1.11

PLANNING STATEMENT

Outline Residential Development
102 East Road
West Mersea

Appendix XI
Surface Water Drainage Strategy

The Johnson Dennehy Planning Partnership
The Coach House
Beacon End House
London Road
Stanway
Colchester
Essex, CO3 0NY

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

for BlueSquare Homes
NEW BUILD DEVELOPMENTS

Revised January 2021

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Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

for BlueSquare Homes
NEW BUILD DEVELOPMENTS

Revised January 2021

1.0 Introduction

1.1 This Surface Water Design Strategy (SWDS) has been prepared on behalf BlueSquare Homes to support an outline planning application for the proposed development of land to the south of 102 East Road, West Mersea. **(Appendix 1 – Location Plan)**

1.2 This assessment takes account of the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG) and the definitions of sources of flooding within the Flood and Water Management Act (FWMA) 2010.

1.3 This assessment has been prepared following a review of the Colchester Borough Council Strategic Flood Risk Assessment (SFRA), the results of flood data information and a site visit.

1.4 The development relates to the erection of 56 residential dwellings with associated parking, open space, landscaping, sustainable drainage system (SuDS) and vehicular access point from East Road. An illustrative development layout is included in **(Appendix II)**

2.0 Application Site

2.1 The application site is located to the south of East Road and comprises 1.69 hectares of private amenity land currently forming the domestic curtilage of 102 East Road. The present dwelling is scheduled for demolition to facilitate a new priority junction onto East Road. Residential properties border the site to the north and west.

2.2 The topographical survey **(Appendix III)** shows that the ground levels generally fall from north (from a level in the region of 18.44m AOD) towards the south (to a level in the region of 16.25m AOD).

2.3 The application site lies in Flood Zone 1 **(Appendix IV)** with no designated Main Rivers or ordinary watercourses on-site. (the nearest river is the River Blackwater lying in excess of 500 metres to the south). Ordnance Survey mapping shows an unnamed watercourse/drainage ditch located adjacent to the eastern boundary of the site flowing in a southerly direction.

2.4 British Geological Survey (BGS) mapping shows that the northern area of the site is underlain by River Terrace Deposits (sand and gravel). Bedrock geology of the Thames Group is shown to lie beneath the whole of the application site.

2.5 Environment Agency (EA) mapping indicates the site lies outside the groundwater source protection zones.

3.0 Forms of Flooding

Coastal Floodwater and Watercourses

The Flood Map for Planning shows the application site is located in the low probability flood area **(Flood Zone 1)** and is not therefore considered to be exposed to flooding from the coast or river. **(Appendix IV)**

Surface Water Run-off/Overland Flow

Surface water flood maps show the whole of the application site is located in the very low flood risk area.

The risk posed to the development is not considered to be notable and can be readily managed through the proposed overland flow routing.

Surface Water Sewers

Anglian Water asset plans **(Appendix VI)** indicate the nearest surface water sewer in East Road (225mm diameter connection from MH 4453 – invert level 1.43m).

Groundwater

The BGS infiltration SuDS GeoReport indicates that groundwater is likely to be more than 5 metres below the ground surface throughout the year.

Reservoirs/Lakes

The site is not shown to lie within an area denoted as being at risk of flooding from a breach of a reservoir embankment. There are no other lakes/ponds in the vicinity of the site deemed as posing a risk to the development.

4.0 Surface Water Management

Proposed Surface Water Disposal

4.1 Site infiltration knowledge has determined that rates are too low to support the disposal of surface water runoff via infiltration.

4.2 It is therefore proposed to discharge surface water runoff from the site via a connection to the existing ditch/watercourse which forms the eastern site boundary.

4.3 Sufficient on-site surface water storage will be provided in order to manage the 1 in 100 annual probability storm including the requisite 40% allowance for climate change. The discharge rate will be limited to the annual greenfield rate (Q1) of 2.8l/s/ha.

4.4 It is proposed to attenuate flows in a single attenuation arrangement located along the southern boundary of the site. All flow controls will be suitably protected.

4.5 All proposals are subject to detailed design and the approval of relevant parties.

Treatment

4.6 The maximum pollution hazard level for the proposals can be considered as low, based on the assumption of the associated traffic movements for some of the development roads are likely to be greater than 150 traffic movements per day. CIRIA C753 (Table 26.2) presents an associated pollution score for the medium pollution hazard of 0.7 for total suspended solids (TSS), 0.6 for metals (M), and 0.7 for hydrocarbons (HC).

4.7 The attenuation arrangement provides enough treatment for the less trafficked roads and roof areas (both with a corresponding low pollution hazard designation, i.e. TSS 0.5, M 0.4 and HC 0.4); however supplementary treatment facilities for the more trafficked roads will be required including:

- Lengths of roadside grassed filter drains with underdrains forming the spine network, or with individual connections to a more central sewer network beneath the roads; and
- SuDS planters/tree pit SuDS.

4.8 The treatment/mitigation table in CIRIA C753 (Table 26.3) assigns treatment scores as follows for the following SuDS features:

SuDS feature	TSS	M	HC
Attenuation	0.5	0.5	0.6
Filter Drain	0.4	0.4	0.4
SuDS planters/bioretention systems	0.8	0.8	0.8

4.9 As runoff will pass through one of the aforementioned SuDS components (or combination of components in the case of the more trafficked road) prior to discharging off-site, the proposed scheme can provide sufficient treatment for development runoff.

Conclusions

5.1 The site is not considered to be liable to significant or unmanageable flooding from the sources Identified in the Flood and Water Management Act 2010 (FWMA)

5.2 Surface water runoff from the development will be discharged at greenfield rates to the ditch/watercourse located along the eastern boundary of the site. On-site attenuation will be provided in order to manage flows up to and including the 1 in 100 annual probability storm event inclusive of 40% climate change allowance.

5.3 The proposed outline surface water management strategy allows for sufficient space within the layout for water management. The strategy also allows for sufficient treatment of runoff prior to it leaving the proposed development.

5.4 It is envisaged that maintenance responsibilities of the surface water management scheme will be undertaken by a private management company with some elements potentially adopted by Anglia Water.

Surface Water Drainage Strategy

Outline Residential Development
102 East Road
West Mersea
Essex

Appendix I
Location Plan

The Johnson Dennehy Planning Partnership
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Knightstown
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County Kerry
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Land at East Road
West Mersea

Promap®

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Surface Water Drainage Strategy

Outline Residential Development
102 East Road
West Mersea
Essex

Appendix II
Illustrative Masterplan

The Johnson Dennehy Planning Partnership
The Coach House
Beacon End House
London Road
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JDP Environmental
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County Kerry
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PROPOSED RESIDENTIAL DEVELOPMENT
102 EAST ROAD - WEST MERSEA - ESSEX

BlueSquare Homes
NEW BUILD DEVELOPMENTS

SCALE 1:500 (A1)

ILLUSTRATIVE MASTERPLAN

OVERALL SITE AREA 4.2 ACRES
(1.69 HECTARES)

ILLUSTRATIVE MASTERPLAN

HOUSING DENSITY 13.3 DPA.
(33.1 DPH.)

SCHEDULE OF ACCOMMODATION

AFFORDABLE HOUSING 12 UNITS

(8 Nos. 2 BEDROOM TERRACED
+ 4 Nos. 3 BEDROOM SEMI-DETACHED)

MIXED DEVELOPMENT 44 UNITS

(22 Nos. 3/4 BEDROOM DETACHED
+ 22 Nos. 2/3 BEDROOM SEMI-DETACHED)

102 EAST ROAD
WEST MERSEA, ESSEX

THE JOHNSON DENNEHY PLANNING PARTNERSHIP LTD.
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PROJECT
:RESIDENTIAL DEVELOPMENT
102 EAST ROAD
WEST MERSEA
ESSEX.

TITLE
ILLUSTRATIVE MASTERPLAN

CLIENT
BlueSquare Homes
NEW BUILD DEVELOPMENTS

Revisions

DATE	No.	

SCALE 1 : 500 (A1)
DATE JAN. 2021.
FILE No. 4126.
DRG No. 220. PJ.

Surface Water Drainage Strategy

Outline Residential Development
102 East Road
West Mersea
Essex

Appendix III
Topographical Survey

The Johnson Dennehy Planning Partnership
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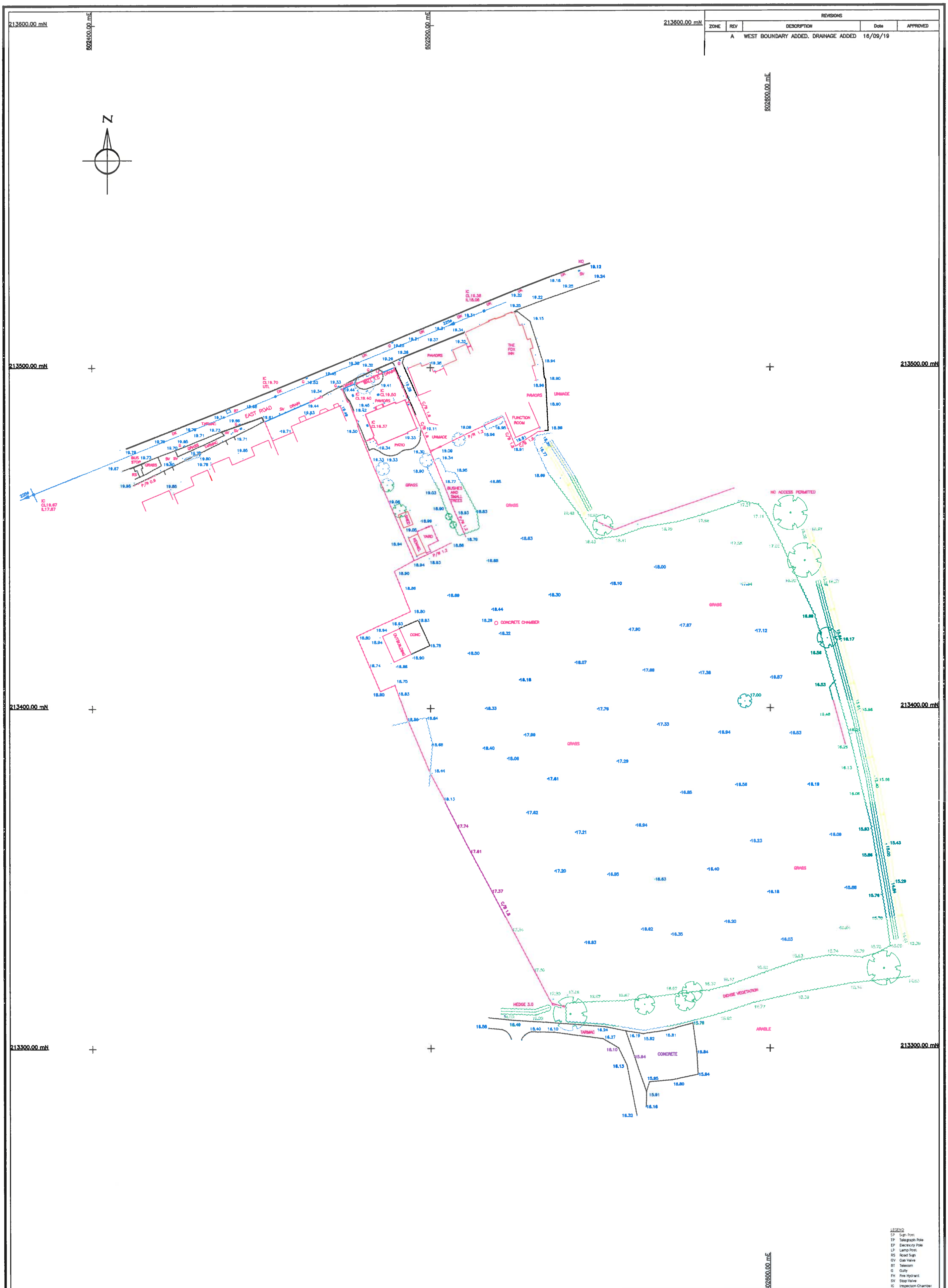

