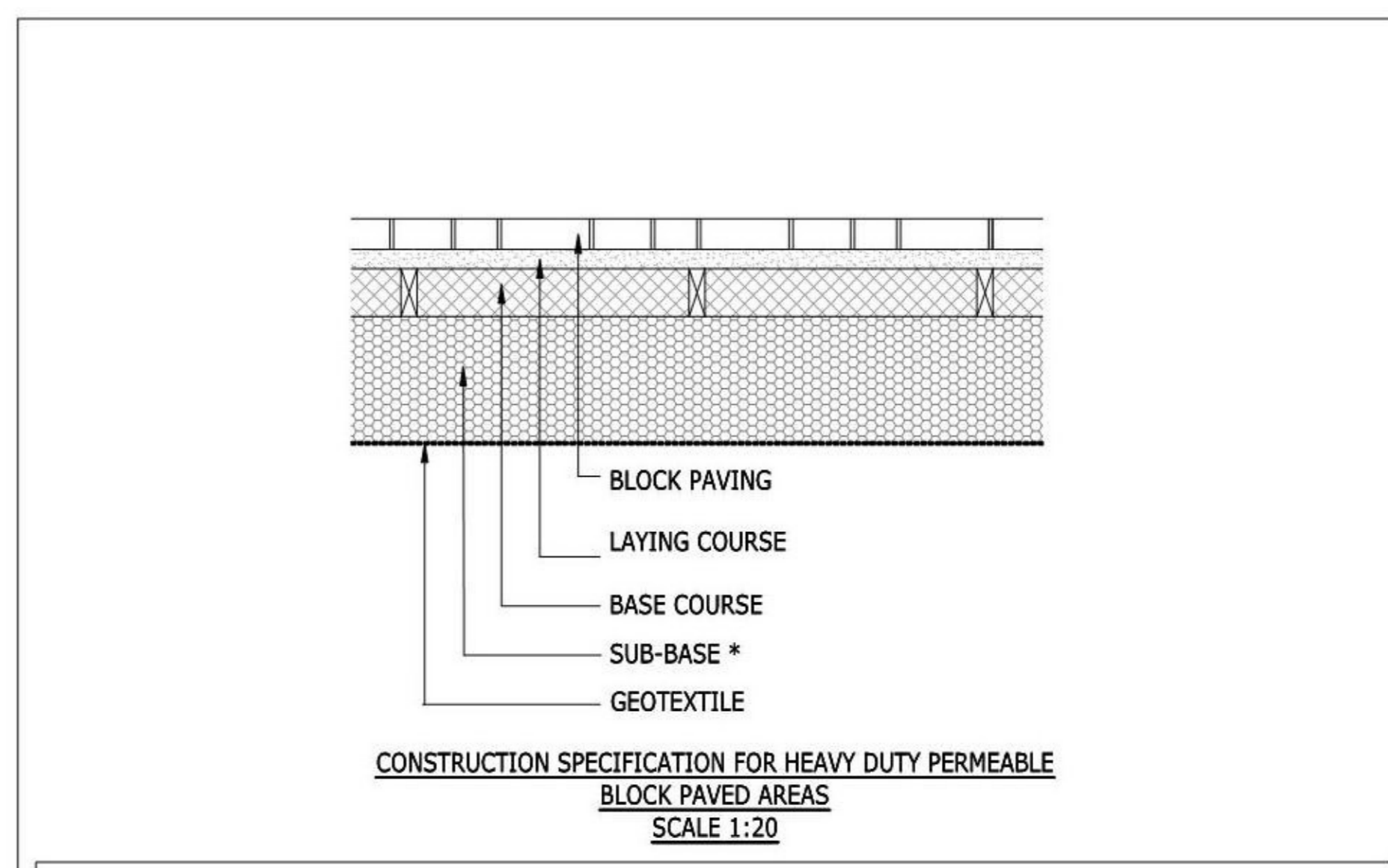
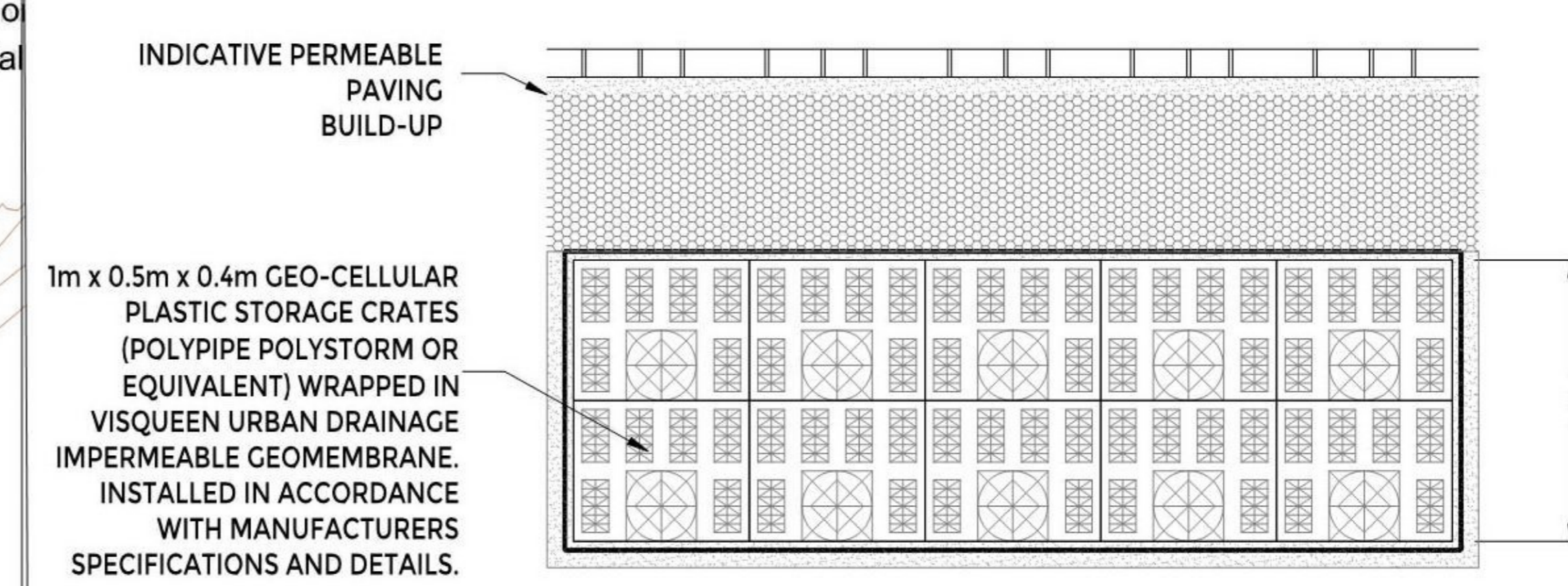
