

1A & 1C Eynsham Drive, Abbey Wood

Flood Risk Assessment and Drainage Strategy

Date: September 2018

Consultant: Shear Design



INDEX

1.0	INTRODUCTION
2.0	TOPOGRAPHY AND SITE DESCRIPTION
3.0	DEVELOPMENT DESCRIPTION
4.0	EXISTING DRAINAGE AND SITE INVESTIGATIONS
5.0	FLOOD RISK TO THE DEVELOPMENT
6.0	PROPOSED DRAINAGE STRATEGY
7.0	CONCLUSION

APPENDIX

APPENDIX A	Site Location Plan
APPENDIX B	Topographical Survey
APPENDIX C	Proposed Site Plan and Illustrative Drainage Proposals
APPENDIX D	Thames Water Maps and Services Plan
APPENDIX E	Site Photographs
APPENDIX F	Calculations
APPENDIX G	Environment Agency Flood Data

Issue	Prepared by	Checked by	NOTES	Date
D100	Paul Graham	Simon Mason		October 2017
D100B	Paul Graham	Simon Mason		December 2017
D100C	Paul Graham	Matt Jessop		September 2018

1.0 Introduction

Shear Design Ltd. has been instructed to prepare a flood risk assessment and drainage strategy in respect of a proposed development at Eynsham Drive, Abbey Wood.

This report has been prepared on behalf of Abbey Wood Property Ltd and is intended to support a planning application for a mixed residential and commercial development.

This assessment has been undertaken by compiling information concerning the site and the surrounding area.

This report has been prepared with reference to National Planning Policy Framework (NPPF) and the London Plan 2016.

The general approach is to advise caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions. The overarching aim of the precautionary framework is, in order of preference, to: -

- Direct new development away from those areas which are at high risk of flooding.
- Where development has to be considered in high risk areas (zone 3) only those developments which can be justified are located within such areas.

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the site.

The purpose of this report is to also describe the existing site and associated drainage infrastructure and to identify a sustainable solution for the proposed surface and foul water drainage.

A site location plan is included in [Appendix A](#). The site occupies approximately 0.628ha. The National Grid Reference is TQ472795.

The site is within an area benefiting from flood defences which is discussed further within the body of the report.

This document has been prepared in consultation with Thames Water, the Environment Agency and Royal borough of Greenwich Council.

Shear Design Limited has prepared this report in accordance with the instructions of their client, Abbey Wood Property Ltd.

2.0 Topography and Site Description

The following commentary has been based on site walkover and topographical information which is to a local grid.

The site is relatively flat with a slight overall fall from north to south with levels across the site range from 1.4m AOD to -0.3m AOD. The levels on site are largely based on current use with an access road and buildings occupying the application site. These levels have been derived from the topographical survey.

Vehicular and pedestrian access to the site is currently via a one way road that runs along the western and southern edge of the application boundary. Access to this road is from Eynsham Drive to the north and west and then the exit from the road is on the A2041. The site is in an area containing residential and commercial developments. A topographic survey of the site is included in [Appendix B](#).

The site is currently occupied by a car wash and a PDSA centre which is to be rehoused within the new development.

The total site area is approximately 0.628ha which consists of 0.364ha of impermeable surface. This impermeable area consists of the access roads, tarmac drive areas, parking areas and buildings.

A CCTV survey has been carried out for the existing drainage infrastructure which indicates that surface water and foul mix within the application site and discharge to a combined sewer to the south east of the application site. There is also a culvert along the northern boundary of the application site, which forms part of a main river, the Butts Canal, as defined by the Environment Agency.

3.0 Development Description

The Proposal for the site include demolition of existing car wash and pet hospital and any associated structures and the re-development of the site for a residential-led mixed use development, including buildings ranging from 3 to 17 storeys, comprising a re-provided pet hospital (D1) floorspace, 272 new homes, flexible A1/A2/A3/A4/B1/D1/D2 commercial floorspace, car parking spaces, cycle parking, hard and soft landscaping measures including play space provision and refuse and recycling facilities. The proposed development plans are included in [Appendix C](#).

4.0 Existing Drainage and Site Investigations

There are existing Thames Water combined sewers located in the A2041 to the east of the application site and Eynsham Drive to the north of the application site, a copy of the Thames Water sewer record is included in [Appendix D](#).

The CCTV survey indicates that the site currently discharges surface water and foul water to the combined sewer located within the A2041 to the east of the application site.

There are rainwater pipes and gullies within the parking areas to collect surface water and convey the flows into the combined network.

The ground investigation undertaken indicates that the groundwater levels at the site are relatively high making it unsuitable for soakaway drainage.

5.0 Flood Risk to the Development

A product 4 data request was made to the EA and is referenced KSL 47874 LB, carried out on 30th May 2017.

The flood map indicates that the site is located within flood zone 3. This is land defined as having a 0.5% or greater annual probability of tidal flooding.

Flood Source	Presence *	Notes
Fluvial (River)	X	Not Present (Linked to below)
Tidal (Sea)	✓	Defended, residual risk
Canals	x	Not Present
Groundwater	x	No evidence
Sewers	x	No evidence of flooding
Reservoirs	x	Not Present
Pluvial (Rain)	✓	Areas of surface water flooding associated with hardstanding areas.
Development Drainage	✓	Considered within this report.

*Comments where relevant are discussed below

Fluvial

As described above the Environment Agency flood maps do not identify significant risk from watercourses in this area. The source of flooding is from the River Thames, however, the risk of flooding to the site is sourced from a tidal upsurge rather than an excess of downstream water from precipitation.

There is a watercourse which is culverted through the application site which is not modelled to pose a flood risk to the site. Due to the proximity to this, an Environment Agency permit for flood risk activities will be required. It is not expected that there will be any issues with this as the newly proposed buildings are not to be moved closer to the culvert than the existing buildings.

Tidal

The principal source of flooding within the application site is from a tidal source, along the tidally influenced River Thames. The information regarding flooding at the application site has been derived from detailed modelling of the tidal River Thames through the Thames Tidal Breach modelling which was completed by CH2M HILL in 2015. This model is based on the Thames Estuary in channel levels, which take into account flow increases, if the barrier must be opened along with a breach of the existing defences.

The site is located 1.6km to the south of the River Thames.

In the event that the defences are breached the model indicates that the water level on the application site would be approximately 1.85mAOD without climate change or 2.34mAOD with climate change in the Q200 (0.5% annual probability) event. The model also indicates that the site could be flooded to a depth of 1.89mAOD without climate change or 2.51mAOD with climate change in the Q1000 (0.1% annual probability) event.

The closest defences to the application site are located at the periphery of the South Mere lake to the north east of the application site. These defences have been designed to a Q1000 flood level and are maintained with a crest level of 7.1mAOD. They are also inspected twice a year by the Environment Agency and the condition of the defences is scored from a maximum of 1 (very good) to a minimum of 5. The defences which serve the application site scored a 2.

The floor level of the newly constructed building is proposed to be 0.95mAOD, therefore, the building may experience a flood depth of 1.56m in the Q1000 event with an allowance for climate change in a breach event. The first floor mainly consists of commercial development and undercroft parking with only 9 residential ground floors of town houses. Commercial development is categorised as “Less Vulnerable”. Due to the nature of the flooding (occurring only in a breach event), the site occupiers should sign up to the Environment Agency early warning system as and a flood evacuation plan along the A4021 to the south should be implemented as detailed below:-

- i) Flood warning – any future owner/occupier to sign up to the government Flood Information service. This is a free service that sends you a direct message when any expected flooding may affect your property. Flood warnings will give time to prepare for flooding, which could save time, money and heartache. Warnings can be received by telephone, mobile, email, SMS text message or fax. This can be arranged using the online service available through the government website.
- ii) Flood emergency plan – this is a detailed plan to be prepared to identify a safe route in the event of an evacuation. In this instance, the safe route is in a southerly direction along the A4021.

By signing up to these warnings, the risk to life can be mitigated and be deemed as residual. As well as this, the building and in particular the ground floor level of the building should be designed in a resilient way, to protect property as much as reasonable possible in a flood event. The site is justifiable as it is to be constructed on previously developed land. The development can be used as an opportunity to raise awareness of the risks involved with the location of the application site and to positively reinforce the Flood Warning and Flood emergency plan.

As the site is within an area with a large amount of development, it is assumed that the condition of these defences will continue to be managed in to the future.

There is historical information relating to a flood which affected the application site, which took place in 1953 where a storm surge caused a level in the channel of 5.1mAOD. Given that current defences are now designed to be effective to a level of 7.1mAOD this surge would no longer have such a large-scale implication as the historical flood.

Groundwater

There is no indication that there is any risk of groundwater flooding at the application site.

Pluvial

There are areas at risk of surface water flooding on the existing hardstanding areas of the application site which will be improved following the implementation of the drainage strategy as outlined in section 6.

Sewers

There are no reported incidences of sewer flooding within Thames Water response.

6.0 Proposed Drainage Strategy

Foul Drainage

The site is currently discharging foul flows into the combined network to the south east of the application site. Based on 150 litres per wash, 200 washes per day and a peak loading of 6, the foul flow rate for the car wash has been calculated as 2.08l/s. Based on the PDSA building currently having 13 full time employees (471m² GIA, 36m² per employee derivation), and a loading of 450 litres per employee per day, a peak foul loading of 0.41l/s has been calculated. The combined foul loading from the two buildings equates to 2.49l/s.

It is proposed that foul water from the development will continue to discharge via the public combined sewer to the south east of the application site. The estimated foul loading based on the continued discharge of 0.41l/s from the retained PDSA, with an additional commercial space of 213m² with an estimated 11 full time employees and 271 residential dwellings, a peak foul load of 12.99l/s has been calculated.

Surface Water Drainage

Within Part H of the Building Regulations there is a hierarchy of discharge options to deal with surface water drainage. These are:-

- i) Soakaways;
- ii) Discharge to watercourse;
- iii) Connection to Public Sewer.

Information within the Site Investigation indicates that groundwater levels at the application site are high. Therefore, it is unlikely that soakaway drainage will be a viable method of surface water disposal at the application site.

There is a culverted watercourse within the application boundary. The topographical survey indicates that the soffit level of the pipe through the site is approximately 0.17mAOD. Given that the existing levels to the south of the application site are -0.21mAOD in the access road area, which is proposed to be raised to approximately 0.6mAOD as part of the development process, a gravity surface water connection will not be viable to this feature. As this culvert has a slacker gradient than any newly installed pipe within the network, "chasing" this culvert for a gravity connection will not be viable.

The site is currently discharging surface water into the public combined sewer to the south east of the application site. It is proposed to continue to discharge to the combined sewer.

Greenfield run off rate calculations have been carried out in accordance with ICP SUDS methodology resulting in the following based on a site area of 0.628ha. According to the London Plan 2016, runoff from the application site should be limited to the greenfield rate. This is included within [Appendix F](#) and summarised below: -

Storm event	Greenfield run off (l/s)
Qbar	0.2
1:30 year	0.5
1:100 year	0.7

The existing site has a large component of hard standing access road, paved driveways and roof area equating to approximately 0.364ha. The existing run-off rate is therefore greater than green field runoff figures and is estimated to be l/s based on a nominal 50mm/hour storm combined with the remaining 40% of the Qbar greenfield rate.

$$\text{Flow} = (0.000278 \times 50 \times 3640) + (0.4 \times 0.2) = 50.68\text{l/s}$$

The London Plan 2016 indicates that all new sites should be restricted back to greenfield rates. Therefore, flows from the site will be restricted to 2l/s for all event up to the Q100 + 40% allowance for climate change. It is proposed to restrict surface water from the development at the above rate by using a hydrobrake or other similar approved device and 2l/s is the approximate minimum discharge rate achievable with a minimum maintainable orifice size of 75mm. It is proposed to retain surface water on site for all storm events up to the 1:100 year event allowing for climate change growth. A calculation has been undertaken to determine the approximate volume of attenuation that would be required for the 1:100 year + 40% (climate change) discharge rate. This is based on an impermeable area of 0.502ha based on the site proposals. This is included within [Appendix F](#) and also summarised below: -

Storm event	Discharge Rate (l/s)	Approximate storage volume required (m ³) (Total)
1:100 year + 40%	2l/s	340m ³

To accommodate the 1 in 100 year + 40% allowance for climate change it is proposed that below ground storage will be used and this storage will be located within the proposed undercroft car park area and access road area of the site.