REVISIONS				
ZONE	REV	DESCRIPTION	Date	APPROVED
	A	WEST BOUNDARY ADDED. DRAINAGE ADDED	16/09/19	

Sterling Surveys
Brookfield Place
Low Street
Glemsford
Suffolk
CO10 7QF
Phone 01787 280325
Mobile 07989 581290
Fax 07050 650887
E-mail pw@sterling-surveys.com
www.sterling-surveys.com

Peter Whitney
Land Surveying
Site Engineering

P. WHEELER

TOPOGRAPHIC SURVEY AT EAST ROAD, WEST MERSEA
SURVEY RELATED TO OS NATIONAL GRID (OSTN15)

SIZE	Date	DWG NO.	REV
A1	JULY 2019	1877–1	A

Scale 1:500@A1 | Drawn by PW | Sheet

Surface Water Drainage Strategy

Outline Residential Development
102 East Road
West Mersea
Essex

Appendix IV
Flood Map

The Johnson Dennehy Planning Partnership
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County Kerry
Eire, V23 WP9

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
East Road	**602561/213407**	**5 Mar 2021 9:56**

Your selected location is in flood zone 1, an area with a low probability of flooding.

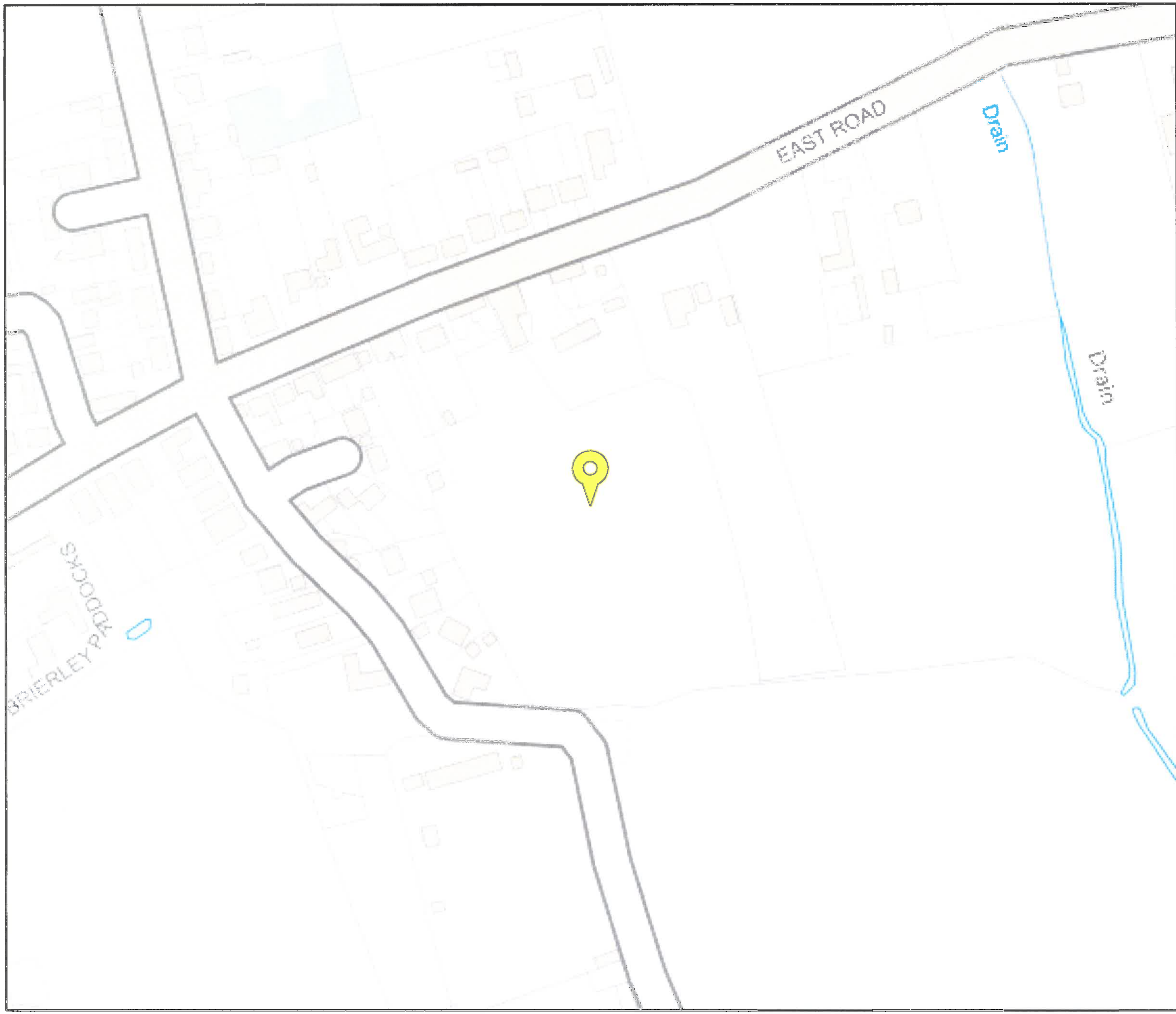
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
East Road

Location (easting/northing)
602561/213407

Scale
1:2500

Created
5 Mar 2021 9:56

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Surface Water Drainage Strategy

Outline Residential Development
102 East Road
West Mersea
Essex

Appendix V
Outline Surface Water Strategy

The Johnson Dennehy Planning Partnership
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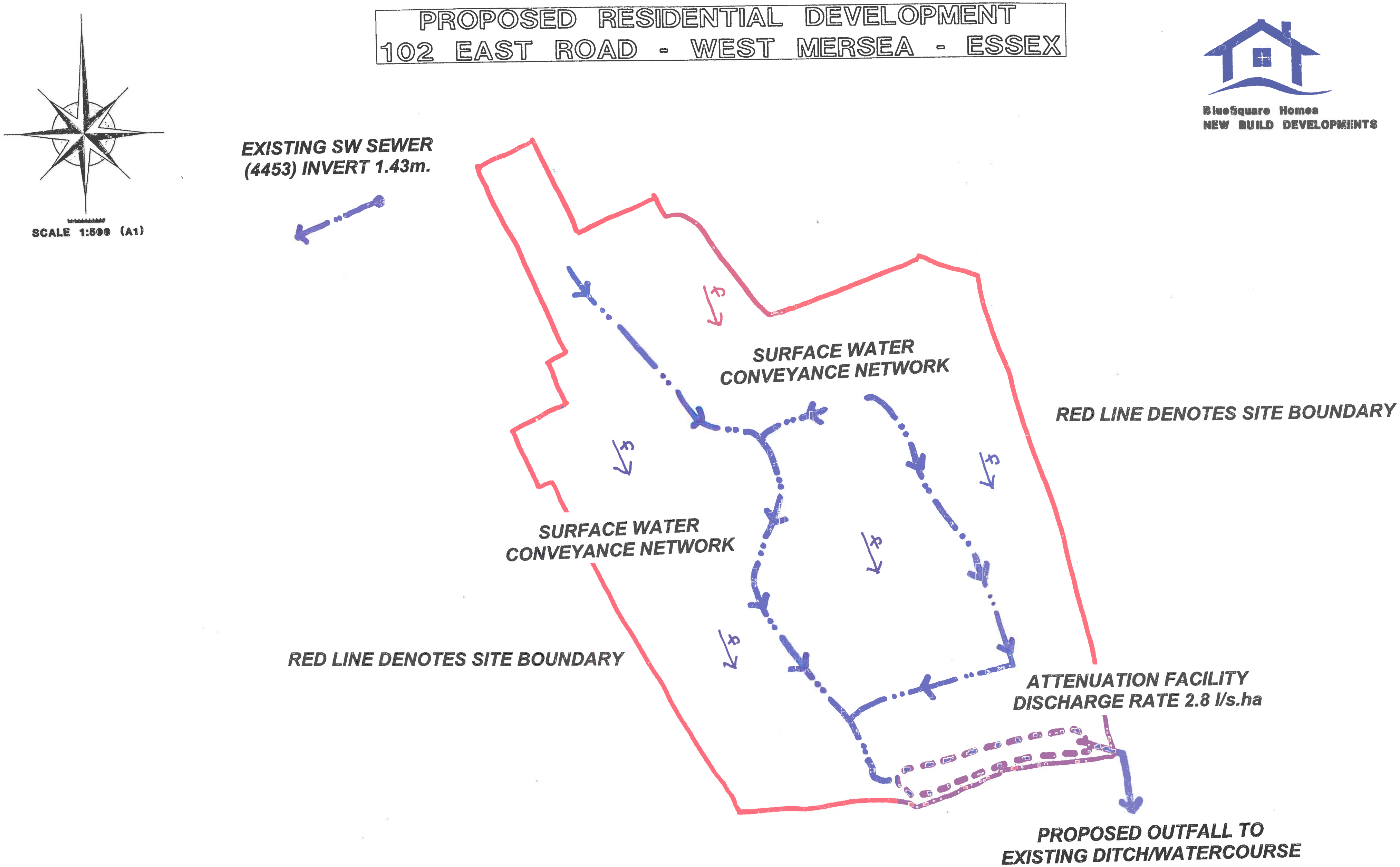
PROPOSED RESIDENTIAL DEVELOPMENT
102 EAST ROAD - WEST MERSEA - ESSEX

BlueSquare Homes
NEW BUILD DEVELOPMENTS



102 EAST ROAD
WEST MERSEA, ESSEX

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PROJECT	TITLE	CLIENT	Revisions	
RESIDENTIAL DEVELOPMENT 102 EAST ROAD WEST MERSEA ESSEX.	OUTLINE SURFACE WATER DRAINAGE STRATEGY	BlueSquare Homes NEW BUILD DEVELOPMENTS	DATE / No.	SCALE 1 : 500 (A1) DATE AUG. 2020. FILE No. 4126. DRG No. 130. PJ.