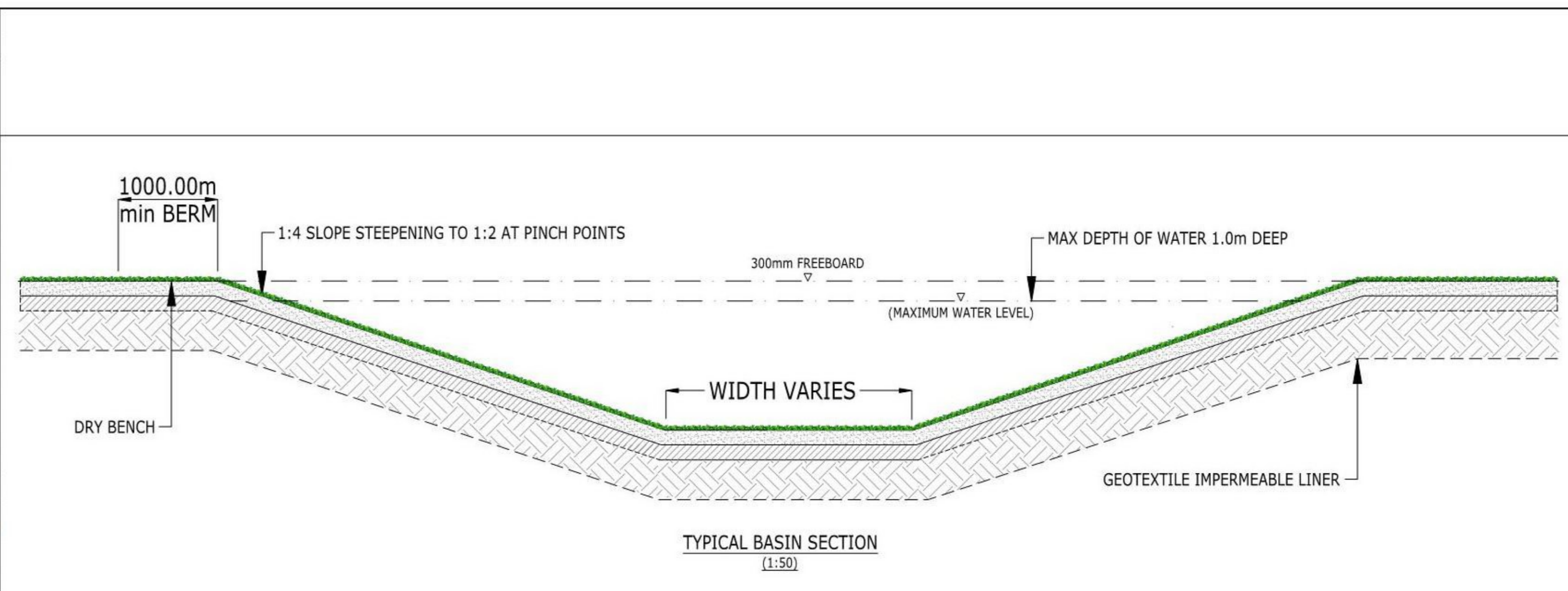
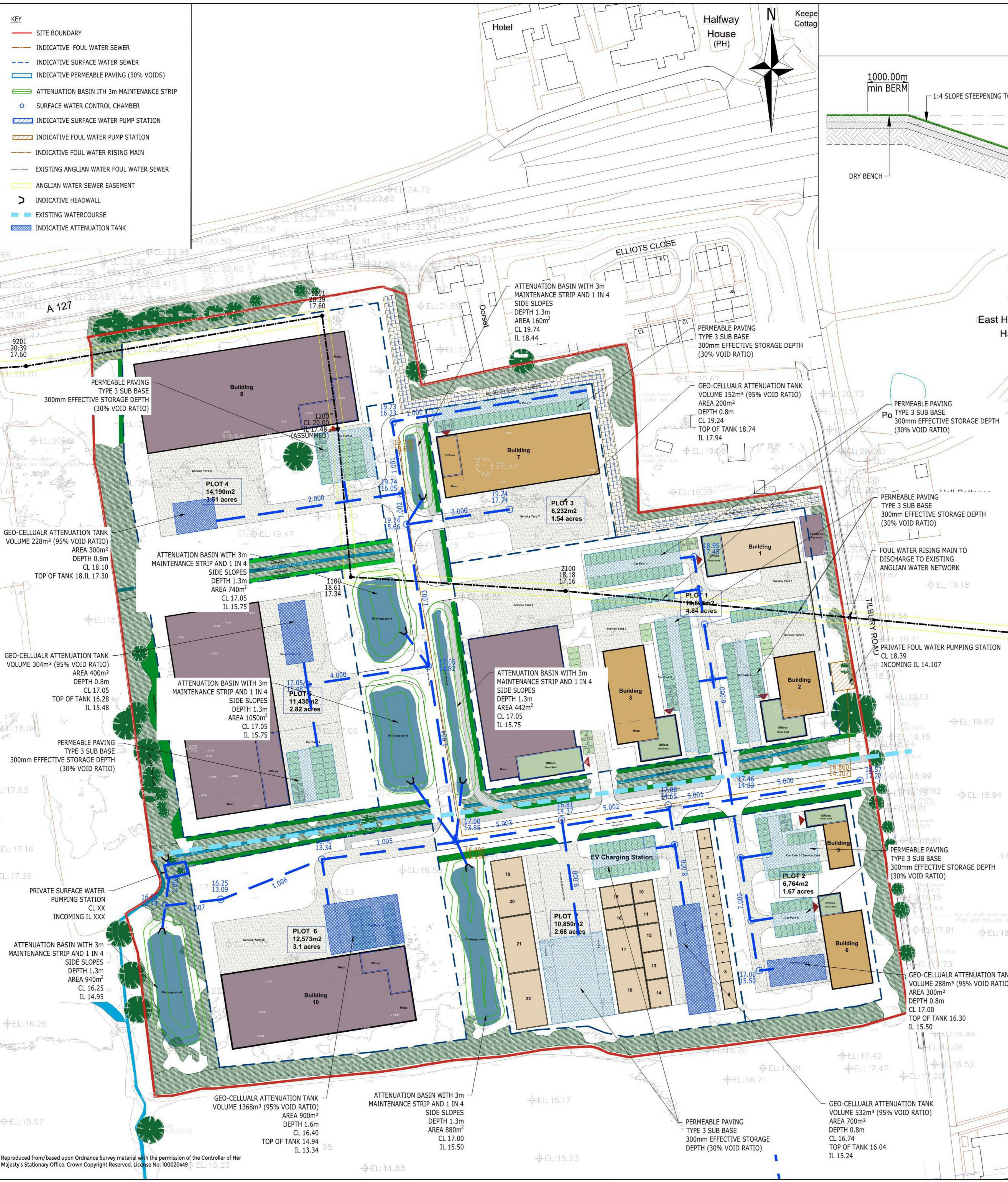
Q100 years 70.4