An illustrative drainage plan is included in [Appendix C](#).

Total Drainage

Currently the application site is discharging a total of 53.17l/s (foul and surface) into the combined network in a nominal 50mm/hour storm. Following the development, there will be an increase in foul, but a reduction in surface water, equating to a flow of approximately 14.99l/s in the same storm event. Therefore, it is assumed that capacity will likely exist within the combined network. Prior to connection, a capacity check should still be carried out with Thames Water to ensure capacity exists within their network.

Pollution Control

In keeping with best practice consideration must be given to pollution control of surface water run-off. The impermeable areas are predominantly roof areas with some also associated with the access road. This will be considered further at detailed design stage and might incorporate petrol interceptors or permeable paving in areas to help improve quality of surface water effluent.

7.0 Conclusion

The FRA and drainage strategy document has been prepared by Shear Design on behalf of Abbey Wood Property Ltd for the construction of a new mixed residential and commercial development at Eynsham Drive, Abbey wood.

The flood data acquired from the EA shows the principle mechanism whereby the site may become flooded, is from tidal flooding along the River Thames.

As the site will only become flooded in a breach event, the risk to life can be mitigated using the following measures:

- i) Flood warning – any future owner/occupier to sign up to the government Flood Information service. This is a free service that sends you a direct message when any expected flooding may affect your property. Flood warnings will give time to prepare for flooding, which could save time, money and heartache. Warnings can be received by telephone, mobile, email. SMS text message or fax. This can be arranged using the online service available through the government website.
- ii) Flood emergency plan – this a detailed plan to be prepared to identify a safe route in the event of an evacuation. In this instance, the safe route is in a southerly direction the A4021.

By carrying out the measures above, and due to the good condition of the flood defences, the residual risk to the site is perceived to be low, as the application site will be evacuated prior to a flood scenario. The development can be used as an opportunity to raise awareness of the risks involved with the location of the application site and to positively reinforce the Flood Warning and Flood emergency plan.

There is a culvert through the application site, which contains the Butts Canal, a main river, as defined by the EA. Prior to construction an environmental permit for flood risk activities will need to be obtained from the EA, however, as the proposed building is not to be moved closer to the culvert than the existing building it is not anticipated that any problems will arise from this.

Both surface water and foul water connect into the Thames Water combined network to the south east of the application site. By reducing surface water flows with the required attenuation to the greenfield rates in line with the London Plan 2016, the combined flow rate in a nominal 50mm/hour storm will be reduced from 53.17l/s to 14.99l/s.

It is proposed that discharge of surface water from the application site will follow the hierarchy of discharge. The proposed method of surface water discharge will comply with Part H of the building regulations. It is proposed that in this instance, surface water should discharge to the adopted combined sewer which it already discharges into, but at a significantly reduced rate.

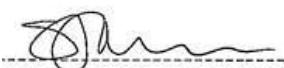
Before discharging to the combined sewer, the site will require restriction of development flows in order to achieve /s in the Q100 + 40% storm. In order to achieve this, attenuation will be required, potentially in the form of below ground storage and will accommodate all flows up to and including the 1 in 100 year storm event plus an additional 40% allowance for climate change. The attenuation volume requirement is approximately 340m³, in order to reduce rates back to the greenfield rate.

Report prepared by: -



ON BEHALF OF SHEAR DESIGN LTD
PAUL GRAHAM BSc (Hons) AMCIWEM
GRADUATE ENGINEER

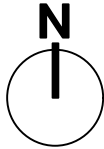
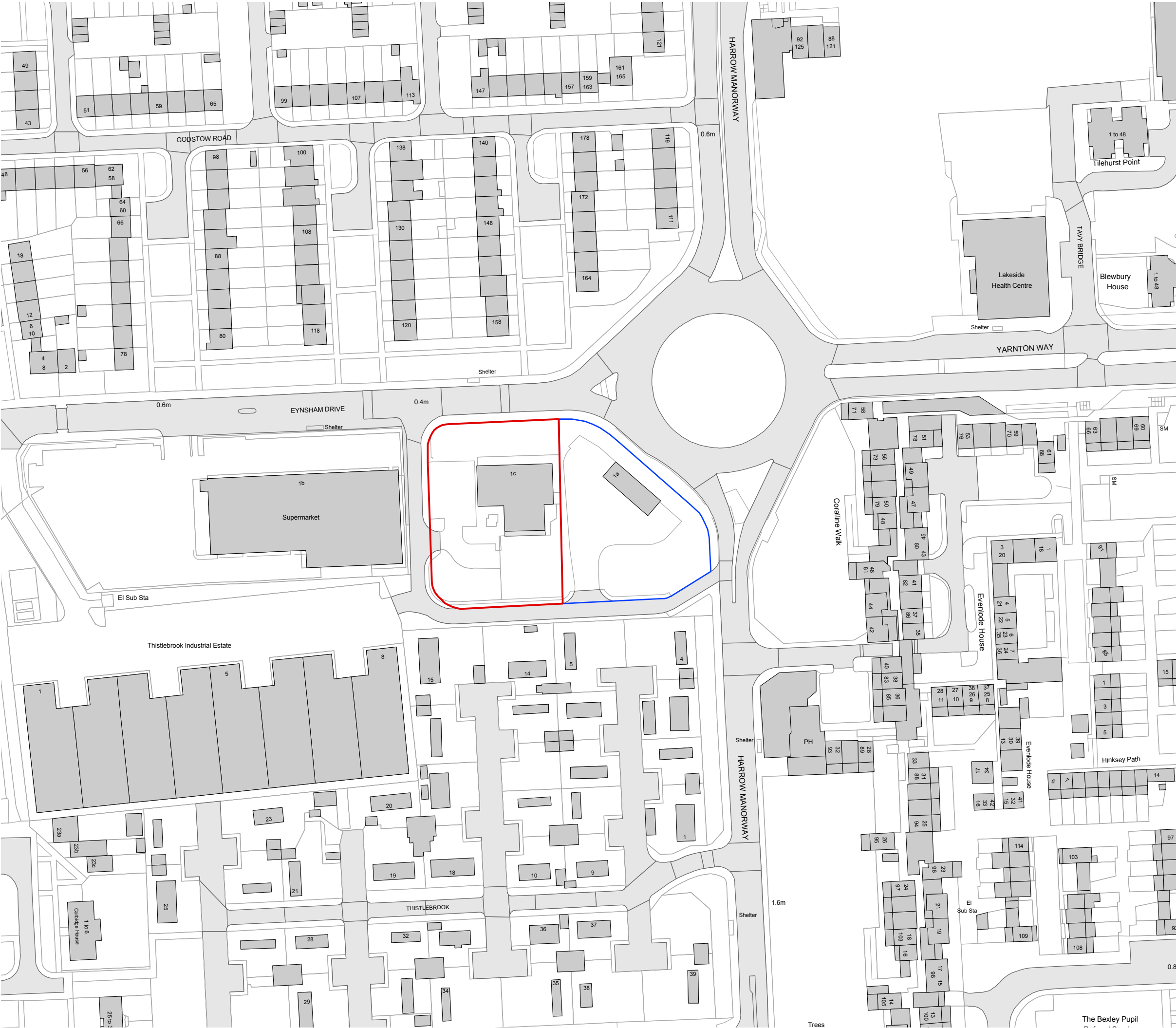
Approved by: -



ON BEHALF OF SHEAR DESIGN LTD
SIMON MASON I.Eng, A.M.I Struct.E
DIRECTOR

APPENDIX

A) SITE LOCATION PLAN



General notes

All setting out must be checked on site
All levels must be checked on site and refer to
Ordnance Datum Newlyn unless alternative Datum given
All fixings and weatherings must be checked on site
All dimensions must be checked on site
This drawing must not be scaled
This drawing must be read in conjunction with all other
relevant drawings , specification clauses and current design risk
register
This drawing must not be used for land transfer purposes
Calculated areas in accordance with Assael Architecture's
Definition of Areas for Schedule of Areas
This drawing must not be used on site unless issued for
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Subject to survey, consultation and approval from all statutory
Authorities

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Drawing notes

Electronic file reference

A2874 Eynsham Drive Plans Working

Status R:	Revision	Date	DRN	CHK	CDM
1	For Information	17/02/17	KC	LT	

Purpose of information

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	Information	<input checked="" type="checkbox"/>
All information on this drawing is not for construction unless it is marked for construction.	Comment	<input type="checkbox"/>
	Client approval	<input type="checkbox"/>
	Construction	<input type="checkbox"/>

Key:	
	Site boundary PDSA pet hospital
	Site boundary car wash facility

Client

**Abbey Wood
Property Ltd**

Project title

**Eynsham Drive,
Abbey Wood**

Drawing title

**Site Location Plan
PDSA Pet Hospital Site**

Scale @ A3 size Date

1:1250 Feb '17

Drawing N° Status & Revision

A2874 110 R1

Assael

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APPENDIX

B) TOPOGRAPHICAL SURVEY

179620N
547240E

547280E

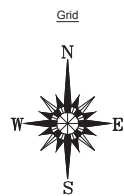
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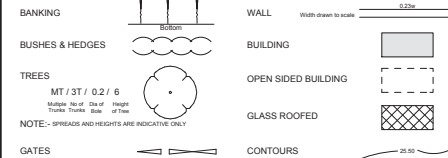
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Sheet Layout

16324-100

LEGEND



ABBREVIATIONS (WHERE APPLICABLE)

ARCH HEAD HEIGHT	AHH	MARKER	MKR
ARCH HEAD LEVEL	AHL	MONITORING WELL	MW
ARCH SPRINGER HEIGHT	ASH	NOTICE BOARD	NB
ARCH SPRINGER LEVEL	ASL	NAME PLATE	NP
AIR VALVE	AV	OVERHEAD WIRES	CHW
BED LEVEL	BL	PARKING METER	PM
BELISHA BEACON	BB	RIDGE LEVEL	RL
BOLLARD	B	ROOF LEVEL	RS
BRITISH TELECOM BOX	BTB	ROAD SIGN	RE
BRITISH TELECOM MANHOLE	BTMH	RODDING EYE	RTW
BRICKWORK	BKWK	RETAINING WALL	RWP
BUS STOP	BS	RAIN WATER PIPE	SV
CABLE TV	CATV	SLUICE VALVE	SC
COVER LEVEL	CL	STOP COCK	SC
CABLE MARKER	CM	SOFFIT LEVEL	SOF
COLUMN	Col	STRUCTURAL SLAB LEVEL	SSL
CONCRETE POST	CP	TREE STUMP	ST
EAVES LEVEL	EAV	SOIL AND VENT PIPE	SVP
ELECTRICAL COVER	ELEC	THRESHOLD LEVEL	THL
ELECTRICITY CONTROL BOX	ECB	TELEGRAPH POLE	TP
ELECTRICITY POLE	EP	TELEPHONE CALL BOX	TCB
EARTH ROD	ER	TOP OF KERB	TK
FLOWER BED	FB	TURNSTILE	TS
FINISHED FLOOR LEVEL	FFL	TRAFFIC LIGHT	TL
FIRE HYDRANT	FH	TOP OF WALL	TW
FLOOR LEVEL	FL	UNABLE TO LIFT	UTL
FLAG STAFF	FS	UNABLE TO SURVEY	UTS
GAS PIPE	GP	VENT PIPE	VP
GAS VALVE	GV	WATER METER	WM
GULLY	G	WATER LEVEL	WL
GATE STOP	GS	WASH OUT	WO
INSPECTION COVER	IC	WASTE PIPE	WP
INVERT LEVEL	IL	WATER TANK	WT
LAMP POST	LP	WATER VALVE	WV

FENCES

BARBED WIRE FENCE	BWF	LARCH LAP FENCE	LLF
CORRUGATED IRON FENCE	CIF	METAL RAILING FENCE	MRF
CLOSE BOARD FENCE	CBF	POST AND CHAIN FENCE	PCF
CHAIN LINK FENCE	CLF	PICKET FENCE	PIF
CHESTNUT PALING FENCE	CPF	POST AND RAIL FENCE	PRF
FENCE POST	FPO	POST AND WIRE FENCE	PWF
INTERWOVEN FENCE	IWF	STEEL PALISADE SECURITY FENCE	SPSF
IRON RAILING FENCE	IRF	TUBULAR STEEL RAIL FENCE	TSRF

REV.	NOTES	DWN	DATE
A	---	---	---



Notes:

Grid and levels relate to OS GPS Active Network.
Sheet is North orientated unless stated.