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

Appendix VI
Anglian Water Asset Plans

The Johnson Dennehy Planning Partnership
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Data updated: 29/06/20
Scale: 1:1250
Map Centre: 602552,213411
Date: 17/08/20
Our Ref: 427102 - 3
OS Background Plan A4
Powered by digdat

jdp2@btconnect.com

102 East Road

OS Partner

(c) Crown copyright and database rights 2020 Ordnance Survey 100019209	Scale: 1:1250	Date: 17/08/20	Clean Water Plan A4
Data updated: 31/07/20	Map Centre: 602552,213411	Our Ref: 427102 - 1	Powered by digdat

Potable Water

Raw Water — RAW

Decommissioned Water

Fitting

Hydrant

Please note: Not all fittings are shown on the map

jdp2@btconnect.com

102 East Road

love every drop
anglianwater

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2020 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

(c) Crown copyright and database rights 2020 Ordnance Survey 100019209	Scale: 1:1250	Date: 17/08/20	Wastewater Plan A4
Data updated: 31/07/20	Map Centre: 602552,213411	Our Ref: 427102 - 2	Powered by digdat

Foul Sewer	Outfall*	Sewage Treatment Works	jdp2@btconnect.com
Surface Sewer			102 East Road
Combined Sewer			
Final Effluent	Inlet*	Public Pumping Station	
Rising Main*			
Private Sewer*			
Decommissioned Sewer*	Manhole*	Decommissioned Pumping Station	love every drop anglianwater

*(Colour denotes effluent type)

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2020 Ordnance Survey 100022432.This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
4403	F	19.255	18.585	0.67
4405	F	19.697	17.947	1.75
5501	F	19.392	18.112	1.28
4350	S	-	-	-
4452	S	-	-	1.31
4453	S	-	-	1.43

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

Appendix VII
Infiltration SuDS GeoReport

The Johnson Dennehy Planning Partnership
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British Geological Survey
Expert | Impartial | Innovative

GeoReports

Peter Johnson
The Johnson Dennehy Planning Partnership
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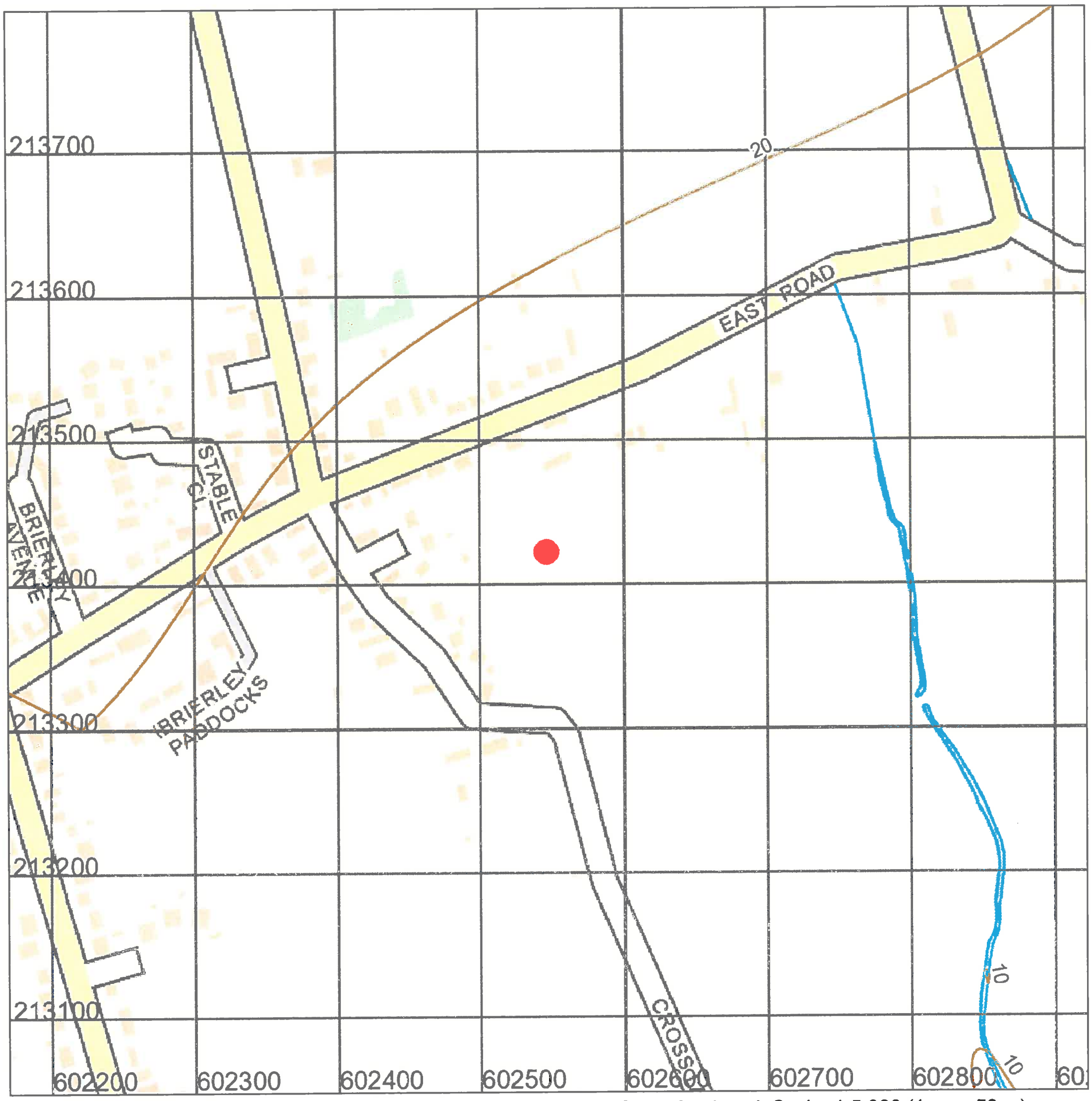
Infiltration SuDS GeoReport:

This report provides information on the suitability of the subsurface for the installation of infiltration sustainable drainage systems (SuDS). It provides information on the properties of the subsurface with respect to significant constraints, drainage, ground stability and groundwater quality protection.

Report Id: ***BGS_311604/15186***

Client reference: PRJ/SM/4126

Search location



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Search location indicated in red

Point centred at: 602546,213423

Assessment for an infiltration sustainable drainage system

Introduction

Sustainable drainage systems (SuDS) are drainage solutions that manage the volume and quality of surface water close to where it falls as rain. They aim to reduce flow rates to rivers, increase local water storage capacity and reduce the transport of pollutants to the water environment. There are four main types of SuDS, which are often designed to be used in sequence. They comprise:

- **source control:** systems that control the rate of runoff
- **pre-treatment:** systems that remove sediments and pollutants
- **retention:** systems that delay the discharge of water by providing surface storage
- **infiltration:** systems that mimic natural recharge to the ground.

This report focuses on infiltration SuDS. It provides subsurface information on the properties of the ground with respect to drainage, ground stability and groundwater quality protection. It is intended principally for those involved in the preliminary assessment of the suitability of the ground for infiltration SuDS, and those involved in assessing proposals from others for sustainable drainage, but it may also be useful to help house-holders judge whether or not further professional advice should be sought. If in doubt, users should consult a suitably-qualified professional about the results in this report before making any decisions based upon it.

This GeoReport is structured in two parts:

- **Part 1. Summary data**.

  Comprises three maps that summarise the data contained within Part 2.

- **Part 2. Detailed data**.

  Comprises a further 24 maps in four thematic sections:

  - **Very significant constraints.** Maps highlight areas where infiltration may result in adverse impacts due to factors including: ground instability (soluble rocks, non-coal shallow mining and landslide hazards); persistent shallow groundwater, or the presence of made ground, which may represent a ground stability or contamination hazard.
  - **Drainage potential**. Maps indicate the drainage potential of the ground, by considering subsurface permeability, depth to groundwater and the presence of floodplain deposits.
  - **Ground stability**. Maps indicate the presence of hazards that have the potential to cause ground instability resulting in damage to some buildings and structures, if water is infiltrated to the ground.
  - **Groundwater protection**. Maps provide key indicators to help determine whether the groundwater may be susceptible to deterioration in quality as a result of infiltration.

This report considers the suitability of the subsurface for the installation of infiltration SuDS, such as soakaways, infiltration basins or permeable pavements. It provides subsurface data to indicate whether, and which type of infiltration system may be appropriate. It does not state that infiltration SuDS are, or are not, appropriate as this is highly dependent on the design of the individual system. This report therefore describes the subsurface conditions at the site, allowing the reader to determine the suitability of the site for infiltration SuDS.

The map and text data in this report is similar to that provided in the '*Infiltration SuDS Map: Detailed*' national map product. For further information about the data, consult the '*User Guide for the Infiltration SuDS Map: Detailed*', available from http://nora.nerc.ac.uk/16618/.

PART 1: SUMMARY DATA

This section provides a summary of the data.

In terms of the drainage potential, is the ground suitable for infiltration SuDS?

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- Highly compatible for infiltration SuDS. The subsurface is likely to be suitable for free-draining infiltration SuDS.
- Probably compatible for infiltration SuDS. The subsurface is probably suitable although the design may be influenced by the ground conditions.
- Opportunities for bespoke infiltration SuDS. The subsurface is potentially suitable although the design will be influenced by the ground conditions.
- Very significant constraints are indicated. There is a very significant potential for one or more hazards associated with infiltration.