Q1 year 18.8
Q30 years 50.0
Q100 years 70.4

Appendix F

Drawing 2008451-001 Foul and Surface Water Drainage Strategy

- KEY**
- SITE BOUNDARY
 - INDICATIVE FOUL WATER SEWER
 - INDICATIVE SURFACE WATER SEWER
 - INDICATIVE PERMEABLE PAVING (30% VOIDS)
 - ATTENUATION BASIN WITH 3m MAINTENANCE STRIP
 - SURFACE WATER CONTROL CHAMBER
 - INDICATIVE SURFACE WATER PUMP STATION
 - INDICATIVE FOUL WATER PUMP STATION
 - INDICATIVE FOUL WATER RISING MAIN
 - EXISTING ANGLIAN WATER FOUL WATER SEWER
 - ANGLIAN WATER SEWER EASEMENT
 - INDICATIVE HEADWALL
 - EXISTING WATERCOURSE
 - INDICATIVE ATTENUATION TANK



PERMEABLE PAVING NOTES
 LIGHT DUTY: SHOULD ONLY BE USED FOR SINGULAR OR DOUBLE DRIVES SERVING 1 OR 2 PLOTS - NOT SUITABLE FOR AREAS WHICH WILL BE SUBJECT TO CONSTRUCTION TRAFFIC OR POTENTIAL LOADING FROM HEAVY GOODS VEHICLES INC. DELIVERY, PAANTECHNICON, REFUSE COLLECTION AND FIRE RESCUE VEHICLES

HEAVY DUTY: TO BE USED FOR ALL SHARED DRIVES, PARKING COURTS AND PRIVATE ACCESS ROADS

* THE FORMATION OF THE PERMEABLE PAVING SUB-BASE MUST NOT EXCEED A GRADIENT OF 1/40.

FOR STEEPER GRADIENTS, USE MAXIMUM GRADIENT OF 1/40 FOR FORMATION, APPLYING VERTICAL STEPS AS NECESSARY, BUT ENSURING MINIMUM SUB-BASE THICKNESS IS ALWAYS ACHIEVED.

PERMEABLE PAVING CONSTRUCTION SPECIFIED ABOVE IS SUITABLE FOR CBR VALUES OF BETWEEN 2% & 5%. FOR CBR VALUES OUTSIDE OF THIS RANGE, REFER BACK TO THE ENGINEER FOR CLARIFICATION.

ALL MATERIAL SPECIFICATION AND WORKMANSHIP OF PERMEABLE PAVING CONSTRUCTION TO BE STRICTLY IN ACCORDANCE WITH RECOMMENDATIONS BY MARSHALLS.