Maltby Surveys Ltd



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WEST SUSSEX
RH16 1EB
Tel: 01444 416246
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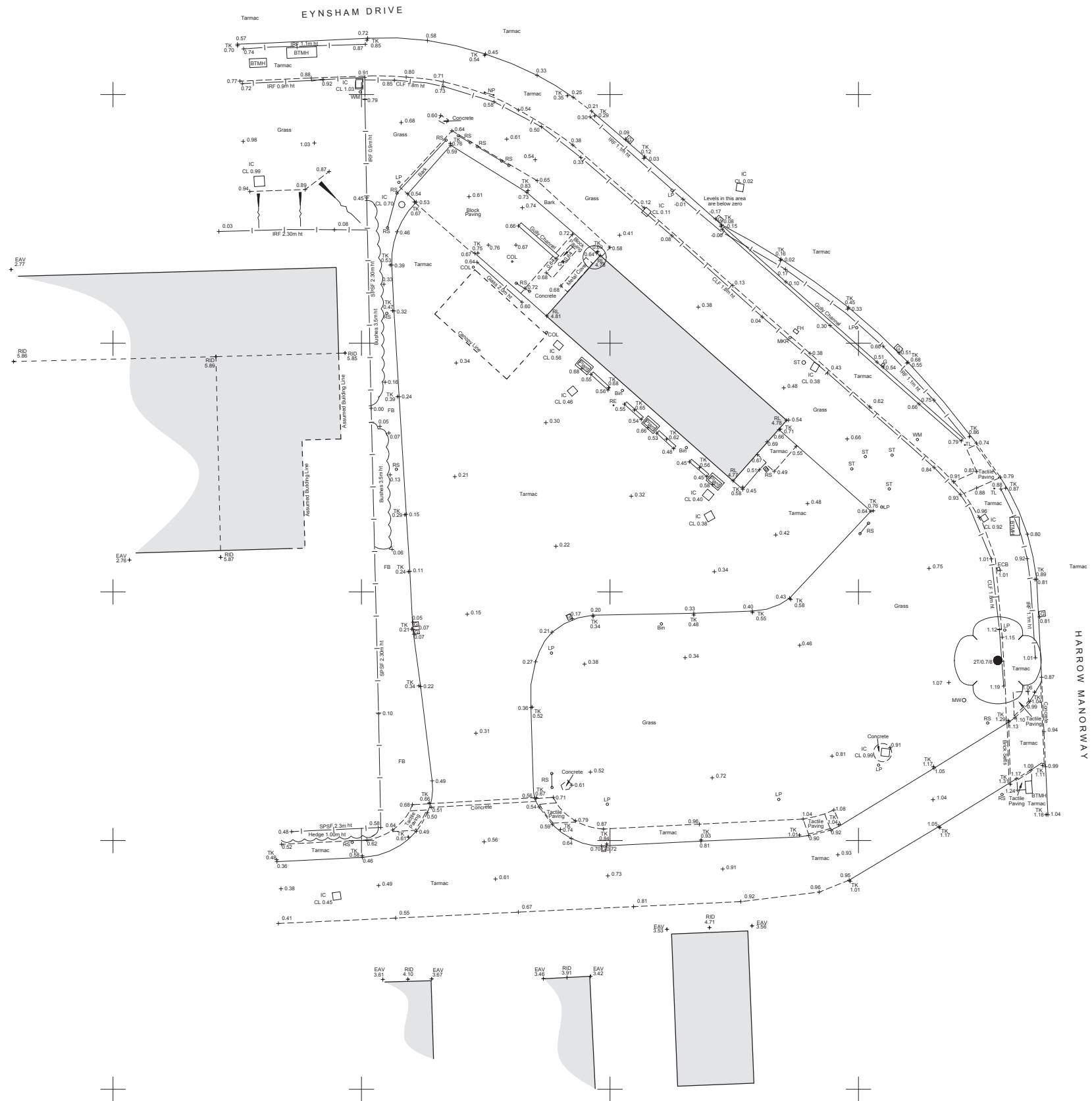
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DRAWN	MT	JMH Group
CHECKED	SJ	SCALE
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1A Eynsham Drive, Thamesmead, SE2 9RD

TOPOGRAPHICAL SURVEY

Job No	Rev	Drawing Number
16/324		16/324/100

Date : Oct 2016



APPENDIX

C) PROPOSED SITE PLAN AND ILLUSTRATIVE DRAINAGE PROPOSALS



NOTES

GENERAL

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
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KEY

- PROPOSED FOUL SEWER
- PROPOSED SURFACE WATER SEWER
- PROPOSED ATTENUATION CRATE

A	11.09.18	AMENDED TO LATEST LAYOUT	PG	MJ
REV	DATE	DESCRIPTION	BY	CHK
AMENDMENTS				

CLIENT: ABBEY WOOD PROPERTY LTD

PROJECT: EYNSHAM DRIVE
ABBAY WOOD

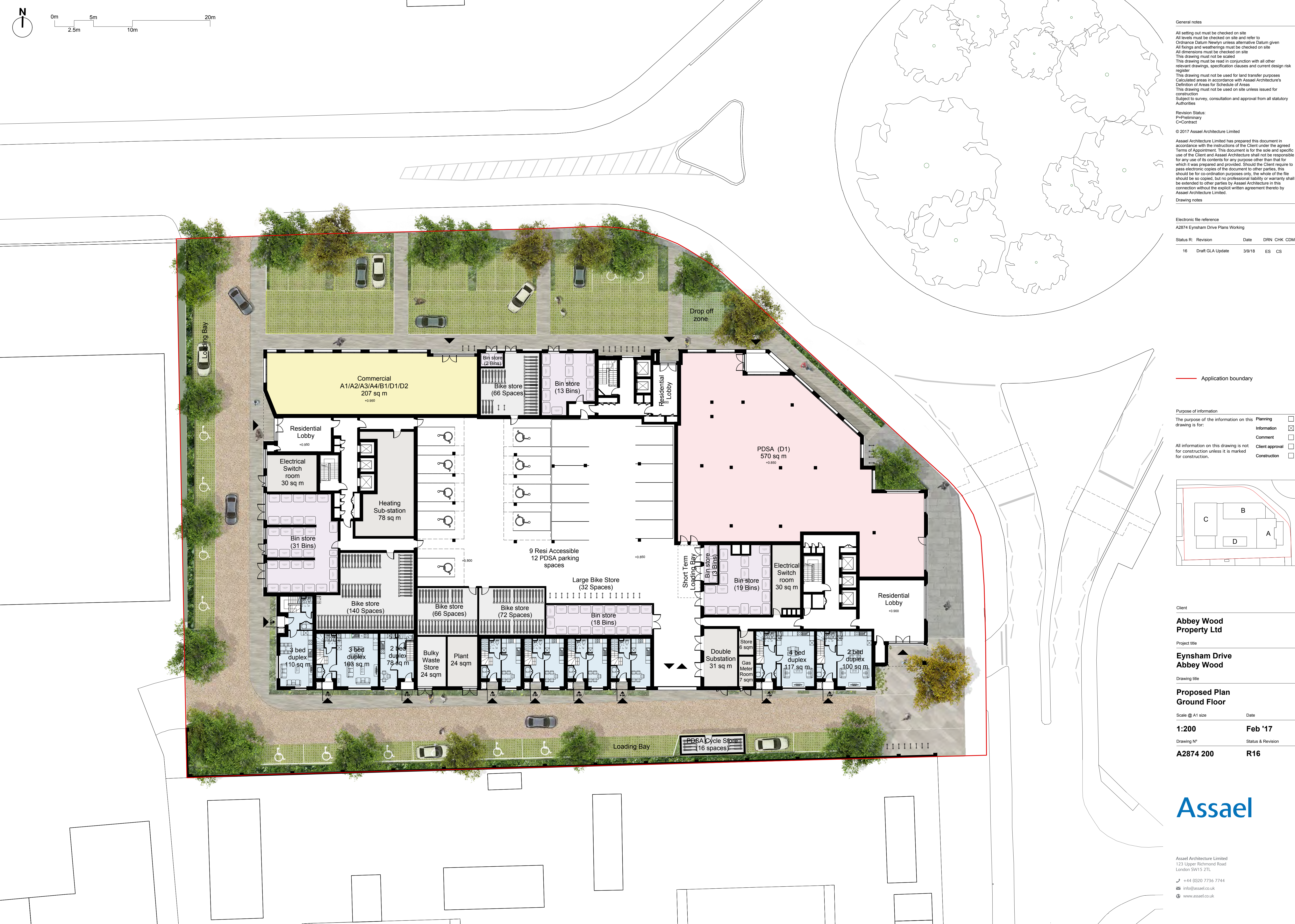
TITLE: INDICATIVE DRAINAGE STRATEGY

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DRAWN	PG	CHECKED	SM	DATE	SCALE
				AUGUST 2017	1:200 @ A1

STATUS KEY: I = INFORMATION P = PRELIMINARY A = APPROVAL CO = CONTRACT
T = TENDER C = CONSTRUCTION AB = AS-BUILT

STATUS	DRAWING NUMBER	REVISION
P	17050-101	A



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Ordinance Datum Newlyn unless alternative Datum given
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This drawing must not be scaled
This drawing must be read in conjunction with all other
relevant drawings, specification clauses and current design risk
register
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Definition of Areas for Schedule of Areas
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Drawing notes

Electronic file reference					
A2874 Eynsham Drive Plans Working					
Status R:	Revision	Date	DRN	CHK	CDM
	16	Draft GLA Update	3/9/18	ES	CS