Is ground instability likely to be a problem?

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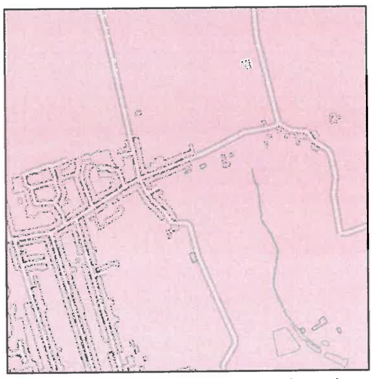
- Increased infiltration is very unlikely to result in ground instability.
- Ground instability problems may be present or anticipated, but increased infiltration is unlikely to result in ground instability.
- Ground instability problems are probably present. Increased infiltration may result in ground instability.
- There is a very significant potential for one or more geohazards associated with infiltration.

Is the groundwater susceptible to deterioration in quality?



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- The groundwater is not expected to be especially vulnerable to contamination.
- The groundwater may be vulnerable to contamination.
- The groundwater is likely to be vulnerable to contaminants.
- Made ground is present at the surface. Infiltration may increase the possibility of remobilising pollutants.

PART 2: DETAILED DATA

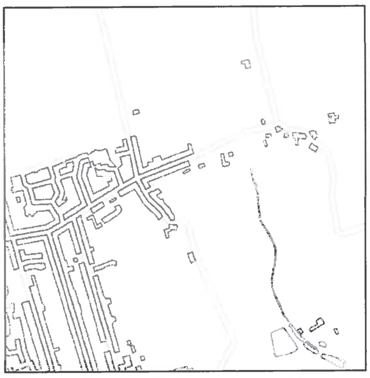
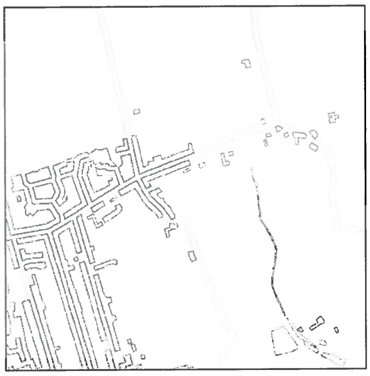
This section provides further information about the properties of the ground and will help assess the suitability of the ground for infiltration SuDS.

Section 1. Very significant constraints

Where maps are overlain by grey polygons, geological or hydrogeological hazards may exist that could be made worse by infiltration. The following hazards are considered:

- soluble rocks
- landslides
- shallow mining
- shallow groundwater
- made ground

For more information read 'Explanation of terms' at the end of this report.

Soluble rock hazard		
 Contains OS data © Crown Copyright and database right 2020	■	Very significant soluble rock hazard. Soluble rocks are present with a very significant possibility of localised subsidence that could be initiated or made worse by infiltration. The site investigation should consider whether the potential for or the consequences of subsidence as a result of infiltration are significant.
	□	Very significant soluble rock hazards are not present; however this hazard may still need to be considered. See Part 3.
Landslide hazard		
 Contains OS data © Crown Copyright and database right 2020	■	Very significant landslide hazard. Slope instability problems are almost certainly present and may be active. An increase in moisture content as a result of infiltration may cause the slope to fail. The site investigation should consider whether the potential for or the consequences of landslide as a result of infiltration are significant.
	□	Very significant landslide hazards are not present; however this hazard may still need to be considered. See Part 3.

Shallow mining hazard

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- [shaded] Very significant mining hazard.
  Shallow mining is likely to be present with a very significant possibility of localised subsidence that could be initiated or made worse by increased infiltration. Also, infiltration may increase the possibility of remobilising pollutants. The site investigation should consider whether the potential for or consequences of subsidence and/or remobilisation of pollutants as a result of infiltration are significant.
- [ ] Very significant mining hazards are not present; however this hazard may still need to be considered. See Part 3.

Persistent shallow groundwater

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- [shaded] Very high likelihood of persistent or seasonally shallow groundwater.
  Persistent or seasonally shallow groundwater is likely to be present. Infiltration may increase the likelihood of soakaway inundation, or groundwater emergence at the surface. The site investigation should consider whether the potential for or the consequences of groundwater level rise as a result of infiltration are significant.
- [ ] See Part 2 for the likely depth to water table.

Made ground

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- [shaded] Made ground present.
  Made ground is present at the surface. Infiltration may affect ground stability or increase the possibility of remobilising pollutants. The site investigation should consider whether the potential for or consequences of ground instability and/or pollutant leaching as a result of infiltration are significant.
- [ ] None recorded

Section 2. Drainage potential

The following pages contain maps that will help you assess the drainage potential of the ground by considering the:

- depth to water table
- permeability of the superficial deposits
- thickness of the superficial deposits
- permeability of the bedrock
- presence of floodplains

Superficial deposits are not present everywhere and therefore some areas of the *superficial deposit permeability* map may not be coloured. Where this is the case, the *bedrock permeability* map shows the likely permeability of the ground. Superficial deposits in some places are very thin and hence in these places you may wish to consider both the permeability of the superficial deposits and the permeability of the bedrock. The *superficial thickness* map will tell you whether the superficial deposits are thin (< 3 m thick) or thick (>3 m). Where they are over 3 m thick, the permeability of the bedrock may not be relevant.

For more information read 'Explanation of terms' at the end of this report.

Depth to groundwater table

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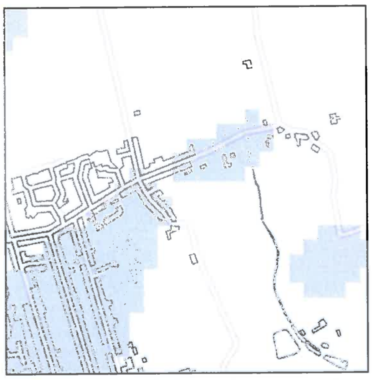
(lightest blue)	Groundwater is likely to be **more than 5 m** below the ground surface throughout the year.
(medium blue)	Groundwater is likely to be between **3 and 5 m** below the ground surface for at least part of the year.
(dark blue)	Groundwater is likely to be **less than 3 m** below the ground surface for at least part of the year.

Superficial deposit permeability



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Superficial deposits are likely to be **free-draining**.

The superficial deposit permeability is **spatially variable**, but likely to permit moderate infiltration.

Superficial deposits are likely to be **poorly draining**.

These maps show the permeability range that is summarised above.

- Very Low
- Low
- Moderate
- High
- Very High

Minimum

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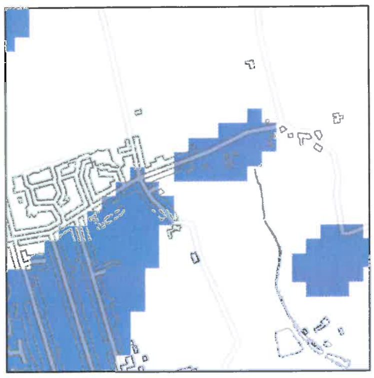
Maximum



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Superficial deposit thickness

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The thickness of superficial deposits is **< 3 m** and hence the permeability of the ground may be dependent on both the superficial deposits (where present) and underlying bedrock (see below).

The thickness of superficial deposits is **> 3 m** and hence the permeability of the superficial deposits is likely to determine the permeability of the ground.

Bedrock permeability

Contains OS data © Crown Copyright and database right **2020**

Bedrock deposits are likely to be **free-draining**.

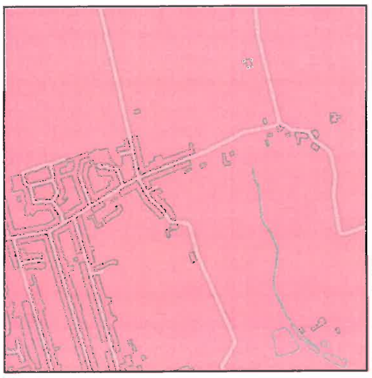
The bedrock permeability is **spatially variable**, but likely to permit moderate infiltration.

Bedrock deposits are likely to be **poorly draining**.

These maps show the permeability range that is summarised above.

Key
- Very Low
- Low
- Moderate
- High
- Very High

Minimum



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Maximum

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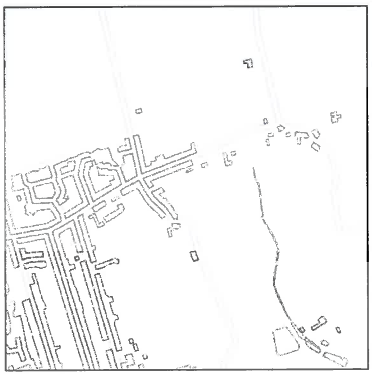
Geological indicators of flooding



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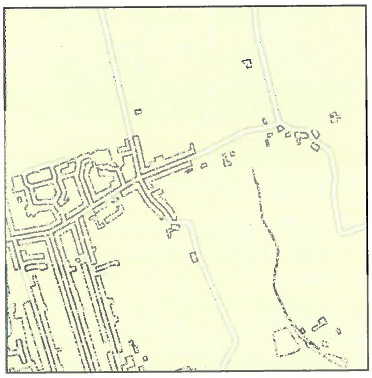
Superficial floodplain deposits or low-lying coastal areas have been identified. Groundwater levels may rise in response to high river or tide levels, potentially causing inundation of subsurface infiltration SuDS.

Section 3. Ground stability

The following pages contain maps that will help you assess whether infiltration may impact the stability of the ground. They consider hazards associated with:

- soluble rocks
- landslides
- shallow mining
- running sands
- swelling clays
- compressible ground, and
- collapsible ground

In the following maps, geohazards that are identified in green are unlikely to prevent infiltration SuDS from being installed, but they should be considered during design. For more information read 'Explanation of terms' at the end of this report.