- NOTES:**
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE RELEVANT SPECIFICATION AND ALL OTHER RELATED DRAWINGS ISSUED BY THE ENGINEER.
 2. DO NOT SCALE FROM THIS DRAWING. WORK FROM FIGURED DIMENSIONS ONLY.
 3. ALL DIMENSIONS SHOWN ON THIS DRAWING ARE IN METRES UNLESS OTHERWISE STATED. ALL GROUND LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (AOD).
 4. ALL DIMENSIONS, LEVELS AND SURVEY GRID CO-ORDINATES ARE TO BE CHECKED ON SITE AND THE ENGINEER NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES PRIOR TO THE COMMENCEMENT OF THE WORKS. LEVELS ARE SUBJECT TO DETAILED EARTHWORKS AND LEVELS DESIGN.
 5. THIS DRAWING HAS BEEN BASED ON DRAWING No. NWA-0503-A20-007 PRODUCED BY NICHOLAS WEBB ARCHITECTS.
 6. EXISTING DRAINAGE AND UTILITIES TO BE CONFIRMED IN-SITU BY THE CONTRACTOR, PRIOR TO STARTING WORKS. EXISTING DRAINAGE SHOWN INDICATIVELY.
 7. THE DRAINAGE STRATEGY IS INDICATIVE ONLY, TO DEMONSTRATE DESIGN INTENT AND REQUIREMENTS. DESIGN SUBJECT TO CHANGE AND DESIGN TEAM COORDINATION.
 8. LOCATIONS OF EXISTING SEWERS HAVE BEEN TRANSCRIBED FROM ANGLIAN WATER SEWER RECORDS AND ARE TO BE CONFIRMED BY AN IN-SITU SURVEY.
 9. PROPOSED SURFACE WATER DRAINAGE SYSTEM HAS BEEN DESIGNED UP TO THE 1 IN 100 YEAR RAINFALL EVENT + 40% FOR CLIMATE CHANGE.
 10. PROPOSED DISCHARGE RATE OF 31.80 L/S BASED ON MEAN ANNUAL GREENFIELD RUNOFF RATE (QBAR).
 11. PROPOSED SURFACE WATER PONDS TO BE DESIGNED (AT DETAILED DESIGN STAGE) AS PERMANENT WATER FEATURES IN COORDINATION WITH LANDSCAPE ARCHITECT.
 12. PROPOSED FOUL WATER CONNECTION TO ANGLIAN WATER SEWERS TO BE CONFIRMED AT DETAILED DESIGN STAGE VIA SECTION 106 (WATER ACT) APPLICATION.

DRAFT
 FOR INFORMATION ONLY

A	UPDATED RLB	FH	CC	BC	07/10/22
Rev	Description	Drm	Chk	App	Date

ARDENT CONSULTING ENGINEERS

Suite 207
 One Aile Street
 London
 E1 8DE

Tel: 020 7680 4088
 Fax: 020 7498 3736

Web: www.ardent-ce.co.uk
 E-mail: enquiries@ardent-ce.co.uk

Client: **MM PROPERTIES (LONDON) LIMITED**

Project Title: **BROADFIELDS, EAST HORNDON, BRENTWOOD**

Drawing Title: **INDICATIVE SURFACE & FOUL WATER DRAINAGE STRATEGY**

At Scale	Date	Designed by
1:1000	07/10/22	FH
Drawn by	Checked by	Approved by
FH	CC	BC
Drawing Number	Rev	
2008543-001	A	

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Appendix G

Post-development hydraulic calculations

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	21.000	Add Flow / Climate Change (%)	0
Ratio R	0.439	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm


Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	1.428	4-8	3.914	8-12	0.681

Total Area Contributing (ha) = 6.022

Total Pipe Volume (m³) = 132.470

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
1.008		15.270	12.475	0.000	0	0


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Online Controls for Storm

Pump Manhole: 20, DS/PN: 1.008, Volume (m³): 7.9

Invert Level (m) 12.744

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	22.1000	1.000	22.1000	1.800	22.1000	2.600	22.1000
0.400	22.1000	1.200	22.1000	2.000	22.1000	2.800	22.1000
0.600	22.1000	1.400	22.1000	2.200	22.1000	3.000	22.1000
0.800	22.1000	1.600	22.1000	2.400	22.1000		

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Storage Structures for Storm

Porous Car Park Manhole: 1, DS/PN: 1.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	90.0
Max Percolation (l/s)	250.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	18.000	Cap Volume Depth (m)	0.300

Complex Manhole: 3, DS/PN: 2.000

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	70.0
Max Percolation (l/s)	194.4	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	17.295	Cap Volume Depth (m)	0.300

Cellular Storage

Invert Level (m)	17.295	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	300.0	0.0	0.801	0.0	0.0
0.800	300.0	0.0			

Tank or Pond Manhole: 4, DS/PN: 1.002

Invert Level (m) 18.440

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	12.9	1.300	164.0

Tank or Pond Manhole: 6, DS/PN: 1.003

Invert Level (m) 18.440

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Tank or Pond Manhole: 6, DS/PN: 1.003

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	328.8	1.300	748.1

Complex Manhole: 7, DS/PN: 4.000

Cellular Storage

Invert Level (m) 15.400 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	400.0	0.0	0.801	0.0	0.0
0.800	400.0	0.0			