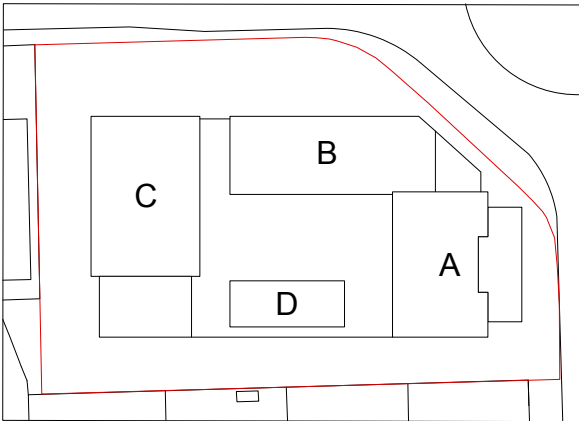
Application boundary

Purpose of information

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Client

**Abbey Wood
Property Ltd**

Project title

**Eynsham Drive
Abbey Wood**

Drawing title

**Proposed Plan
Ground Floor**

Scale @ A1 size	Date
1:200	Feb '17
Drawing N°	Status & Revision
A2874 200	R16

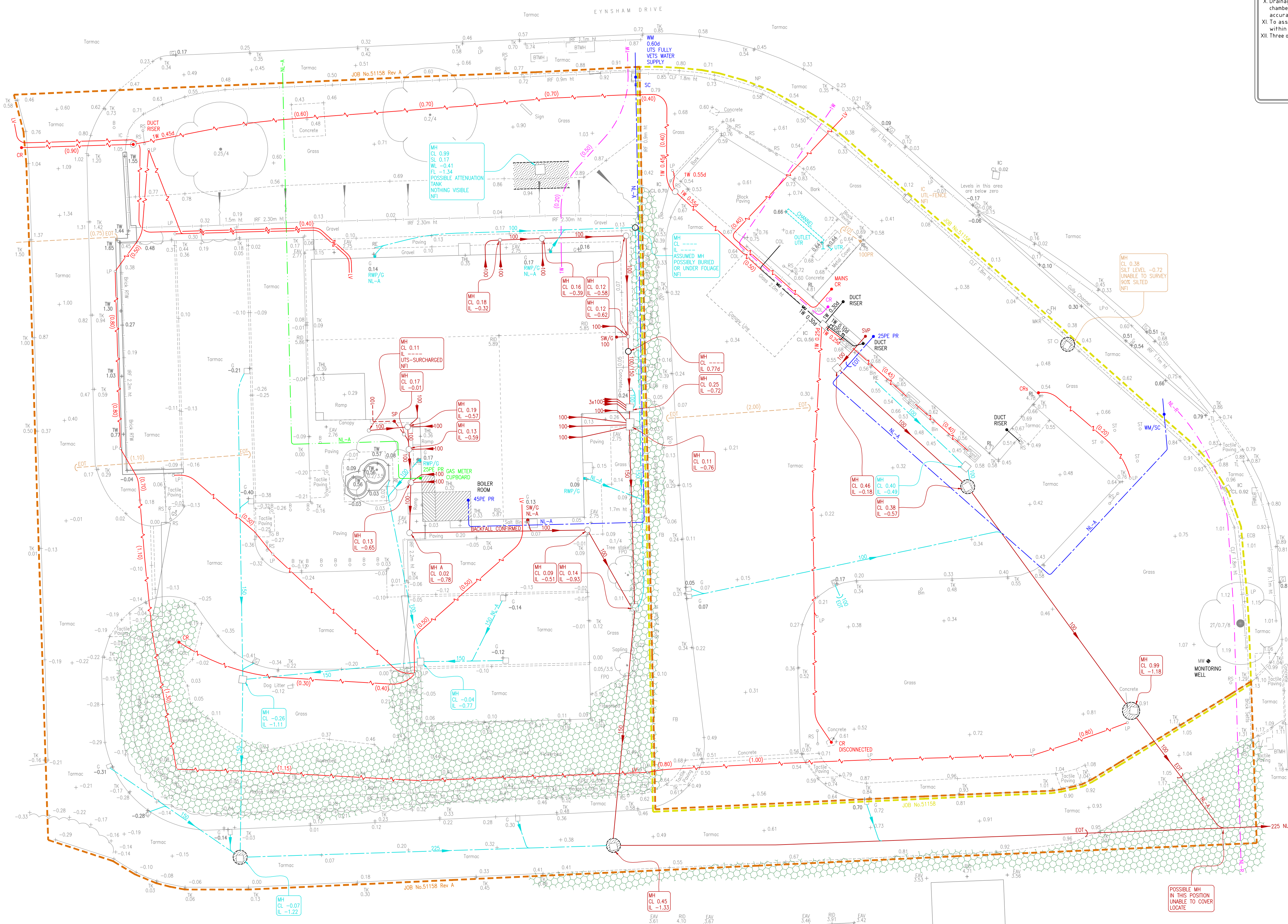
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+44 (0)20 7736 7744
info@assael.co.uk
www.assael.co.uk

APPENDIX

D) THAMES WATER MAPS AND SERVICES PLAN



Type of survey
Topographical ☐ Drainage ☒ Services ☒

Notes for underground services
I. A combination of electromagnetic techniques & ground penetrating radar have been used, as appropriate, in the location of underground services and drains. The results are not infallible and trial excavations should be carried out to confirm service identification, positions and particularly depths, where these are critical. Although all reasonable effort has been made in searching available record drawings, the completeness of the underground services information cannot be guaranteed.
II. Where no cover level is available, depths to pipe inverts are shown thus, **IL 0.954**
III. Depths of services at inspection chambers, where possible, are shown thus, **0.954**
IV. Depths obtained electronically are generally to the centre of the service and are shown thus, **(0.80)**
V. Number of duct ways, where known, shown thus, **2W**
VI. Pipe sizes, which cannot be obtained by visual survey, are taken from record drawings/marker plates where available.
VII. Cable routes shown as a single line may actually consist of many cables.
VIII. Electric cable routes shown are assumed to be LV unless otherwise annotated
IX. Information taken from records is suffixed thus, (R)
X. Drainage pipe sizes & invert levels have been determined without man entry into chambers. Every effort has been made to correctly obtain this information, however, accuracy is dependent on visibility from the surface.
XI. To assist with clarity of presentation, services and drains have been extended within buildings.
XII. Three or more GPR reflections are required to be shown as an assumed linear service.

Key for underground services
Foul/Combined water drain
Foul/Combined drain 300P and above
Surface water drain
Surface water drain 300P and above
Pumping main
End of trace
Electric cables
HV cables
EHV cables
Band of electric cables
Earthing strap
Gas low pressure
Gas medium pressure
Gas high pressure
Water
Telephone
Cable
Multiuser ducts
End of trench scar
Unidentified
GPR reflection
Overhead service
Characteristic change
Survey boundary November 2016
Survey boundary May 2017

Where chamber extents are significantly greater than the cover size, their approximate extents are shown thus;

Inaccessible areas, shown thus;

Inaccessible areas due to vegetation, shown thus;

Abbreviations for underground services
AC Asbestos cement
ALK Alkathene
AV Air valve
BD Back drop
BH Bore hole
Br Brick
BTIC British Telecom inspection chamber
BTMH British Telecom manhole
CA Compressed air
CATV Cable tv
CCTV Closed circuit television
CH Coal hole
CI Cast iron
CL Cover level
CM Cable marker
CONC Concrete
C/PIT Catch pit
CU Copper
CR Cable riser
DB Direct buried
DI Ductile iron
ECP Electric cable pit
EHV Extra high voltage
EJB Electric joint box
EP Electricity pole
ER Earthing rod
ES Steel
FH Fire hydrant
FL Floor level
FI Flood light
F/O Fibre optic
FP Feeder pillar
G Gully
GM Gas meter
GPR Ground penetrating radar
GV Gas valve
HV High voltage
IC Inspection chamber
IL Invert level
Kv Kilo volts
LD Land drain
LH Lamp hole
LP Lamp post
LPG Liquid petroleum gas
LV Low voltage
MDPE Medium density polyethylene
MH Manhole
Mkr Marker post
NFI No further information
NL-A Not located - route assumed
NL-I Not located - route plotted from on-site information
NL-R Not located - route plotted from records
NL-T Not located - plotted from visible trench scar detail
NRV Non return valve
NS No signal
o/h Overhead
PE Polyethylene
PE Pot ended
PR Pipe riser
PRV Pressure reducing valve
PVC Polyvinyl chloride
RE Rodding eye
RS Road sign
RWP Rain water pipe
S/A Soakaway
SC Stop cock
SE Side entry
SE Span iron
SL Soffit level
SP Soil pipe
ST Steel
SV Stop valve
SVP Soil vent pipe
SW Sink waste
TEB Telephone call box
T/I Trapped inlet
T/O Trapped outlet
TP Telephone pole
UTG Unable to gain access
UTR Unable to rod
UV Unable to survey
UTT Unable to trace
VC Vitrified clay
VP Vent pipe
WL Water level
WM Water meter
WO Wash out

A Survey area extended covering the vets and access road
REV NO REV NOTE
DATE SIGNED DREID

Subsight
SURVEYS LIMITED
Unit 5
Braunston Business Park
London Road
Braunston
Dorset
Northants, NN11 7HB
T: 01788 891721
E: mail@subsight.co.uk
W: www.subsight.co.uk

Client **Maltby Land Surveys Ltd**

Title **Location of Underground Services and Drains Eynsham Drive London**

Surveyed DC/GB/DB Date May 2017
Drawn DC Scale 1:200@A1
Checked MPW

Drawing No. **51158** Rev. **A**

The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 547305,179577

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

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

APPENDIX

E) SITE PHOTOGRAPHS










APPENDIX

F) CALCULATIONS

Shear Design Ltd		Page 1																								
7 Ashtree Court Woodsy Close Cardiff Gate Business Park																										
Date 09/08/2017 17:02 File	Designed by paul.graham Checked by																									
Causeway	Source Control 2017.1.2																									
<p style="text-align: center;"><u>ICP SUDS Mean Annual Flood</u></p> <p style="text-align: center;">Input</p> <table><tr><td>Return Period (years)</td><td>100</td><td>Soil</td><td>0.150</td></tr><tr><td>Area (ha)</td><td>0.628</td><td>Urban</td><td>0.000</td></tr><tr><td>SAAR (mm)</td><td>600</td><td>Region Number</td><td>Region 6</td></tr></table> <p style="text-align: center;">Results 1/s</p> <table><tr><td>QBAR Rural</td><td>0.2</td></tr><tr><td>QBAR Urban</td><td>0.2</td></tr><tr><td>Q100 years</td><td>0.7</td></tr><tr><td>Q1 year</td><td>0.2</td></tr><tr><td>Q30 years</td><td>0.5</td></tr><tr><td>Q100 years</td><td>0.7</td></tr></table>			Return Period (years)	100	Soil	0.150	Area (ha)	0.628	Urban	0.000	SAAR (mm)	600	Region Number	Region 6	QBAR Rural	0.2	QBAR Urban	0.2	Q100 years	0.7	Q1 year	0.2	Q30 years	0.5	Q100 years	0.7
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©1982-2017 XP Solutions																										