<table>
<tr><th colspan="2">Soluble rocks</th></tr>
<tr><td rowspan="4">
Contains OS data © Crown Copyright and database right 2020</td><td>Increased infiltration is unlikely to result in subsidence.</td></tr>
<tr><td>Increased infiltration is unlikely to cause localised subsidence, but potential impacts should be considered.</td></tr>
<tr><td>Increased infiltration may result in localised subsidence. The potential for or the consequences of subsidence associated with soluble rocks should be considered.</td></tr>
<tr><td>Very significant possibility of localised subsidence that could be initiated or made worse by infiltration.</td></tr>
</table>

Landslides

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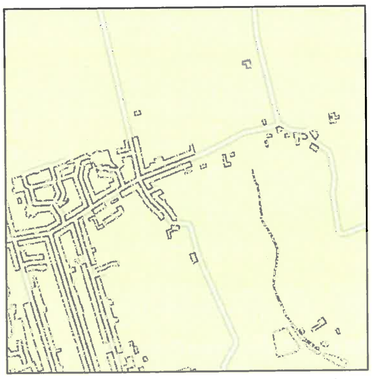
- Increased infiltration is unlikely to lead to slope instability.
- Slope instability problems may be present or anticipated, but increased infiltration is unlikely to cause instability
- Slope instability problems are probably present or have occurred in the past, and increased infiltration may result in slope instability.
- Slope instability problems are almost certainly present and may be active. An increase in moisture content as a result of infiltration may cause the slope to fail.

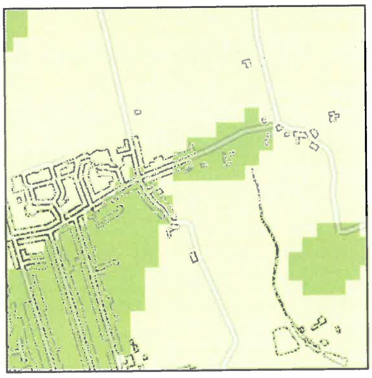
Shallow mining



Contains OS data © Crown Copyright and database right 2020

- Increased infiltration is unlikely to lead to subsidence.
- Shallow mining is possibly present. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Shallow mining could be present with a significant possibility that localised subsidence could be initiated or made worse by increased infiltration.
- Shallow mining is likely to be present, with a very significant possibility that localised subsidence may be initiated or made worse by increased infiltration.

Running sand



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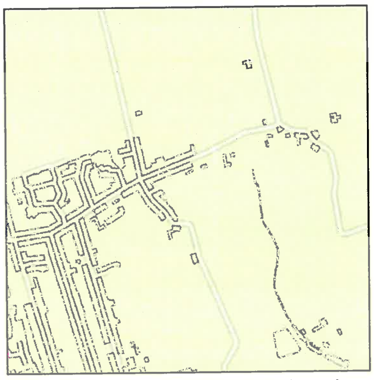
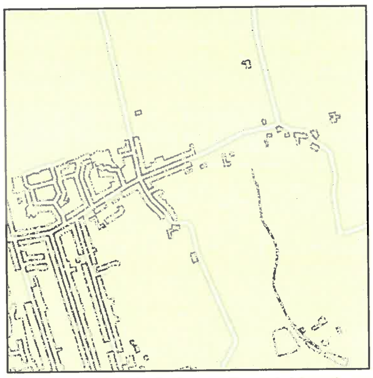
- Increased infiltration is unlikely to cause ground collapse associated with running sands.
- Running sand is possibly present. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
- Significant possibility for running sand problems. Increased infiltration may result in a geohazard.

Swelling clays	
 Contains OS data © Crown Copyright and database right 2020	Increased infiltration is unlikely to cause shrink-swell ground movement.
	Ground is susceptible to shrink-swell ground movement. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
	Ground is susceptible to shrink-swell ground movement. Increased infiltration may result in a geohazard.

Compressible ground	
 Contains OS data © Crown Copyright and database right 2020	Increased infiltration is unlikely to lead to ground compression.
	Compressibility and uneven settlement hazards are probably present. Increased infiltration may result in a geohazard.

Collapsible ground	
 Contains OS data © Crown Copyright and database right 2020	Increased infiltration is unlikely to result in subsidence.
	Deposits with potential to collapse when loaded and saturated are possibly present in places. Increased infiltration is unlikely to cause a geohazard, but potential impacts should be considered.
	Deposits with potential to collapse when loaded and saturated are probably present in places. Increased infiltration may result in a geohazard.

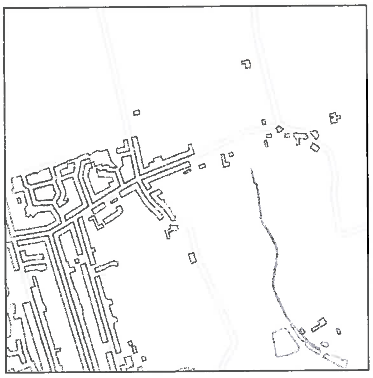
Section 4. Groundwater quality protection

The following pages contain maps showing some of the information required to ensure the protection of groundwater quality. Data presented includes:

- groundwater source protection zones (Environment Agency data)
- predominant flow mechanism
- made ground

For more information read 'Explanation of terms' at the end of this report.

Groundwater source protection zones

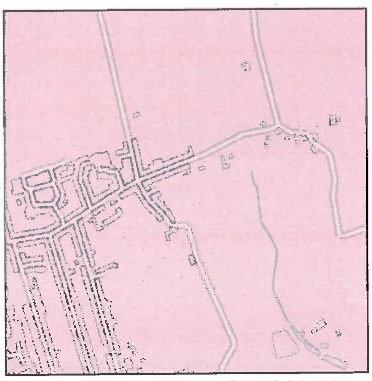


Contains OS data © Crown Copyright and database right 2020

Derived in part from Source Protection Zone data provided under licence from the Environment Agency © Environment Agency 2020.

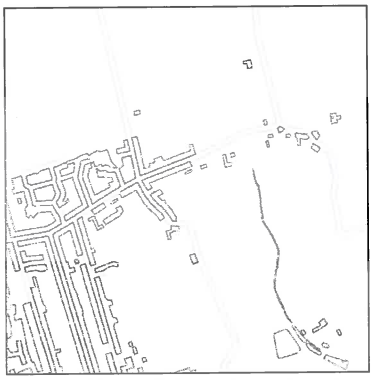
☐	Groundwater is not within a source protection zone.
☐	Source protection zone IV
☐	Source protection zone III
☐	Source protection zone II
☐	Source protection zone I

Predominant flow mechanism



Contains OS data © Crown Copyright and database right 2020

☐	Water is likely to percolate through the unsaturated zone to the groundwater through either the pore space in granular media or through porespace and fractures; these processes have some potential for contaminant removal and breakdown.
☐	Water is likely to percolate through the unsaturated zone to the groundwater through fractures, a process which has little potential for contaminant removal and breakdown.

Made ground	
 Contains OS data © Crown Copyright and database right 2020	Made ground is present at the surface. Infiltration may increase the possibility of remobilising pollutants.

Section 5. Geological Maps

The following maps show the artificial, superficial and bedrock geology within the area of interest.

Artificial deposits

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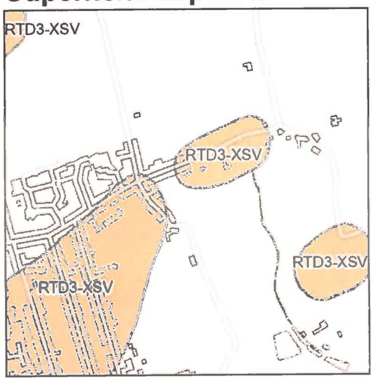
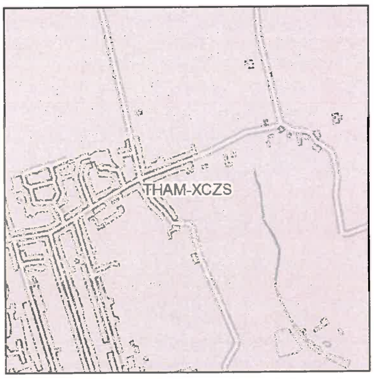
Superficial deposits



Contains OS data © Crown Copyright and database right 2020

Bedrock



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Fault

Coal, ironstone or mineral vein

Note: Faults and Coals, ironstone & mineral veins are shown for illustration and to aid interpretation of the map. Not all such features are shown and their absence on the map face does not necessarily mean that none are present

Key to Artificial deposits:
No deposits recorded by BGS in the search area

Key to Superficial deposits:

Map colour	Computer Code	Rock name	Rock type
	RTD3-XSV	RIVER TERRACE DEPOSITS, 3	SAND AND GRAVEL

Key to Bedrock geology:

Map colour	Computer Code	Rock name	Rock type
	THAM-XCZS	THAMES GROUP	CLAY, SILT AND SAND

Limitations of this report:

- This report is concerned with the potential for infiltration-to-the-ground to be used as a SuDS technique at the site described. It only considers the subsurface beneath the search area and does NOT consider potential surface or subsurface impacts outside of that area.
- This report is NOT an alternative for an on-site investigation or soakaway test, which might reach a different conclusion.
- This report must NOT be used to justify disposal of foul waste or grey water.
- This report is based on and limited to an interpretation of the records held by the British Geological Survey (BGS) at the time the search is performed. The datasets used (with the exception of that showing depth to water table) are based on 1:50 000 digital geological maps and not site-specific data.
- Other more specific and detailed ground instability information for the site may be held by BGS, and an assessment of this could result in a modified assessment.
- To interpret the maps correctly, the report must be viewed and printed in colour.
- The search does NOT consider the suitability of sites with regard to:
  - previous land use,
  - potential for, or presence of contaminated land
  - presence of perched water tables
  - shallow mining hazards relating to coal mining. Searches of coal mining should be carried out via The Coal Authority Mine Reports Service: www.coalminingreports.co.uk.
  - made ground, where not recorded
  - proximity to landfill sites (searches for landfill sites or contaminated land should be carried out through consultation with local authorities/Environment Agency)
  - zones around private water supply boreholes that are susceptible to groundwater contamination.
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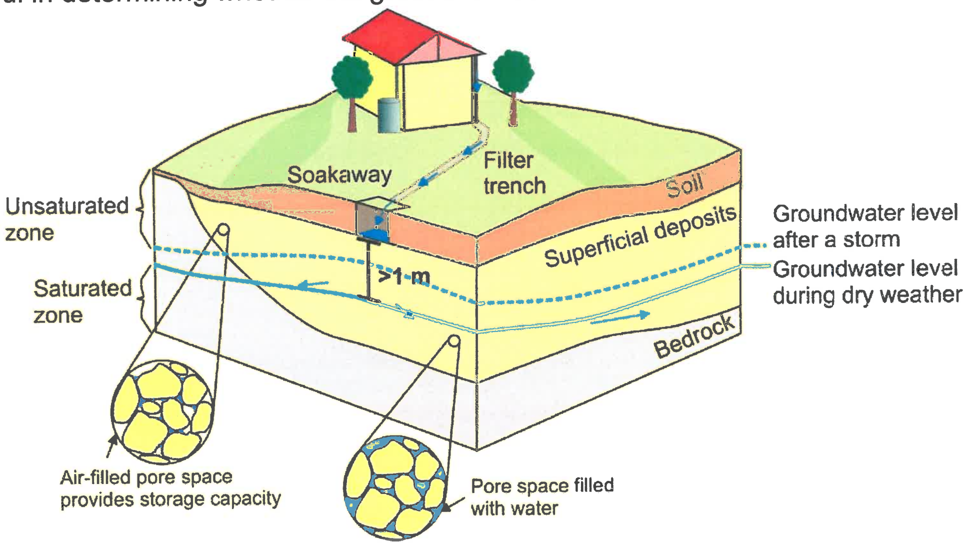
Explanation of terms

Depth to groundwater

In the shallow subsurface, the ground is commonly unsaturated with respect to water. Air fills the spaces within the soil and the underlying superficial deposits and bedrock. At some depth below the ground surface, there is a level below which these spaces are full of water. This level is known as the groundwater level, and the water below it is termed the groundwater. When water is infiltrated, the groundwater level may rise temporarily. To ensure that there is space in the unsaturated zone to accommodate this, there should be a minimum thickness of 1 m between the base of the infiltration system and the water table. An estimate of the *depth to groundwater* is therefore useful in determining whether the ground is suitable for infiltration.