Porous Car Park

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 10.0
 Membrane Percolation (mm/hr) 1000 Length (m) 55.0
 Max Percolation (l/s) 152.8 Slope (1:X) 100.0
 Safety Factor 2.0 Depression Storage (mm) 5
 Porosity 0.30 Evaporation (mm/day) 3
 Invert Level (m) 16.550 Cap Volume Depth (m) 0.300

Complex Manhole: 8, DS/PN: 1.004

Tank or Pond

Invert Level (m) 15.750

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	507.5	1.300	1007.7

Tank or Pond

Invert Level (m) 15.750

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	393.8	1.300	844.6

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Innovyze Network 2020.1

Tank or Pond

Invert Level (m) 15.750

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	140.5	1.300	444.0

Tank or Pond

Invert Level (m) 15.750

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	415.7	1.300	876.5

Porous Car Park Manhole: 10, DS/PN: 6.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	50.0
Membrane Percolation (mm/hr)	1000	Length (m)	60.0
Max Percolation (l/s)	833.3	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	18.450	Cap Volume Depth (m)	0.300

Complex Manhole: 11, DS/PN: 7.000

Cellular Storage

Invert Level (m) 15.425 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	300.0	0.0	0.801	0.0	0.0
0.800	300.0	0.0			

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	50.0
Membrane Percolation (mm/hr)	1000	Length (m)	21.0
Max Percolation (l/s)	291.7	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	16.500	Cap Volume Depth (m)	0.300

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Complex Manhole: 13, DS/PN: 8.000

Cellular Storage

Invert Level (m) 15.240 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	700.0	0.0	0.801	0.0	0.0
0.800	700.0	0.0			

Porous Car Park

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 10.0
Membrane Percolation (mm/hr) 1000 Length (m) 55.0
Max Percolation (l/s) 152.8 Slope (1:X) 100.0
Safety Factor 2.0 Depression Storage (mm) 5
Porosity 0.30 Evaporation (mm/day) 3
Invert Level (m) 16.240 Cap Volume Depth (m) 0.300

Porous Car Park Manhole: 15, DS/PN: 9.000

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 10.0
Membrane Percolation (mm/hr) 1000 Length (m) 50.0
Max Percolation (l/s) 138.9 Slope (1:X) 0.0
Safety Factor 2.0 Depression Storage (mm) 5
Porosity 0.30 Evaporation (mm/day) 3
Invert Level (m) 16.500 Membrane Depth (mm) 0

Porous Car Park Manhole: 16, DS/PN: 5.003

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 11.0
Membrane Percolation (mm/hr) 1000 Length (m) 67.0
Max Percolation (l/s) 204.7 Slope (1:X) 100.0
Safety Factor 2.0 Depression Storage (mm) 5
Porosity 0.30 Evaporation (mm/day) 3
Invert Level (m) 16.310 Cap Volume Depth (m) 0.300

Cellular Storage Manhole: 18, DS/PN: 1.006

Invert Level (m) 13.340 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

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Cellular Storage Manhole: 18, DS/PN: 1.006

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	900.0	0.0	1.601	0.0	0.0
1.600	900.0	0.0			

Tank or Pond Manhole: 20, DS/PN: 1.008

Invert Level (m) 14.950

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	466.1	1.300	949.1

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	13
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details


Rainfall Model	FSR	Ratio R	0.438
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	21.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	OFF		

Profile(s)

		Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440	
Return Period(s) (years)	1, 30, 100	
Climate Change (%)	0, 0, 45	

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%	100/15 Summer				16.917
1.001	2	30 Winter	1	+0%	30/15 Summer				16.331
2.000	3	30 Winter	1	+0%	100/15 Summer				17.429
1.002	4	30 Winter	1	+0%	30/15 Summer				16.169
3.000	5	15 Winter	1	+0%	100/15 Summer				17.840
1.003	6	30 Winter	1	+0%	30/15 Summer				15.842
4.000	7	120 Winter	1	+0%	30/60 Winter				15.570
1.004	8	30 Winter	1	+0%	30/15 Summer				15.098
5.000	9	15 Winter	1	+0%					17.267
6.000	10	15 Winter	1	+0%	30/15 Summer				17.631
7.000	11	240 Winter	1	+0%	100/15 Summer				15.548
5.001	12	30 Winter	1	+0%	1/15 Winter				15.262
8.000	13	120 Winter	1	+0%	100/15 Summer				15.295
5.002	14	30 Winter	1	+0%	1/15 Winter				15.156
9.000	15	30 Winter	1	+0%	100/15 Winter				16.654
5.003	16	30 Winter	1	+0%	1/15 Summer				15.050

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged		Flooded	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow (l/s)					
1.000	1	-0.308	0.000	0.06		5	8.4	OK	
1.001	2	-0.310	0.000	0.07			9.2	OK	
2.000	3	-0.241	0.000	0.28		22	41.3	OK	
1.002	4	-0.259	0.000	0.21			51.4	OK	
3.000	5	-0.275	0.000	0.16			59.5	OK	
1.003	6	-0.197	0.000	0.45			87.7	OK	
4.000	7	-0.280	0.000	0.14			20.9	OK	
1.004	8	-0.194	0.000	0.44		12	94.6	OK	
5.000	9	-0.328	0.000	0.04			13.6	OK	
6.000	10	-0.194	0.000	0.45		6	127.2	OK	
7.000	11	-0.327	0.000	0.04			5.8	OK	
5.001	12	0.053	0.000	0.81			110.3	SURCHARGED	
8.000	13	-0.320	0.000	0.05		96	9.0	OK	
5.002	14	0.129	0.000	0.80			108.2	SURCHARGED	
9.000	15	-0.296	0.000	0.10			28.3	OK	
5.003	16	0.301	0.000	0.61		8	111.9	SURCHARGED	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.005	17	30	Winter	1	+0% 1/15 Summer				14.890
1.006	18	360	Winter	1	+0% 1/60 Summer	100/360 Summer			14.041
1.007	19	360	Winter	1	+0% 1/15 Summer				14.308
1.008	20	360	Winter	1	+0% 1/15 Summer				14.438