Shear Design Ltd		Page 1					
7 Ashtree Court Woodsy Close Cardiff Gate Business Park							
Date 10/08/2017 11:28 File STORAGE CALC.SRCX							
Designed by paul.graham Checked by							
Causeway		Source Control 2017.1.2					
<u>Summary of Results for 100 year Return Period (+40%)</u>							
Half Drain Time : 1489 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	-0.601	0.399	0.0	1.9	1.9	135.6	O K
30 min Summer	-0.489	0.511	0.0	1.9	1.9	173.9	O K
60 min Summer	-0.379	0.621	0.0	1.9	1.9	211.2	O K
120 min Summer	-0.277	0.723	0.0	1.9	1.9	245.8	O K
180 min Summer	-0.225	0.775	0.0	1.9	1.9	263.4	O K
240 min Summer	-0.194	0.806	0.0	1.9	1.9	274.1	O K
360 min Summer	-0.159	0.841	0.0	1.9	1.9	285.9	O K
480 min Summer	-0.140	0.860	0.0	1.9	1.9	292.3	O K
600 min Summer	-0.132	0.868	0.0	1.9	1.9	295.2	O K
720 min Summer	-0.130	0.870	0.0	1.9	1.9	295.9	O K
960 min Summer	-0.138	0.862	0.0	1.9	1.9	293.2	O K
1440 min Summer	-0.174	0.826	0.0	1.9	1.9	280.9	O K
2160 min Summer	-0.225	0.775	0.0	1.9	1.9	263.4	O K
2880 min Summer	-0.273	0.727	0.0	1.9	1.9	247.2	O K
4320 min Summer	-0.362	0.638	0.0	1.9	1.9	217.1	O K
5760 min Summer	-0.456	0.544	0.0	1.9	1.9	185.0	O K
7200 min Summer	-0.538	0.462	0.0	1.9	1.9	157.2	O K
8640 min Summer	-0.606	0.394	0.0	1.9	1.9	133.9	O K
10080 min Summer	-0.665	0.335	0.0	1.9	1.9	113.8	O K
15 min Winter	-0.553	0.447	0.0	1.9	1.9	152.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	146.317	0.0	129.2	27			
30 min Summer	94.118	0.0	156.5	41			
60 min Summer	57.587	0.0	213.2	72			
120 min Summer	34.065	0.0	250.9	130			
180 min Summer	24.754	0.0	271.8	190			
240 min Summer	19.637	0.0	285.2	248			
360 min Summer	14.105	0.0	299.4	368			
480 min Summer	11.159	0.0	302.7	486			
600 min Summer	9.299	0.0	301.8	604			
720 min Summer	8.009	0.0	299.7	724			
960 min Summer	6.323	0.0	294.0	962			
1440 min Summer	4.526	0.0	281.0	1256			
2160 min Summer	3.236	0.0	435.9	1628			
2880 min Summer	2.548	0.0	456.8	2024			
4320 min Summer	1.818	0.0	483.3	2860			
5760 min Summer	1.429	0.0	515.9	3632			
7200 min Summer	1.186	0.0	534.8	4392			
8640 min Summer	1.017	0.0	550.3	5104			
10080 min Summer	0.894	0.0	563.1	5768			
15 min Winter	146.317	0.0	142.7	26			
©1982-2017 XP Solutions							

Shear Design Ltd		Page 3																																										
7 Ashtree Court Woodsy Close Cardiff Gate Business Park																																												
Date 10/08/2017 11:28 File STORAGE CALC.SRCX																																												
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<p style="text-align: center;"><u>Rainfall Details</u></p> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>0.750</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>0.840</td> </tr> <tr> <td>M5-60 (mm)</td> <td>20.300</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.450</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <p style="text-align: center;"><u>Time Area Diagram</u></p> <p style="text-align: center;">Total Area (ha) 0.502</p> <table> <thead> <tr> <th>Time (mins)</th> <th>Area</th> <th>Time (mins)</th> <th>Area</th> <th>Time (mins)</th> <th>Area</th> </tr> <tr> <th>From: To:</th> <th>(ha)</th> <th>From: To:</th> <th>(ha)</th> <th>From: To:</th> <th>(ha)</th> </tr> </thead> <tbody> <tr> <td>0 4</td> <td>0.167</td> <td>4 8</td> <td>0.167</td> <td>8 12</td> <td>0.167</td> </tr> </tbody> </table>			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)	20.300	Shortest Storm (mins)	15	Ratio R	0.450	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	From: To:	(ha)	From: To:	(ha)	From: To:	(ha)	0 4	0.167	4 8	0.167	8 12	0.167
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APPENDIX

G) ENVIRONMENT AGENCY FLOOD DATA

Product 4 (Detailed Flood Risk) for: Land at Eynsham Drive, Abbeywood, SE2 9RD

Requested by: Mike Snell, Shear Design Ltd

Reference: KSL 47874 LB

Date: 30 May 2017

Contents

- Flood Map for Planning (Rivers and Sea)
- Flood Map Extract
- Thames Estuary 2100 (TE2100)
- Thames Tidal Breach Modelling
- Thames Tidal Breach Modelling Map
- Site Node Locations Map
- Defence Details
- Recorded Flood Events Data
- Recorded Flood Events Outlines Map
- Additional Information

The information provided is based on the best data available as of the date of this letter.

You may feel it is appropriate to contact our office at regular intervals, to check whether any amendments/ improvements to the data for this location have been made. Should you re-contact us after a period of time, please quote the above reference in order to help us deal with your query.

Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

Flood Map for Planning (Rivers and Sea)

The Flood Map:

Our Flood Map shows the natural floodplain for areas at risk from river and tidal flooding. The floodplain is specifically mapped ignoring the presence and effect of defences. Although flood defences reduce the risk of flooding they cannot completely remove that risk as they may be over topped or breached during a flood event.

The Flood Map indicates areas with a 1% (0.5% in tidal areas), Annual Exceedance Probability (AEP) - the probability of a flood of a particular magnitude, or greater, occurring in any given year, and a 0.1% AEP of flooding from rivers and/or the sea in any given year. In addition, the map also shows the location of some flood defences and the areas that benefit from them.

The Flood Map is intended to act as a guide to indicate the potential risk of flooding. When producing it we use the best data available to us at the time and also take into account historic flooding and local knowledge. The Flood Map is updated on a quarterly basis to account for any amendments required. These amendments are then displayed on the internet at

<https://www.gov.uk/government/organisations/environment-agency>.

At this Site:

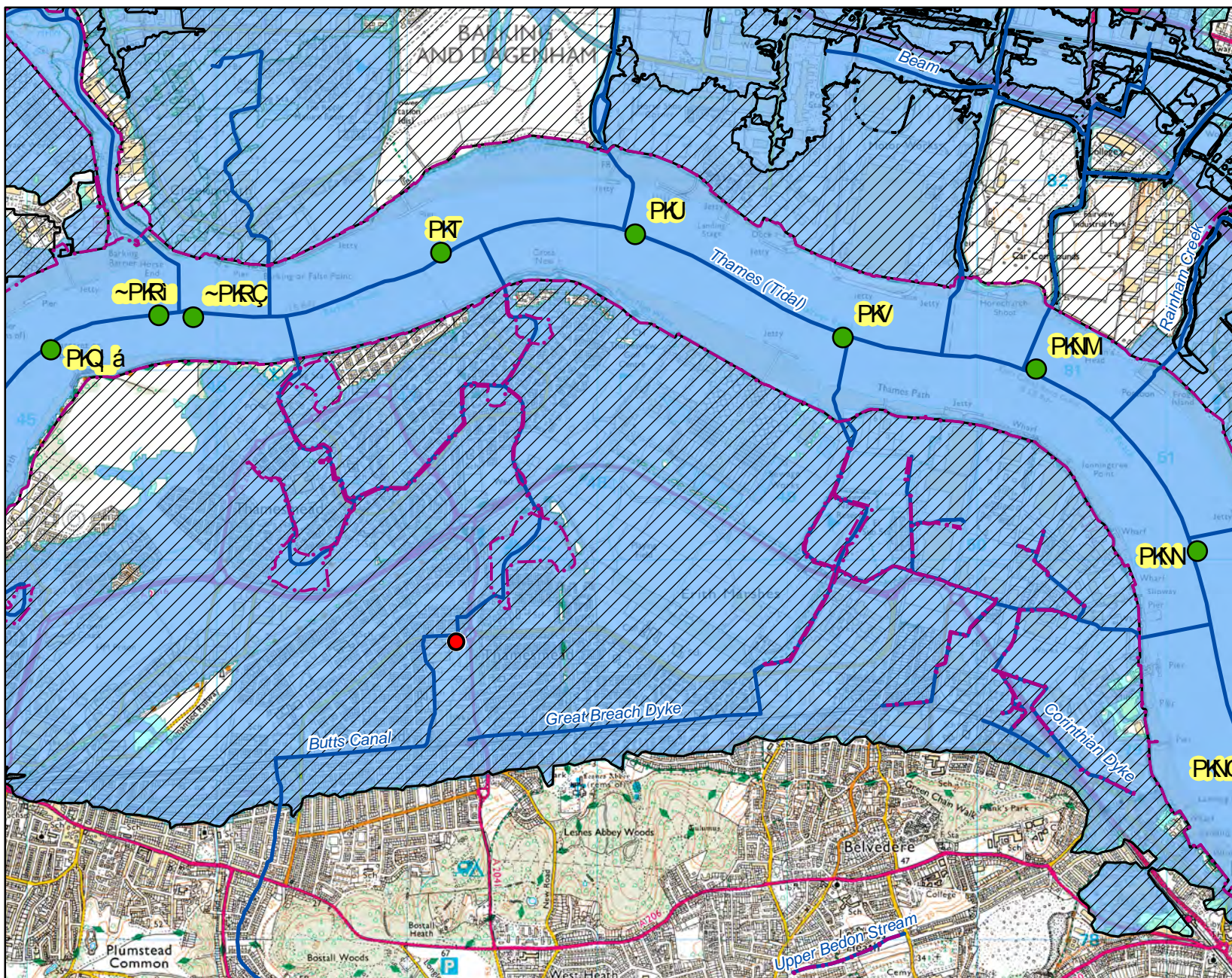
The Flood Map shows that this site lies within the outline of Flood Zone 3. This zone comprises land assessed as having a 0.5% (1 in 200) or greater annual probability of tidal flooding.

Enclosed is an extract of our Flood Map which shows this information for your area.

Method of production

The Flood Map at this location has been derived using detailed modelling of the tidal River Thames through Thames Tidal Defences Study completed in 2006 by Halcrow Ltd.









Detailed FRA/FCA Map centred on SE2 9RD created 30 May 2017 [Ref: KSL 47874 LB]



pÅ~ \dot{E} NAPMMMM



Legend

-  pāÉ≡ çÄ~îçÄ
 qbONM# çÇÉak çÇÉe
 cāççÇj ~é=çā ÉñÇāÉē
 j ~ā=ā āÉ ēē
 cāççÇj ~é=çāççÇpîçē-ÇÉā Éē~ē
 ^Éē~ē=ÉāÉñāāÖñçā =
cāççÇā ÉñÇāÉē
 cāççÇj ~é=çāççÇwçāÉ=P
 cāççÇj ~é=çāççÇwçāÉ=O

**Flood Map for Planning
(assuming no defences)**

Flood Zone 3 = Ügē = iÜē = eÉ = iÜ - iÄ q Ä =
 ~ iÜ iÄ ē = ä = Nē q ä W
 == Nē = iÜ ē = ē = iÄ iÜ = NRB = ē = ē = iÉ ē
 == iÜ iÄ ē = q Ä q Ä ē ē ä = É Ä iÜ ē ē
 == ē = Nē ē = ē ä ē = iÄ = ÄB = ē ē = ē = iÉ ē
 == iÜ iÄ ē = q Ä q Ä ē ē ä = É Ä iÜ ē Ä

Flood Zone 2

Contact Us: k-lā-ā-# i ēica Êē cāl-Ai= ÊaiÉl-m l= çñ-RQI-oçIUÉU-à I-p-SMN vñÉANPTM-RVS-RVS-ç cācūUSTO ā -āŋÊaiÉl Êai ācāā Êai J-CĒAĐCīK ā

Thames Estuary 2100 (TE2100)

You have requested in-channel flood levels for the tidal river Thames. These have been taken from the Thames Estuary 2100 study completed by HR Wallingford in 2008. The modelled node closest to your site is **3.10**; the locations of nearby nodes are also shown on the enclosed map.