Groundwater flooding

Groundwater flooding occurs when a rise in groundwater level results in very shallow groundwater or the emergence of groundwater at the surface. If infiltration systems are installed in areas that are susceptible to groundwater flooding, it is possible that the system could become inundated. The susceptibility map seeks to identify areas where the geological conditions and water tables indicate that groundwater level rise could occur under certain circumstances. A high susceptibility to groundwater flooding classification does not mean that groundwater flooding has ever occurred in the past, or will do so in the future as the susceptibility maps do not contain information on how often flooding may occur. The susceptibility maps are designed for planning; identifying areas where groundwater flooding might be an issue that needs to be taken into account.

Geological indicators of flooding

In floodplain deposits, groundwater level can be influenced by the water level in the adjacent river. Groundwater level may increase during periods of fluvial flood and therefore this should be taken into account when designing infiltration systems on such deposits. The *geological indicators of flooding* dataset shows where there is geological evidence (floodplain deposits) that flooding has occurred in the past.

For further information on flood-risk, the likely frequency of its recurrence in relation to any proposed development of the site, and the status of any flood prevention measures in place, you are advised to contact the local office of the Environment Agency (England and Wales) at www.environment-agency.gov.uk/ or the Scottish Environment Protection Agency (Scotland) at www.sepa.org.uk.

Artificial ground

Artificial ground comprises deposits and excavations that have been created or modified by human activity. It includes ground that is worked (quarries and road cuttings), infilled (back-filled quarries), landscaped (surface re-shaping), disturbed (near surface mineral workings) or classified as made ground (embankments and spoil heaps). The composition and properties of artificial ground are often unknown. In particular, the permeability and chemical composition of the artificial ground should be determined to ensure that the ground will drain and that any contaminants present will not be remobilised.

Superficial permeability

Superficial deposits are those geological deposits that were formed during the most recent period of geological time (as old as 2.6 million years before present). They generally comprise relatively thin deposits of gravel, sand, silt and clay and are present beneath the pedological soil in patches or larger spreads over much of Britain. The ease with which water can percolate through these deposits is controlled by their permeability and varies widely depending on their composition. Those deposits comprising clays and silts are less permeable and thus infiltration is likely to be slow, such that water may pool on the surface. In comparison, deposits comprising sands and gravels are more permeable allowing water to percolate freely.

Bedrock permeability

Bedrock forms the main mass of rock forming the Earth. It is present everywhere, commonly beneath superficial deposits. Where the superficial deposits are thin or absent, the ease with which water will percolate into the ground depends on the permeability of the bedrock.

Natural ground instability

Natural ground instability refers to the propensity for upward, lateral or downward movement of the ground that can be caused by a number of natural geological hazards (e.g. ground dissolution/compressible ground). Some movements associated with particular hazards may be gradual and of millimetre or centimetre scale, whilst others may be sudden and of metre or tens of metres scale. Significant natural ground instability has the potential to cause damage to buildings and structures, especially when the drainage characteristics of a site are altered. It should be noted, however, that many buildings, particularly more modern ones, are built to such a standard that they can remain unaffected in areas of significant ground movement.

Shrink-swell

A shrinking and swelling clay changes volume significantly according to how much water it contains. All clay deposits change volume as their water content varies, typically swelling in winter and shrinking in summer, but some do so to a greater extent than others. Contributory circumstances could include drought, leaking service pipes, tree roots drying-out the ground or changes to local drainage patterns, such as the creation of soakaways. Shrinkage may remove support from the foundations of buildings and structures, whereas clay expansion may lead to uplift (heave) or lateral stress on part or all of a structure; any such movements may cause cracking and distortion.

Landslides (slope stability)

A landslide is a relatively rapid outward and downward movement of a mass of ground on a slope, due to the force of gravity. A slope is under stress from gravity but will not move if its strength is greater than this stress. If the balance is altered so that the stress exceeds the strength, then movement will occur. The stability of a slope can be reduced by removing ground at the base of the slope, by placing material on the slope, especially at the top, or by increasing the water content of the materials forming the slope. Increase in subsurface water content beneath a soakaway could increase susceptibility to landslide hazards. The assessment of landslide hazard refers to the stability of the present land surface. It does not encompass a consideration of the stability of excavations.

Soluble rocks (dissolution)

Some rocks are soluble in water and can be progressively removed by the flow of water through the ground. This process tends to create cavities, potentially leading to the collapse of overlying materials and possibly subsidence at the surface. The release of water into the subsurface from infiltration systems may increase the dissolution of rock or destabilise material above or within a cavity. Dissolution cavities may create a pathway for rapid transport of contaminated water to an aquifer or water course.

Compressible ground
Many ground materials contain water-filled pores (the spaces between solid particles). Ground is compressible if a building (or other load) can cause the water in the pore space to be squeezed out, causing the ground to decrease in thickness. If ground is extremely compressible the building may sink. If the ground is not uniformly compressible, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. The compressibility of the ground may alter as a result of changes in subsurface water content caused by the release of water from soakaways.

Collapsible deposits
Collapsible ground comprises certain fine-grained materials with large pore spaces (the spaces between solid particles). It can collapse when it becomes saturated by water and/or a building (or other structure) places too great a load on it. If the material below a building collapses it may cause the building to sink. If the collapsible ground is variable in thickness or distribution, different parts of the building may sink by different amounts, possibly causing tilting, cracking or distortion. The subsurface underlying a soakaway will experience an increase in water content that may affect the stability of the ground. This hazard is most likely to be encountered only in parts of southern England.

Running sand
Running sand conditions occur when loosely-packed sand, saturated with water, flows into an excavation, borehole or other type of void. The pressure of the water filling the spaces between the sand grains reduces the contact between the grains and they are carried along by the flow. This can lead to subsidence of the surrounding ground. Running sand is potentially hazardous during the drainage system installation. During installation, excavation of the ground may create a space into which sand can flow, potentially causing subsidence of surrounding ground.

Shallow mining hazards (non coal)
Current or past underground mining for coal or for other commodities can give rise to cavities at shallow or intermediate depths, which may cause fracturing, general settlement, or the formation of crown-holes in the ground above. Spoil from mineral workings may also present a pollution hazard. The release of water into the subsurface from soakaways may destabilise material above or within a cavity. Cavities arising as a consequence of mining may also create a pathway for rapid transport of contaminated water to an aquifer or watercourse. The mining hazards map is derived from the geological map and considers the potential for subsidence associated with mining on the basis of geology type. Therefore if mining is known to occur within a certain rock, the map will highlight the potential for a hazard within the area covered by that geology.

For more information regarding underground and opencast **coal mining**, the location of mine entries (shafts and adits) and matters relating to subsidence or other ground movement induced by **coal mining** please contact the Coal Authority, Mining Reports, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG; telephone 0845 762 6848 or at www.coal.gov.uk. For more information regarding other types of mining (i.e. non-coal), please contact the British Geological Survey.

Groundwater source protection zones
In England and Wales, the Environment Agency has defined areas around wells, boreholes and springs that are used for the abstraction of public drinking water as source protection zones. In conjunction with Groundwater Protection Policy the zones are used to restrict activities that may impact groundwater quality, thereby preventing pollution of underlying aquifers, such that drinking water quality is upheld. The Environment Agency can provide advice on the location and implications of source protection zones in your area (www.environment-agency.gov.uk/)

Contact Details

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- The data, information and related records supplied in this Report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
- If a report or other output is produced for you on the basis of data you have provided to BGS, or your own data input into a BGS system, please do not rely on it as a source of information about other areas or geological features, as the report may omit important details.
- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

Report issued by
BGS Enquiry Service

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

Appendix VIII
Surface Water Strategy
– Summary Table

The Johnson Dennehy Planning Partnership
The Coach House
Beacon End House
London Road
Stanway
Colchester
Essex, CO3 0NY

JDP Environmental
Trinity House
Knightstown
Valentia Island
County Kerry
Eire, V23 WP9

Summary Table

Site Location	Land at 102 East Road, West Mersea, Essex, CO5 8SA
Planning Application	Outline
Existing Site	Greenfield
Site Area	1.69ha (4.2 acres)
Proposed Development	Residential
Flood Zone	Zone 1
Surface Water Flooding	None
Reservoir Inundation Zone	None
Other Sources of Flooding	None Assessed as Significant
Section 19 Flood Investigations Report	None
Surface Water Management	Attenuation sized to manage the 1 in100 annual probability storm inclusive of 40% climate change. Discharge limited to the 1 in 1 greenfield rate (Q1)

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

Appendix IX
Infiltration Testing Report

The Johnson Dennehy Planning Partnership
The Coach House
Beacon End House
London Road
Stanway
Colchester
Essex, CO3 0NY

JDP Environmental
Trinity House
Knightstown
Valentia Island
County Kerry
Eire, V23 WP9

Soakaway Infiltration Report
102 East Road, West Mersea, Essex
Dated: 9th September 2020

1.0 Introduction

JDP Environmental has been requested by BlueSquare Homes (the 'Client') to undertake soakage tests to provide information for the suitability and design for soakaways as a drainage solution for the purposed residential development at land located off 102 East Road, West Mersea, Essex, CO5 8SA (hereafter referred to as the "Site".