PN	US/MH Name	Surcharged Flooded			Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Overflow Cap. (l/s)	Time (mins)	Pipe Flow (l/s)		
1.005	17	0.661	0.000	1.51		252.2	SURCHARGED	
1.006	18	0.326	0.000	0.26	288	33.4	SURCHARGED	
1.007	19	0.845	0.000	0.14		26.6	SURCHARGED	
1.008	20	1.319	0.000	0.12		22.1	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 13
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.438
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 21.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
Analysis Timestep Fine Inertia Status ON
DTS Status OFF


Profile(s)

Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%	100/15 Summer				16.973
1.001	2	30 Winter	30	+0%	30/15 Summer				16.927
2.000	3	30 Winter	30	+0%	100/15 Summer				17.561
1.002	4	30 Winter	30	+0%	30/15 Summer				16.915
3.000	5	15 Winter	30	+0%	100/15 Summer				17.902
1.003	6	30 Winter	30	+0%	30/15 Summer				16.697
4.000	7	60 Winter	30	+0%	30/60 Winter				15.858
1.004	8	30 Winter	30	+0%	30/15 Summer				15.809
5.000	9	15 Winter	30	+0%					17.297
6.000	10	15 Winter	30	+0%	30/15 Summer				18.393
7.000	11	30 Winter	30	+0%	100/15 Summer				15.822
5.001	12	15 Winter	30	+0%	1/15 Winter				16.411
8.000	13	480 Winter	30	+0%	100/15 Summer				15.574

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
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PN	US/MH Name	Surcharged		Flooded	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Overflow Cap. (l/s)					
1.000	1	-0.252	0.000	0.23		7	33.4	OK	
1.001	2	0.286	0.000	0.19			26.5	SURCHARGED	
2.000	3	-0.109	0.000	0.83		16	123.9	OK	
1.002	4	0.487	0.000	0.65			158.8	SURCHARGED	
3.000	5	-0.213	0.000	0.39			146.4	OK	
1.003	6	0.658	0.000	1.10			214.9	SURCHARGED	
4.000	7	0.008	0.000	0.83		40	120.5	SURCHARGED	
1.004	8	0.517	0.000	0.75		17	162.1	SURCHARGED	
5.000	9	-0.298	0.000	0.09			33.4	OK	
6.000	10	0.568	0.000	0.92		3	256.5	SURCHARGED	
7.000	11	-0.053	0.000	0.53		22	76.8	OK	
5.001	12	1.202	0.000	1.26			172.0	SURCHARGED	
8.000	13	-0.041	0.000	0.10		176	16.4	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
 for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.002	14	15 Winter	30	+0%	1/15 Winter				16.154
9.000	15	15 Winter	30	+0%	100/15 Winter				16.745
5.003	16	15 Winter	30	+0%	1/15 Summer				16.196
1.005	17	15 Winter	30	+0%	1/15 Summer				15.872
1.006	18	480 Winter	30	+0%	1/60 Summer	100/360 Summer			15.501
1.007	19	480 Winter	30	+0%	1/15 Summer				15.395
1.008	20	480 Winter	30	+0%	1/15 Summer				15.373

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.002	14	1.127	0.000	0.83		112.1	SURCHARGED	
9.000	15	-0.205	0.000	0.41	13	118.6	OK	
5.003	16	1.447	0.000	0.77	35	142.4	SURCHARGED	
1.005	17	1.643	0.000	2.02		337.0	SURCHARGED	
1.006	18	1.786	0.000	0.60		76.3	SURCHARGED	
1.007	19	1.932	0.000	0.41		79.7	SURCHARGED	
1.008	20	2.254	0.000	0.12		22.1	SURCHARGED	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
 for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 13
 Number of Online Controls 1 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.438
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 21.000 Cv (Winter) 0.840


Margin for Flood Risk Warning (mm) 300.0 DVD Status ON
 Analysis Timestep Fine Inertia Status ON
 DTS Status OFF

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440 Summer and Winter
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 45

WARNING: Half Drain Time has not been calculated as the structure is too full.

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+45%	100/15 Summer				18.145
1.001	2	15 Winter	100	+45%	30/15 Summer				18.152
2.000	3	30 Winter	100	+45%	100/15 Summer				17.949
1.002	4	15 Winter	100	+45%	30/15 Summer				18.142
3.000	5	15 Winter	100	+45%	100/15 Summer				18.607
1.003	6	15 Winter	100	+45%	30/15 Summer				18.092
4.000	7	960 Winter	100	+45%	30/60 Winter				16.304
1.004	8	960 Winter	100	+45%	30/15 Summer				16.300
5.000	9	15 Winter	100	+45%					17.326
6.000	10	15 Winter	100	+45%	30/15 Summer				18.546
7.000	11	60 Winter	100	+45%	100/15 Summer				16.717
5.001	12	60 Winter	100	+45%	1/15 Winter				16.758
8.000	13	480 Winter	100	+45%	100/15 Summer				16.509