Details about the TE2100 plan

The TE2100 plan is now live and within it are a set of levels on which the flood risk management strategy is based. The plan is the overarching flood management strategy for the Thames Estuary and therefore any development planning should be based on the same underlying data.

Details about the TE2100 in-channel levels

The TE2100 in-channel levels take into account operation of the Thames Barrier when considering future levels. The Thames Barrier requires regular maintenance and with additional closures the opportunity for maintenance will be reduced. When this happens, river levels – for which the Barrier would normally shut for the 2008 epoch – will have to be allowed through to ensure that the barrier is not shut too often. For this reason, levels upriver of the barrier will increase and the tidal walls will need to be heightened to match.

For further information about the Thames Barrier please visit our website at:

<https://www.gov.uk/the-thames-barrier>

TE2100 2008 levels:

Levels downriver of the Thames Barrier are 0.1% AEP (1 in 1000) and levels upriver are the highest levels permitted by the Thames Barrier, described as the Maximum Likely Water Levels (MLWLs). The defence levels (left defence, right defence) are the minimum levels to which the defences should be built.

Location	Node	Easting	Northing	Extreme water level (m)	Left defence (m)	Right defence (m)	Allow for future defence raising to a level of...	
							Left Bank (m)	Right Bank (m)
	3.7	547183	181618	6.01	7.30	7.10	8.20	8.20
	3.8	548204	181714	6.01	7.30	7.10	8.20	8.20
Beam River	3.9	549299	181171	6.00	7.20	7.10	8.20	8.20
	3.10	550318	181003	5.98	7.10	7.10	8.10	8.10
	3.11	551166	180048	5.97	7.05	7.10	8.10	8.10
	3.12	551411	179069	5.97	6.90	7.00	8.10	8.10
	3.13	552070	178430	5.97	7.00	7.00	8.10	8.10

TE2100 climate change levels:

Location	Node	Easting	Northing	1000-year design water levels					
				2000	2040	2070	2100	2120	2170
	3.7	547183	181618	6.01	6.22	6.42	6.75	6.95	7.46
	3.8	548204	181714	6.01	6.22	6.41	6.74	6.94	7.44
Beam River	3.9	549299	181171	6.00	6.21	6.40	6.72	6.92	7.42
	3.10	550318	181003	5.98	6.19	6.37	6.70	6.90	7.40
	3.11	551166	180048	5.97	6.18	6.37	6.70	6.90	7.39
	3.12	551411	179069	5.97	6.18	6.36	6.70	6.89	7.38
	3.13	552070	178430	5.97	6.18	6.35	6.69	6.88	7.37

Orchard House, Endeavour Park, London Road, Addington, West Malling, Kent, ME19 5SH.

Customer services line: 01732 223 202

Email: kslenquiries@environment-agency.gov.uk

Website: <https://www.gov.uk/government/organisations/environment-agency>

Thames Tidal Breach Modelling

The table below displays site-specific modelled flood levels at your site. These have been taken from the Thames Tidal Breach Modelling Study 2015 completed by CH2M HILL in March 2015. The exact location of the given site-specific levels and the extent of the breach are shown on the enclosed map.

This modelling simulates tidal breaches along the Thames from Teddington to the Mar Dyke and River Darent. A series of 113 tidal models were developed for the Environment Agency at pre-determined breach locations. These were chosen using a risk-based approach by examining critical locations based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width.

Based on the 2008 TE2100 in-channel levels, the 0.5% (1 in 200 year) and 0.1% (1 in 1000 year) annual probability of exceedance tidal events were modelled for all breach locations downriver of the Thames Barrier. These were modelled for the 2014 year epoch, as well as a 2065 and 2100 epoch which include allowances for climate change.

For breaches upriver of the Thames Barrier, there is no return period for modelled levels as the levels are controlled by barrier closures. The levels used are referred to as Maximum Likely Water Levels (MLWLs). Therefore 2014, 2065 and 2100 epochs were modelled on that basis.

Although these modelled levels are site-specific levels at your site, it is uncertain whether we have captured the most critical breach location for this site. However, the levels we hold should be reasonably appropriate.

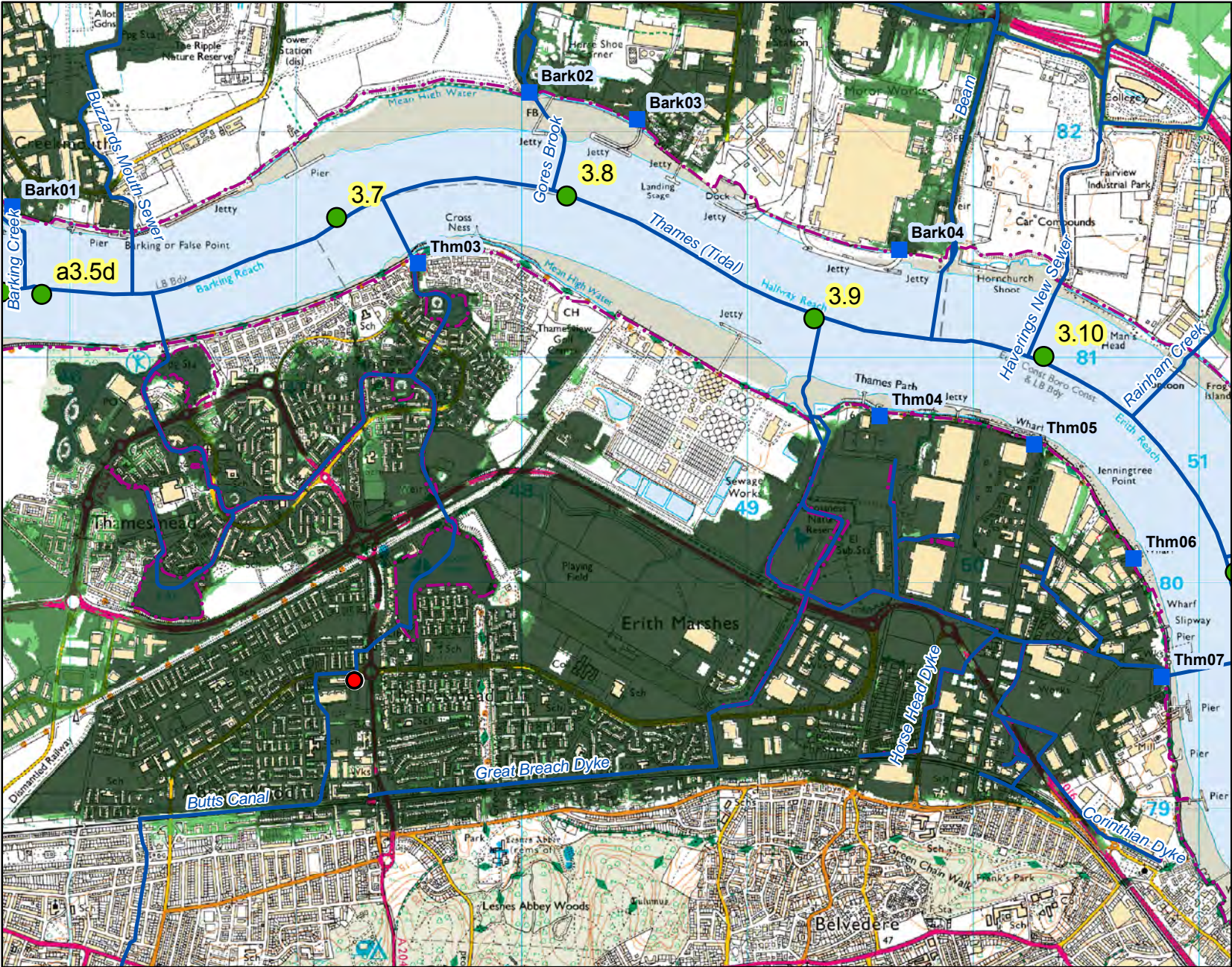
The modelled levels shown assume that the Thames defences have been breached at location 'Thm04' (NGR TQ4958980739), 'Thm05' (NGR TQ5027580613) and 'Thm07' (NGR TQ5083979584).

			Thm04					
National Grid Reference			Modelled levels in mAODN for 0.5% AEP			Modelled levels in mAODN for 0.1% AEP		
Node	Easting	Northing	2014	2065	2100	2014	2065	2100
1	547240	179596	1.36	1.59	1.80	1.44	1.75	1.97
2	547276	179598	1.36	1.59	1.80	1.44	1.75	1.97
3	547307	179584	1.36	1.59	1.80	1.44	1.75	1.97
4	547326	179566	1.36	1.59	1.80	1.44	1.75	1.97
5	547266	179582	Nil return	Nil return	Nil return	Nil return	Nil return	Nil return
6	547297	179566	1.36	1.59	1.80	1.44	1.75	1.97
7	547318	179546	1.36	1.59	1.80	1.44	1.75	1.97
8	547238	179567	1.36	1.59	1.80	1.44	1.75	1.97
9	547268	179556	1.36	1.59	1.80	1.44	1.75	1.97
10	547241	179544	1.36	1.59	1.80	1.44	1.75	1.97
11	547267	179543	1.36	1.59	1.80	1.44	1.75	1.97
12	547290	179544	1.36	1.59	1.80	1.44	1.75	1.97

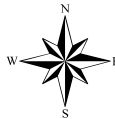
			Thm05					
National Grid Reference			Modelled levels in mAODN for 0.5% AEP			Modelled levels in mAODN for 0.1% AEP		
Node	Easting	Northing	2014	2065	2100	2014	2065	2100
1	547240	179596	1.85	2.11	2.34	1.89	2.24	2.51
2	547276	179598	1.85	2.11	2.34	1.89	2.24	2.51
3	547307	179584	1.85	2.11	2.34	1.88	2.24	2.51
4	547326	179566	1.85	2.11	2.34	1.88	2.24	2.51
5	547266	179582	Nil return	Nil return	Nil return	Nil return	Nil return	Nil return
6	547297	179566	1.85	2.11	2.34	1.89	2.24	2.51
7	547318	179546	1.85	2.11	2.34	1.89	2.24	2.51
8	547238	179567	1.85	2.11	2.34	1.89	2.24	2.51
9	547268	179556	1.85	2.11	2.34	1.89	2.24	2.51
10	547241	179544	1.85	2.11	2.34	1.89	2.24	2.51
11	547267	179543	1.85	2.11	2.34	1.89	2.24	2.51
12	547290	179544	1.85	2.11	2.34	1.89	2.24	2.51

Thm07								
National Grid Reference			Modelled levels in mAODN for 0.5% AEP			Modelled levels in mAODN for 0.1% AEP		
Node	Easting	Northing	2014	2065	2100	2014	2065	2100
1	547240	179596	1.53	1.79	2.03	1.58	1.92	2.17
2	547276	179598	1.53	1.79	2.03	1.58	1.92	2.17
3	547307	179584	1.53	1.79	2.03	1.58	1.92	2.17
4	547326	179566	1.53	1.79	2.03	1.58	1.92	2.17
5	547266	179582	Nil return	Nil return	Nil return	Nil return	Nil return	Nil return
6	547297	179566	1.53	1.79	2.03	1.58	1.92	2.17
7	547318	179546	1.53	1.79	2.03	1.58	1.92	2.17
8	547238	179567	1.53	1.79	2.03	1.58	1.92	2.17
9	547268	179556	1.53	1.79	2.03	1.58	1.92	2.17
10	547241	179544	1.53	1.79	2.03	1.58	1.92	2.17
11	547267	179543	1.53	1.79	2.03	1.58	1.92	2.17
12	547290	179544	1.53	1.79	2.03	1.58	1.92	2.17

Breach Modelling Map centred on SE2 9RD created 30 May 2017 [Ref: KSL 47874 LB]