2.0 Limitations

The following limitations were encountered during the soakage testing:

- Given the slow infiltration rates, the minimum 75% effective depth was not reached over a 24 hour period and as such, the full three infiltration tests per location were not able to be completed as per BRE365 guidance.

3.0 Desktop Study

From BGS mapping, the Site is indicated to be underlain by superficial River Terrace Deposits (sand and gravel) in the north west of the Site although superficial deposits are indicated to be absent in the south east. The Site is indicated to be underlain by bedrock geology of the Thames Group (silty clay). The superficial River Terrace deposits are classified as a Secondary A Aquifer and the bedrock is classified as Unproductive Strata. The nearest surface water feature is a water course located adjacent to the eastern boundary. However, West Mersea is a island and the tidal River Strood and Blackwater Estuary are both locates in close proximity.

4.0 Site Investigation

Soakage testing was undertaken in general accordance with BRE Digest 356 Soakaway Design between 2nd and 4th September.

The soakage testing comprised excavating four trial pits to depths between 1.40m below ground level and 1.6m below ground level. The geology at each trial pit location was lodged. A gravel pack and monitoring pipes were then installed in the trial pit and the remaining void was backfilled with arisings the remaining spoil was graded back to original ground level.

The gravel pack in each test location was then filled with water from a water container and the depth to water from ground level recorded at intervals over a period up to 24 hours.

The soakage test data was recorded and used to calculate the soil infiltration rate for each location.

5.0 Results

The trial pit logs are included in this report. Topsoil was identified in all test locations to a maximum depth of 0.34m below ground level. This was underlain by dark orange to orangish brown slightly clayed silty sand in all locations to a maximum depth of 1.6m below ground level.

A band of soft grey silty clay was identified in all trial pits at 1.32 to 1.37m below ground level and may be representative of the underlying Thames Group. It is considered the Site is underlain by silty slightly gravelly sands which are considered representative of the mapped superficial deposits, however, may extend further than mapping indicates.

6.0 Soakage Tests

Soakaway Test Reference Number	Test Depth Range (m.bgl)	Infiltration Rate	Geology
SA 1	0.80 – 1.60	Failed	Gravelly Clayey Sand
SA 2	0.60 – 1.50	Failed	
SA 3	1.70 – 1.60	Failed	
SA 4	0.60 – 1.60	Failed	

7.0 Conclusions

The infiltration testing has been undertaken at an available range of depths above a shallow ground water table in the silty gravelly sands, which are considered to represent the mapped superficial deposits. However, given the high proportions of site and some clays all the infiltration tests failed to reach 75% effective depth over ta 24 hour period and as such, the Site is unlikely to be suitable for traditional soakaways as a method of drainage.

Alternative methods, such as discharge to an existing facility should be considered.

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

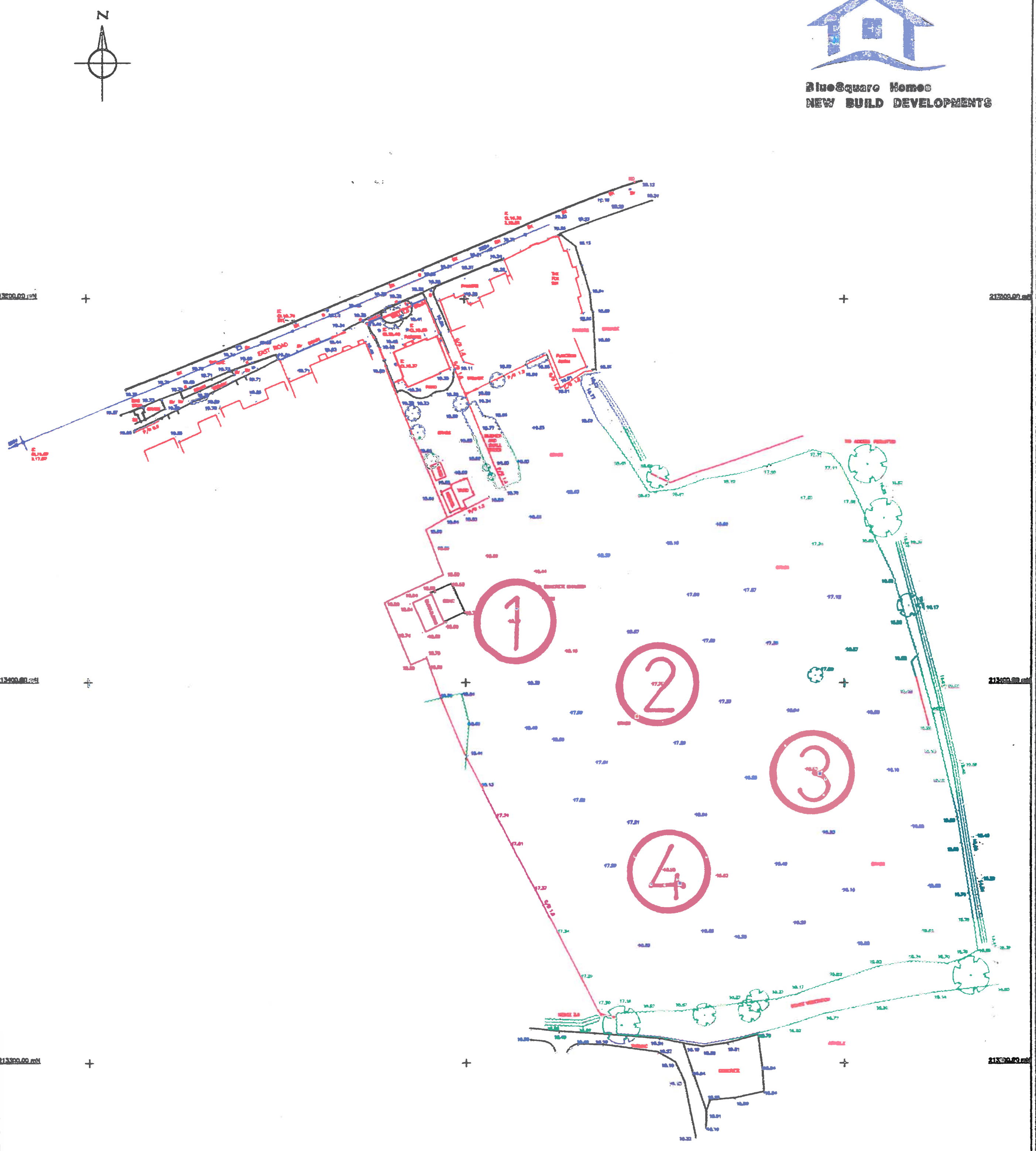
Appendix X
Trial Pit Logs
(1 – 4 inclusive)

The Johnson Dennehy Planning Partnership
The Coach House
Beacon End House
London Road
Stanway
Colchester
Essex, CO3 0NY

JDP Environmental
Trinity House
Knightstown
Valentia Island
County Kerry
Eire, V23 WP9

REV	DESCRIPTION	Date	APPROVED
A	WEST BOUNDARY ADDED, DRAINAGE ADDED	19/03/19	

BlueSquare Homes
NEW BUILD DEVELOPMENTS



SURFACE WATER DRAINAGE STRATEGY
TRIAL PIT LOG LOCATION

Sterling Surveys

Peter Whitney
Land Surveying
Site Engineering

TOPOGRAPHIC SURVEY AT EAST ROAD, WEST MERSEA
SURVEY RELATED TO OS NATIONAL GRID (OSTN15)

SIZE	Date	DWG NO.	REV
A1	JULY 2019	1577-1	A

Scale 1:500@A1 | Drawn by PW | Sheet

J D P Environmental

TRIAL PIT LOG (1)

STRATA DETAILS	KEY	STRATA DEPTH (m)	REDUCED LEVEL (mAOD)	WATER STRIKE (m)
BROWN SLIGHTLY CLAYEY, SLIGHTLY GRAVELLY, FINE TO MEDIUM SAND. GRAVEL IS FINE TO COARSE SUBANGULAR TO SUBROUNDED MIXED LITHOLOGIES.		0.450	48.05	
ORANGERY BROWN SLIGHTLY CLAYEY, SANDY GRAVEL SAND IS FINE TO MEDIUM. GRAVEL IS COARSE SUBANGULAR TO SUBROUNDED MIXED LITHOLOGIES		0.708	47.80	
LOOSE ORANGERY BROWN SLIGHTLY CLAYEY FINE TO MEDIUM SAND. SAND IS FINE TO MEDIUM, SUBANGULAR TO SUBROUNDED WITH OCCASIONAL GRAVEL OF MIXED LITHOLOGIES.			47.30	1.200
		2.100	46.40	

TRIAL PIT DIMENSIONS

500

2100

Blue Square Homes
NEW BUILD DEVELOPMENTS

Surface Water Design Strategy
102 East Road - West Mersea - Essex

J D P Environmental

TRIAL PIT LOG (2)

STRATA DETAILS	KEY	STRATA DEPTH (m)	REDUCED LEVEL (mAOD)	WATER STRIKE (m)
			47.70	
BROWN, SLIGHTLY CLAYEY, SLIGHTLY GRAVELLY, FINE TO MEDIUM SAND. GRAVEL IS FINE TO COARSE SUBANGULAR TO SUBROUNDED MIXED LITHOLOGIES.		0.500	47.20.	
ORANGERY BROWN, SLIGHTLY CLAYEY, SANDY GRAVEL. SAND IS FINE TO MEDIUM. GRAVEL IS COARSE SUBANGULAR TO SUBROUNDED MIXED LITHOLOGIES		2.200.	45.50.	