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
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PN	US/MH Name	Surcharged Flooded		Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m ³)					
1.000	1	0.920	0.000	0.34		4 50.0	SURCHARGED	
1.001	2	1.511	0.000	0.38		53.0	SURCHARGED	
2.000	3	0.279	0.000	1.09		18 163.2	SURCHARGED	
1.002	4	1.714	0.000	0.81		198.2	SURCHARGED	
3.000	5	0.492	0.000	0.66		251.1	SURCHARGED	
1.003	6	2.053	0.000	1.65		322.4	SURCHARGED	
4.000	7	0.454	0.000	0.18		26.2	SURCHARGED	
1.004	8	1.008	0.000	0.33		608 71.6	SURCHARGED	
5.000	9	-0.269	0.000	0.17		63.0	OK	
6.000	10	0.721	0.000	0.97		7 270.4	SURCHARGED	
7.000	11	0.842	0.000	0.44		63.9	FLOOD RISK	
5.001	12	1.549	0.000	1.54		209.9	SURCHARGED	
8.000	13	0.894	0.000	0.09		15.1	FLOOD RISK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
 for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
5.002	14	480 Winter	100	+45%	1/15 Winter				16.567
9.000	15	15 Winter	100	+45%	100/15 Winter				16.972
5.003	16	15 Winter	100	+45%	1/15 Summer				16.613
1.005	17	15 Winter	100	+45%	1/15 Summer				16.452
1.006	18	960 Winter	100	+45%	1/60 Summer	100/360 Summer			16.245
1.007	19	960 Winter	100	+45%	1/15 Summer				16.154
1.008	20	960 Winter	100	+45%	1/15 Summer				16.138

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
5.002	14	1.540	0.000	0.44		59.2	SURCHARGED	
9.000	15	0.022	0.000	0.68	7	193.3	SURCHARGED	
5.003	16	1.864	0.000	0.89	6	163.2	FLOOD RISK	
1.005	17	2.223	0.000	2.30		382.4	SURCHARGED	
1.006	18	2.530	0.000	0.79		101.4	FLOOD RISK	
1.007	19	2.691	0.000	0.56		109.1	FLOOD RISK	
1.008	20	3.019	0.000	0.12		22.1	FLOOD RISK	

Appendix H

Water Quality Management C753 Simplex Method

C753 SIMPLE INDEX TREATMENT METHOD

September 2022

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, home zones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g. hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g. haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

Table 1: Pollution hazard indices for different land use classifications

(land use in bold applicable for the development, Pollution hazard level will be dependent on final use).

Type of SuDS component	Mitigation indices		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bio retention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Table 2: Indicative SuDS mitigation indices for discharges to surface waters

(bold text is applicable to this development).

For surface water discharge from Industrial Sites			
	Required mitigation indices		
Source	TSS	Metals	Hydrocarbons
High	0.8	0.8	0.9
Type of SuDS component provided			
Detention basin	0.5	0.5	0.6
Permeable paving	0.7	0.6	0.7
Total	1.2	1.1	1.3
Check	+0.45	+0.3	+0.4

Table 3: SuDS mitigation indices provided

Appendix I

Maintenance and Management Plan

SuDS MANAGEMENT PLAN

1.0 INTRODUCTION

- 1.1 The development at Broadfields includes a number of Sustainable Drainage Systems (SuDS) as part of the surface water drainage system including attenuation basins, attenuation tanks and permeable paving. This Technical Note sets out an outline management plan for the aforementioned SuDS components.
- 1.2 The proposed SuDS components in addition to addressing climate change will bring a number of benefits in terms of water quality, environmental, and social amenity.
- 1.3 The maintenance of all SuDS components will be in accord with the best practices and CIRIA document C753 "The SuDS Manual". Typical maintenance activities for the proposed SuDS components have been reproduced from Table 32.1 of "The SuDS Manual" in **Table 1** below. A private management company will be set up to maintain the surface water drainage network, including on-site SuDS.

SuDS MANAGEMENT PLAN

Table 1: Typical SuDS Maintenance Activities

Operation and maintenance activity	SuDS component		
	Geo-cellular Tank	Permeable paving	Attenuation Basin
Regular Maintenance			
Inspection	■	■	■
Litter and debris removal	□	■	■
Grass cutting			■
Weed and invasive plant control		□	□
Shrub management		□	□
Shoreline vegetation			□
Aquatic vegetation management			□
Occasional Maintenance			
Sediment management	■	■	■
Vegetation replacement			□
Vacuum sweeping and brushing		■	
Remedial Maintenance			
Structure rehabilitation / repair	□	□	□
■ will be required □ may be required			

SuDS MANAGEMENT PLAN

2.0 SuDS MANAGEMENT PLAN

- 2.1 This plan is intended to cover all on-site drainage structures. The Site Management Team should oversee and implement the SuDS Management Plan and designate a qualified person who will be responsible for the proper operation and maintenance of the surface water drainage structures.

Water Quality Management

- 2.2 In line with Tables 26.2 and 26.3 of the CIRIA C753 The SuDS Manual, the proposed permeable paving and attenuation ponds would provide sufficient treatment for the surface water runoff from the Site.
- 2.3 The surface drainage network would also be designed to protect and enhance the quality of surface water runoff through the removal of sediment and pollutants. Catchpit manholes and silt trapped gullies will reduce the amount of pollutants entering the system. Preventive maintenance of the system will include a comprehensive source reduction program of regular sweeping and litter removal, prohibitions on the use of pesticides, and maintenance of bin areas.