Scale 1: 25,000



Legend

- Site Location
- TE2100 Model Nodes
- Breach Locations
- Main Rivers
- Flood Map - Defences

Downriver 0.5% AEP Outlines

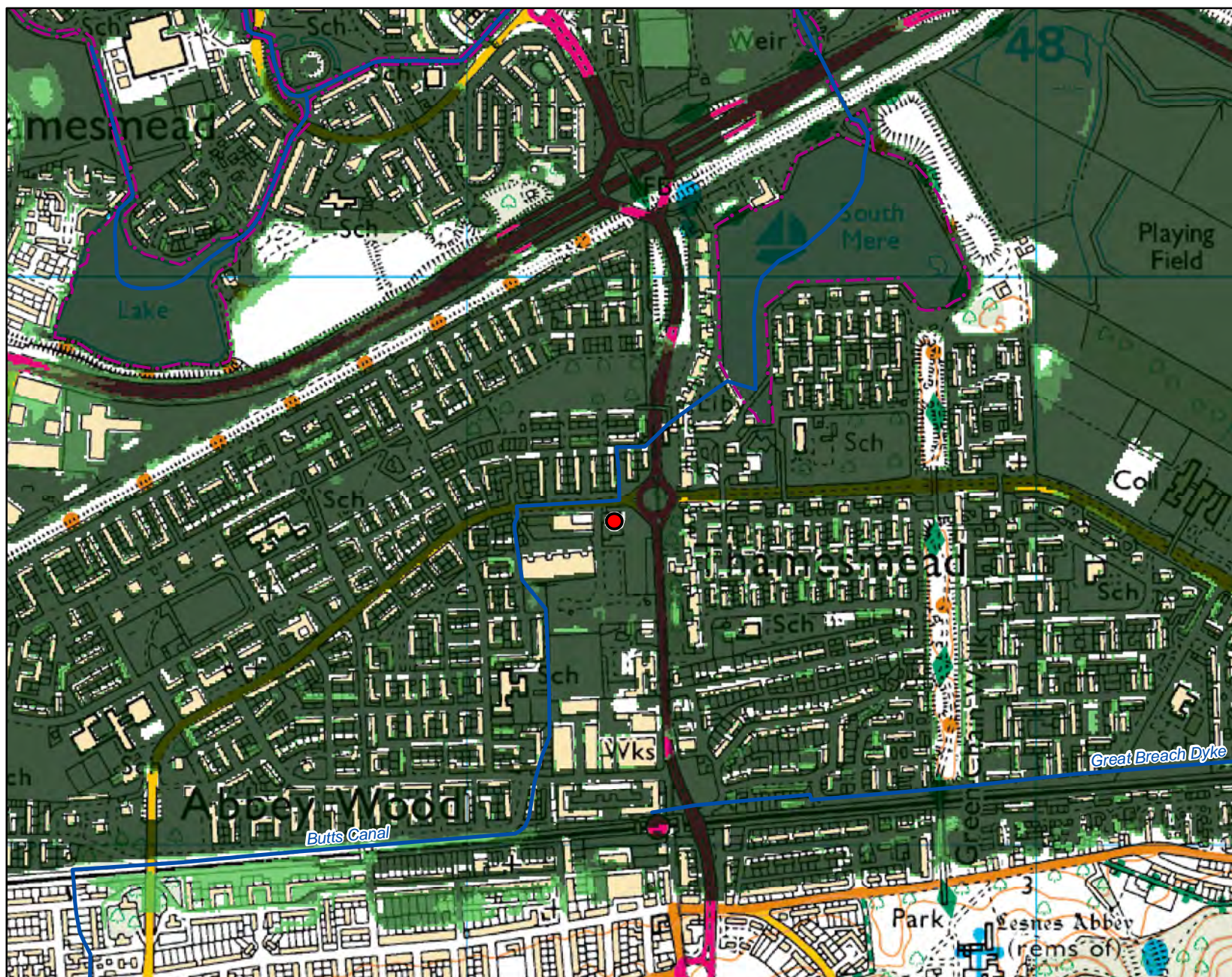
Epoch

- 2014
- 2065
- 2100

Thames Tidal Breach Modelling 2015

A modelled representation of tidal breaches along the Thames from Teddington to the Mar Dyke and River Darent, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width. The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epochs 2065 and 2100.

Breach Modelling Map centred on SE2 9RD created 30 May 2017 [Ref: KSL 47874 LB]



Scale 1: 10,000



Legend

- Site Location
- TE2100 Model Nodes
- Breach Locations
- Main Rivers
- - - Flood Map - Defences

Downriver 0.5% AEP Outlines

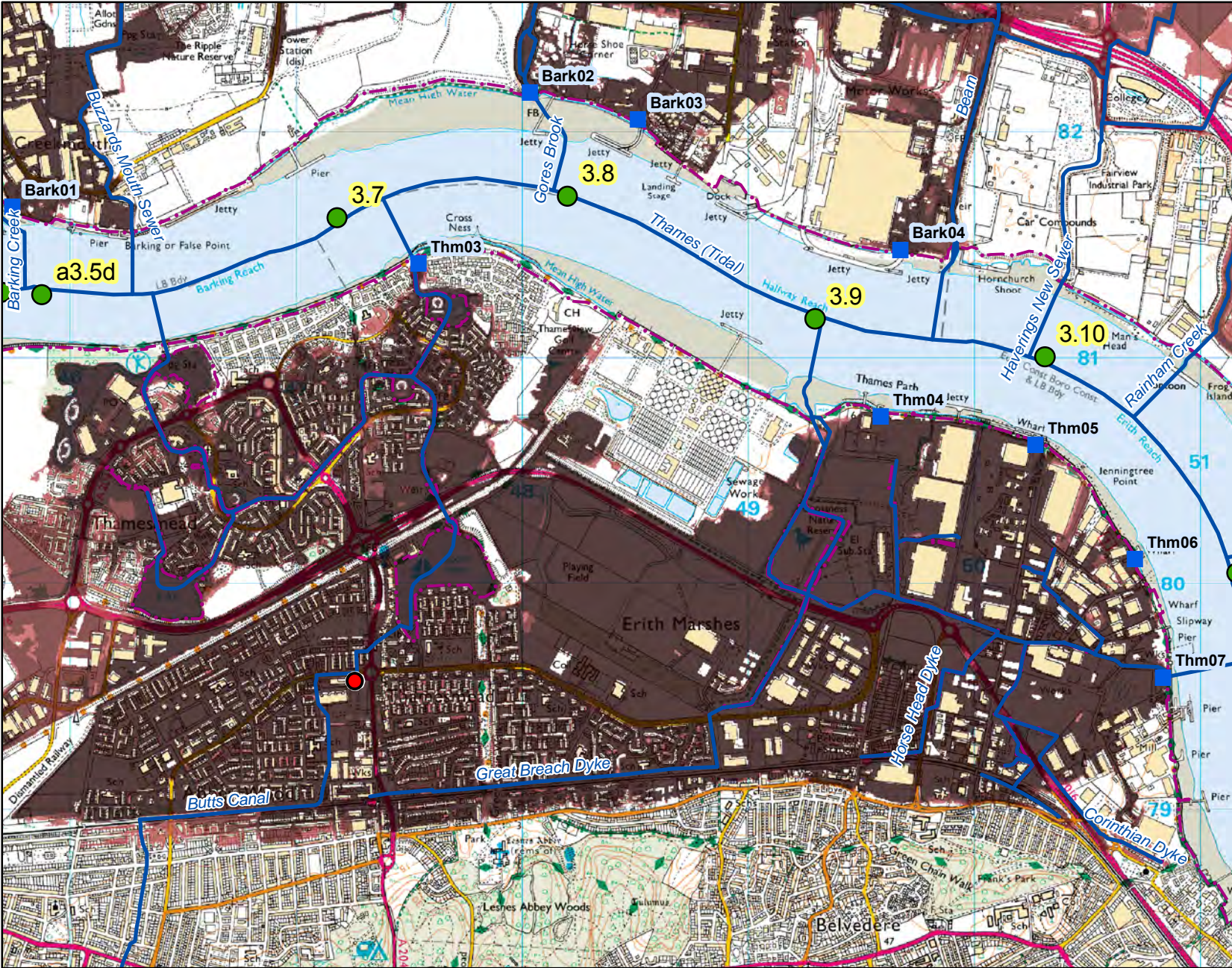
Epoch

- 2014
- 2065
- 2100

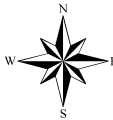
Thames Tidal Breach Modelling 2015

A modelled representation of tidal breaches along the Thames from Teddington to the Mar Dyke and River Darent, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width. The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epochs 2065 and 2100.

Breach Modelling Map centred on SE2 9RD created 30 May 2017 [Ref: KSL 47874 LB]



Scale 1: 25,000



Legend

- Site Location
- TE2100 Model Nodes
- Breach Locations
- Main Rivers
- - - Flood Map - Defences

Downriver 0.1% AEP Outlines

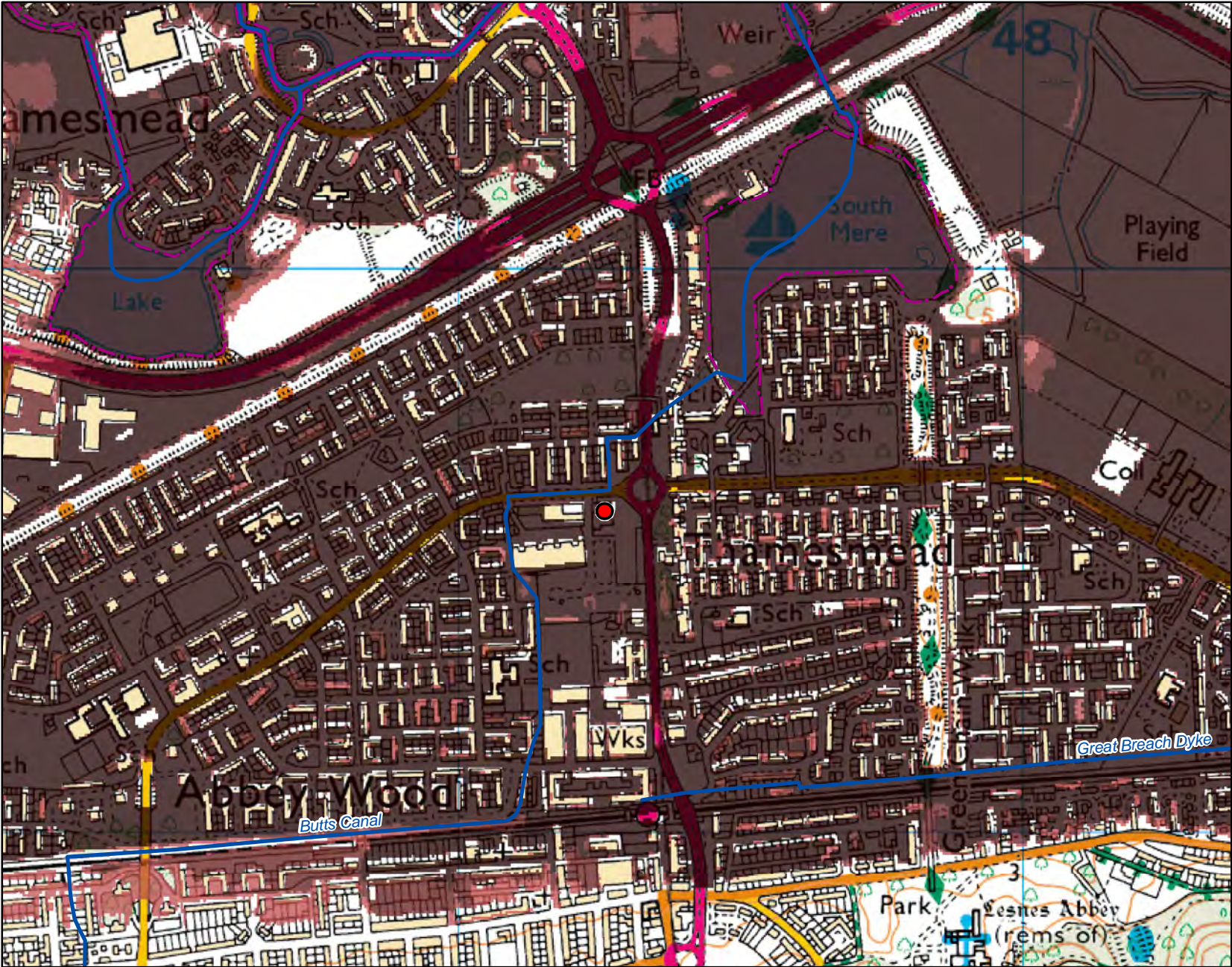
Epoch

- 2014
- 2065
- 2100

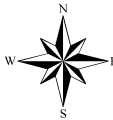
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Breach Modelling Map centred on SE2 9RD created 30 May 2017 [Ref: KSL 47874 LB]