Maintenance Program

- 2.4 The Site Management Team will conduct the SuDS Management Plan set forth in this document. The Site Management will ensure that inspections and record keeping are timely and accurate. Inspection & Maintenance Log Forms should include the date and physical conditions of the structures, depth of sediment in structures, evidence of overtopping or debris blockage and maintenance required of each structure. Records of maintenance will be kept on file on-site and copies of Inspection & Maintenance Log sheets indicating all work and inspections will be available to the Council upon request. A model Maintenance log is appended for reference.
- 2.5 Regular maintenance should include:

SuDS MANAGEMENT PLAN

- Inspect channel and gully inlet grates and remove any debris every 6 months or as determined to be reasonable based on experience with the installed systems to ensure that the gullies are working in their intended fashion and that they are free of debris;
- Inspect gully sumps and bottom of drain manholes quarterly; if depth of sediment in sumps exceeds 50% capacity, sediment must be removed. Excessive sediment shall be removed and properly disposed by a licensed drainage cleaning company.
- All litter shall be picked up and removed from the parking areas, and soft landscaping.
- Inspect external bin stores for spillage and scattered litter must be performed on a regular basis to prevent the spread of pollutants into the surface water drainage network.
- The inlets, outlet and vents and overflows of SuDS components should be checked annually and after large storms to ensure that they are in good condition and operating as designed. Regular maintenance includes inspection and identification of any areas that are not operating correctly monthly for the first 3 months and then every 6 months after.
- Outlet/headwalls should be checked annually and after large storms to ensure that they are in good condition and operating as designed. Regular maintenance includes inspection and identification of any areas that are not operating correctly monthly for the first 3 months and then every 6 months after.

Winter Maintenance Program

- 2.6 Ensure that drainage structures are not blocked by ice, snow, debris or rubbish during winter months.

SuDS MANAGEMENT PLAN

Operation and Maintenance requirements

2.7 Recommendations for the operation and maintenance including typical frequencies are included in **Tables 2, 3 and 4** below.

Table 2: SuDS Operation and Maintenance Requirements- Permeable paving

SUDS Element	Permeable Paving	
Maintenance Period	Maintenance Task	Frequency
Regular Maintenance	Brushing and vacuuming	Once a year or as required
Occasional Maintenance	Stabilise and mow contributing adjacent area	As required
	Removal of weed or management using glyphosate applied directly into weeds by an applicator rather than spraying	As required
Remedial Work	Remediate any landscaping which has been raised to within 50mm of the level of the paving	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to structural performance or a hazard to users.	As required.
Monitoring	Rehabilitation of surface or upper structure by remedial sweeping	Every 10 to 15 years, or as required
	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	3 monthly, 48hrs after large storms in first 6 months

SuDS MANAGEMENT PLAN

	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 3: SuDS Operation and Maintenance Requirements- Attenuation tank

SUDS Element	Attenuation Tank	
Maintenance Period	Maintenance Task	Frequency
Maintenance Work	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risk to performance)	Monthly
	Remove sediment from pre-treatment structures and/or internal forebays.	Annually, or as required
Remedial Work	Repair/rehabilitate inlets, outlets, overflows and vents	As required.
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed	Annually.
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required.

SuDS MANAGEMENT PLAN

Table 4: SuDS Operation and Maintenance Requirements – Attenuation Basin

SUDS Element	Attenuation Basin	
Maintenance Period	Maintenance Task	Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass - meadow grass in and around basin	Half yearly (spring, before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets, and overflows for blockages, and clear is required	Monthly
	Inspect banksides, structures, pipework etc. for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlets and forebays	Annually (or as required)
	Manage wetland plants in outlet pool- where provided	Annually

SuDS MANAGEMENT PLAN

Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseeded or returfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven levels and reinstate design levels	As required

SuDS MANAGEMENT PLAN

Suds Management Plan- Appendix A

Drainage Operation and Maintenance Log

Site Maintenance Supervisor: _____ Date: _____

Routine Response to rainfall event _ in Other: _____

BMP	Frequency	Date Performed	Comments
Gullies and Manholes	Monthly Inspections		
	Maintenance Quarterly and as necessary		
Culverts and Headwalls	Inspect and identify areas not operating property every 3 months (for the first 3 months) and every 6 months after.		
	Monthly trash screens inspection and remove debris		
Pavement Areas (parking, driveways, service areas)	Monthly Sweeping		
	Rubbish & Litter Removal as Necessary		
Landscaped & Vegetated Areas	Maintenance as necessary		

SuDS MANAGEMENT PLAN

Permeable Paving	Rubbish, litter & debris removal on a monthly basis		
	Inspect for evidence of poor operation and silt accumulation on a quarterly basis		
	Specialist sweeping, jetting and vacuuming, as required		
	Remediation of any depressions, rutting or broken paving elements, as required		
	Annual inspection of inlets, outlets, overflows and vents to ensure correct operation.		
	Survey of inside of pond to assess debris / silt build up that may affect operation and clear, as required.		

Appendix J

Foul Water Calculations

PROPOSED FOUL WATER



Unit Type	Proposed Area/Units		Hours (hrs)	Water Flow Rate l/day		Peak Factor	Peak Loading l/s		Loading (l/s)
General Housing p	320	100m sq	24	300	per property	6.6	0.0229167	per property	7.333

TOTAL PROPOSED FOUL LOADING = 7.333