Scale 1: 10,000



Legend

- Site Location
- TE2100 Model Nodes
- Breach Locations
- Main Rivers
- - - Flood Map - Defences

Downriver 0.1% AEP Outlines

Epoch

- 2014
- 2065
- 2100

Thames Tidal Breach Modelling 2015

A modelled representation of tidal breaches along the Thames from Teddington to the Mar Dyke and River Darent, based on low floodplain topography. For hard and composite defences breaches are set at 20 m wide; for soft defences, breaches are 50 m wide. In both cases, the defence breach scour distance was assumed to extend into the floodplain by the same distance as the breach width. The modelling is based on the 2008 TE2100 in-channel levels, with an allowance for climate change for epochs 2065 and 2100.

Node Location Map centred on SE2 9RD created 30 May 2017 [Ref: KSL 47874 LB]



Scale 1: 1,000



Legend

▲ Node Point Locations

Defence Details

The design standard of protection of the flood defences in this area of the Thames is 0.1% AEP; they are designed to defend London up to a 1 in 1000 year **tidal** flood event. The defences are all raised, man-made and privately owned. It is the riparian owners' responsibility to ensure that they are maintained to a crest level of 7.10m AODN (the Statutory Flood Defence Level in this reach of the Thames). We inspect them twice a year to ensure that they remain fit for purpose. The current condition grade for defences in the area is 2 (good), on a scale of 1 (very good) to 5 (very poor). For more information on your rights and responsibilities as a riparian owner, please see our document 'Living on the edge' found on our website at:

<https://www.gov.uk/government/publications/riverside-ownership-rights-and-responsibilities>

There are no planned improvements in this area. Please see the 'Thames Estuary 2100' document on our website for the short, medium and long term Flood Risk Management strategy for London:

<https://www.gov.uk/government/publications/thames-estuary-2100-te2100>

Areas Benefiting from Flood Defences

This site is within an area benefiting from flood defences, as shown on the enclosed extract of our Flood Map. Areas benefiting from flood defences are defined as those areas which benefit from formal flood defences specifically in the event of flooding from rivers with a 1% (1 in 100) chance in any given year, or flooding from the sea with a 0.5% (1 in 200) chance in any given year.

If the defences were not there, these areas would be flooded. An area of land may benefit from the presence of a flood defence even if the defence has overtopped, if the presence of the defence means that the flood water does not extend as far as it would if the defence were not there.

Recorded Flood Events Data

We hold records of historic flood events from rivers and the sea. Information on the floods that may have affected the area local to your site is provided below and in the enclosed map (if relevant).

Flood Event Data

1953 – The site was subject to tidal flooding, due to a storm surge in the North Sea, on the night of the 31st January into the morning of 1st February. An approximate level in the Thames at the time was 5.10m AODN.

Due to the fact that our records are not comprehensive, we would advise that you make further enquiries locally with specific reference to flooding at this location. You should consider contacting the relevant Local Planning Authority and/or water/sewerage undertaker for the area.

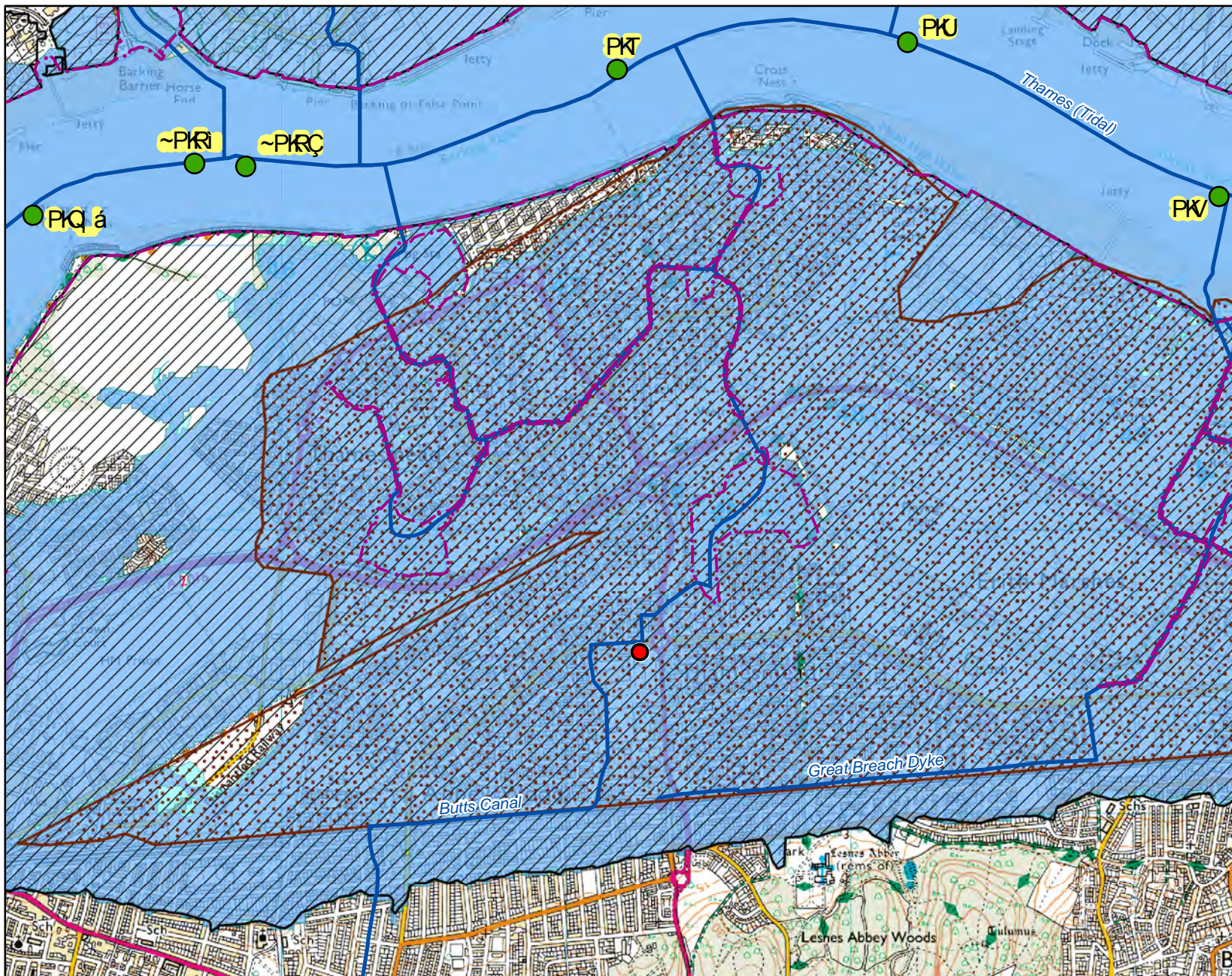
We map flooding to land, not individual properties. Our historic flood event record outlines are an indication of the geographical extent of an observed flood event. Our historic flood event outlines do not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.

Please be aware that flooding can come from different sources. Examples of these are:

- from rivers or the sea;
- surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system);
- overflowing or backing up of sewer or drainage systems which have been overwhelmed,
- groundwater rising up from underground aquifers

Currently the Environment Agency can only supply flood risk data relating to the chance of flooding from rivers or the sea. However you should be aware that in recent years, there has been an increase in flood damage caused by surface water flooding and drainage systems that have been overwhelmed.










Historic Flood Map centred on SE2 9RD created 30 May 2017 [Ref: KSL 47874 LB]



pÅ~ δ ENACMMM



Legend

-  paÉ= çÄ-äçä
 qbCNM# çÇÄ# çÇÉ
 cäçÇj ~é=ä ÉÉäÄÉ
 j ~ä=äÉÉ
 g-ä=MRP-cäçÇj i ääÉ
 cäçÇj ~é=çäçÇj içé-ÇÄÉ-é
 ^É-é=ÉäÉäÖçä =
cäçÇä ÉÉäÄÉ
 cäçÇj ~é=çäçÇjwçäÉP
 cäçÇj ~é=çäçÇjwçäÉO

Flood Map for Planning (assuming no defences)

Flood Zone 3 = Uge = UeE = U = Aq a = Ae
 ~ NIAE = A = NqcaW
 == Na = Ue = E = raU = MRB = ce = Ee
 == UA = E = q = AA eea = EA Ue = e
 = ce = Nae = eaE = raU = NB = ce = Ee
 == UA = E = q = AA eea = EA Ue = A

Flood Zone 2

Contact Us: *k-āḡ-a-# i ēlca Eē cāl-Ai= EāiEīml = cñ-RQI-ṇciUēA-i ləp SMI vñ EāmPTMURVSRMS-E cācūEUSTH ā -āwEai ēelc Eāi ḡāā EāiJ-CĒAdCīKā

Additional Information

Use of Environment Agency Information for Flood Risk / Flood Consequence Assessments

Important

If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:-

<http://www.environment-agency.gov.uk/research/planning/33580.aspx>

Depending on the enquiry, we may also provide advice on other issues related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In **England**, you should refer to the Environment Agency's Flood Risk Standing Advice, the technical guidance to the National Planning Policy Framework and the existing PPS25 Practice Guide for information about what flood risk assessment is needed for new development in the different Flood Zones. These documents can be accessed via:

<https://www.gov.uk/government/publications/flood-risk-standing-advice-for-local-planning-authorities-frsa>

<http://planningguidance.planningportal.gov.uk/>

You should also consult the Strategic Flood Risk Assessment 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 / Consequence Assessment (FRA / FCA) 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 overland runoff. The information produced by the local planning authority referred to above may assist here.
3. Where a planning application requires a FRA / FCA and this is not submitted or deficient, the Environment Agency may well raise an objection.
4. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your local planning authority.

Surface Water

We have provided two national Surface Water maps, under our Strategic Overview for flooding, to your Lead Local Flood Authority who are responsible for local flood risk (i.e. surface runoff, ground water and ordinary watercourse), which alongside their existing local information will help them in determining what best represents surface water flood risk in your area.

Your Lead Local Flood Authority have reviewed these and determined what it believes best represents surface water flood risk. You should therefore contact this authority so they can provide you with the most up to date information about surface water flood risk in your area.

You may also wish to consider contacting the appropriate relevant Local Planning Authority and/or water/sewerage undertaker for the area. They may be able to provide some knowledge on the risk of flooding from other sources. We are working with these organisations to improve knowledge and understanding of surface water flooding.