TRIAL PIT DIMENSIONS

500

2100

Blue Square Homes
NEW BUILD DEVELOPMENTS

Surface Water Design Strategy
102 East Road - West Mersea - Essex

J D P Environmental

TRIAL PIT LOG (3)

STRATA DETAILS	KEY	STRATA DEPTH (m)	REDUCED LEVEL (mAOD)	WATER STRIKE (m)
BROWN SLIGHTLY CLAYEY, SLIGHTLY GRAVELLY, FINE TO MEDIUM SAND. GRAVEL IS FINE TO COARSE SUBANGULAR TO SUBROUNDED MIXED LITHOLOGIES.		0.500	48.50 48.00	
ORANGERY BROWN, SLIGHTLY CLAYEY, SANDY GRAVEL. SAND IS FINE TO MEDIUM. GRAVEL IS COARSE SUBANGULAR TO SUBROUNDED MIXED LITHOLOGIES		2.350	47.40 46.15	1.100

TRIAL PIT DIMENSIONS 2100 × 500

Blue Square Homes
NEW BUILD DEVELOPMENTS

Surface Water Design Strategy
102 East Road - West Mersea - Essex

J D P Environmental

TRIAL PIT LOG (4)

STRATA DETAILS	KEY	STRATA DEPTH (m)	REDUCED LEVEL (mAOD)	WATER STRIKE (m)
BROWN, SLIGHTLY CLAYEY, SLIGHTLY GRAVELLY, FINE TO MEDIUM SAND. GRAVEL IS FINE TO COARSE SUBANGULAR TO SUBROUNDED MIXED LITHOLOGIES.		0.500	48.80 48.30	
ORANGERY BROWN, SLIGHTLY CLAYEY, SANDY GRAVEL. SAND IS FINE TO MEDIUM. GRAVEL IS COARSE SUBANGULAR TO SUBROUNDED MIXED LITHOLOGIES		1.900	47.50 46.90	1.300

500

TRIAL PIT DIMENSIONS

2100

Blue Square Homes
NEW BUILD DEVELOPMENTS

Surface Water Design Strategy
102 East Road – West Mersea – Essex

Surface Water Drainage Strategy
Outline Residential Development
102 East Road
West Mersea
Essex

Appendix XI
Attenuation Design

The Johnson Dennehy Planning Partnership
The Coach House
Beacon End House
London Road
Stanway
Colchester
Essex, CO3 0NY

JDP Environmental
Trinity House
Knightstown
Valentia Island
County Kerry
Eire, V23 WP9

102 East Road – West Mersea
Attenuation Basin – 1:100 Year + CC (40%)

Summary of Results for 100 Year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (M^3)	Status
15 min Winter	9.416	0.316	6.7	1377.1	OK
30 min Winter	9.505	0.405	7.7	1793.3	OK
60 min Winter	9.592	0.492	8.5	2220.5	OK
120 min Winter	9.691	0.591	9.4	2718.1	OK
180 min Winter	9.752	0.652	9.9	3035.7	Flood Risk
240 min Winter	9.795	0.695	10.3	3260.9	Flood Risk
360 min Winter	9.850	0.750	10.7	3555.4	Flood Risk
480 min Winter	9.893	0.783	11.0	3738.7	Flood Risk
600 min Winter	9.905	0.805	11.1	3859.9	Flood Risk
720 min Winter	9.920	0.820	11.2	3942.8	Flood Risk
960 min Winter	9.937	0.837	11.3	4037.4	Flood Risk
1440 min Winter	9.945	0.845	11.4	4079.5	Flood Risk
2160 min Winter	9.932	0.832	11.3	4007.0	Flood Risk
2880 min Winter	9.911	0.811	11.2	3890.7	Flood Risk
4320 min Winter	9.874	0.774	10.9	3687.9	Flood Risk
5760 min Winter	9.846	0.746	10.7	3537.3	Flood Risk
7200 min Winter	9.824	0.724	10.5	3417.5	Flood Risk
8640 min Winter	9.805	0.705	10.4	3314.4	Flood Risk
10080 min Winter	9.788	0.688	10.2	3226.9	Flood Risk

102 East Road – West Mersea
Attenuation Basin – 1:100 Year + CC (40%)

Summary of Results for 100 Year Return Period (+40%)				
Storm Event	Rain (mm/hr)	Flooded Volume (m3)	Discharge Volume (m3)	Time Peak (mins)
15 min Winter	141.680	0.0	509.6	27
30 min Winter	92.400	0.0	594.8	41
60 min Winter	57.400	0.0	1222.5	70
120 min Winter	35.350	0.0	1377.8	130
180 min Winter	26.476	0.0	1463.9	188
240 min Winter	21.455	0.0	1518.6	246
360 min Winter	15.773	0.0	1579.7	364
480 min Winter	12.580	0.0	1608.7	482
600 min Winter	10.506	0.0	1620.6	598
720 min Winter	9.046	0.0	1622.3	716
960 min Winter	7.098	0.0	1607.1	950
1440 min Winter	4.993	0.0	1537.6	1408
2160 min Winter	3.487	0.0	2999.4	2080
2880 min Winter	2.704	0.0	2912.9	2712
4320 min Winter	1.899	0.0	2675.4	3372
5760 min Winter	1.488	0.0	4920.2	4272
7200 min Winter	1.243	0.0	4893.2	5192
8640 min Winter	1.079	0.0	4806.0	6064
10080 min Winter	0.963	0.0	4659.9	6968

102 East Road – West Mersea
Attenuation Basin – 1:100 Year + CC (40%)

RAINFALL DETAILS	
Rainfall Model (Flood Estimation Handbook)	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	TM025134
Date Type	Catchment
Summer Storms	Yes
Winter Storms	Yes
CV (Summer)	0.950
CV (Winter)	0.950
Shortest Storm (Minutes)	15
Longest Storm (Minutes)	10080
Climate Change %	+40

102 East Road – West Mersea
Greenfield Run-off Rate per Hectare

ICP SUDS Mean Annual Flood

<u>Input</u>

Return Period (years) 100 SAAR (mm) 550 Urban 0.000

Area (ha) 1,000

Soil 0.450

Region Number 6

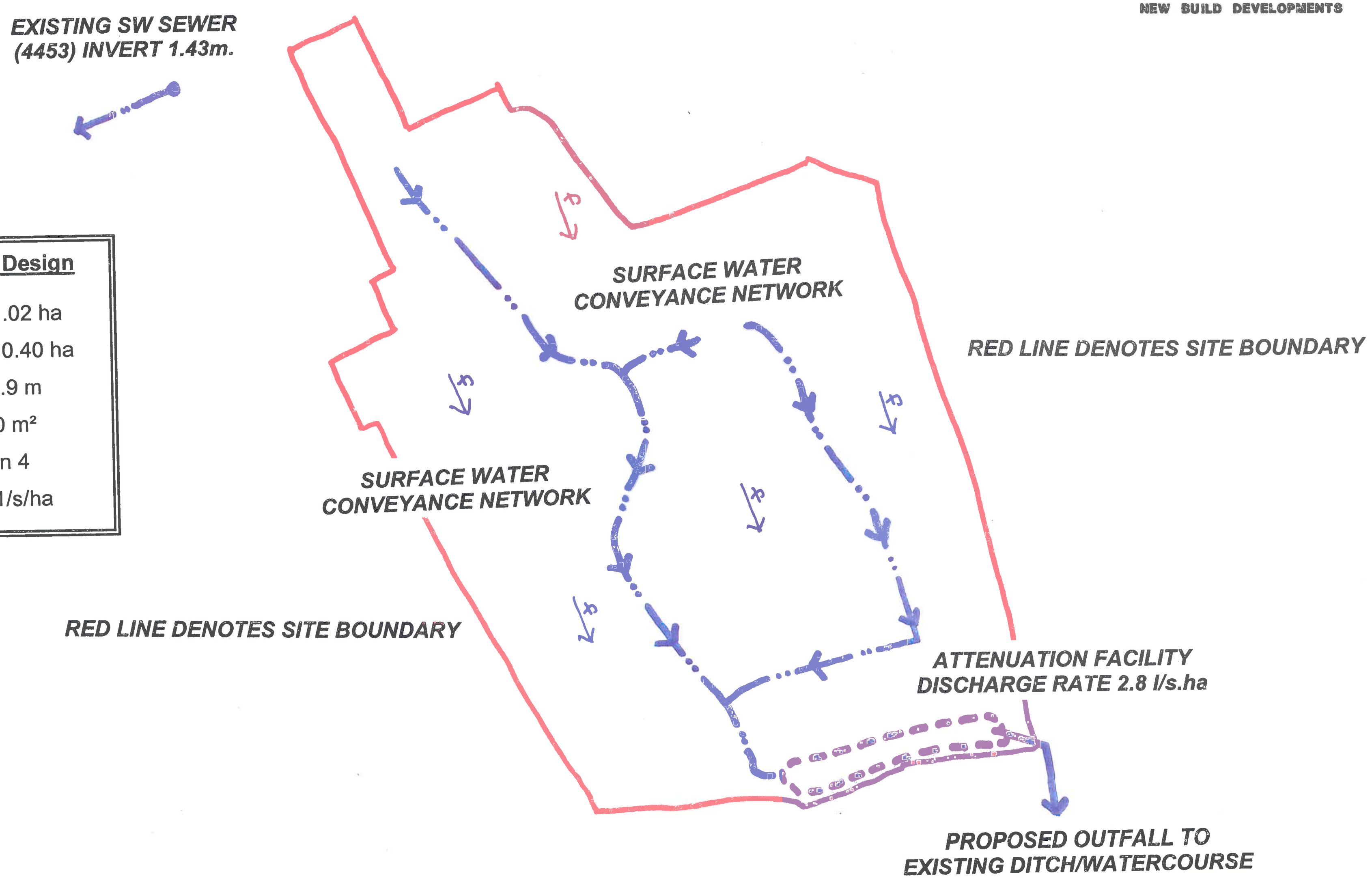
<u>Results l/s</u>

Q BAR Rural	3.3
Q BAR Urban	3.3
Q100 Years	10.6
Q1 Year	2.8
Q30 Years	7.5
Q100 Years	10.6

PROPOSED RESIDENTIAL DEVELOPMENT
102 EAST ROAD - WEST MERSEA - ESSEX

BlueSquare Homes
NEW BUILD DEVELOPMENTS

SCALE 1:500 (A1)



Attenuation Facility Design

Catchment Area = 1.02 ha

Impermeable Area = 0.40 ha

Facility Depth = 0.9 m

Basin Area = 970 m²

Side Slope = 1 in 4

Outfall Rate = 2.81/s/ha

102 EAST ROAD
WEST MERSEA, ESSEX

THE JOHNSON DENNEHY PLANNING PARTNERSHIP LTD. The Coach House, Beacon End House, London Road, Stanway, Colchester, Essex CO3 ONY Telephone: 00 44 1206 763334 Fax: 00 44 1206 763335 E-Mail: jdp2@btconnect.com Trinity House, Knightstown, Valentia Island, Co Kerry, Ireland Telephone: 00 353 66 9476278 E-Mail: jdp2@btconnect.com	**PROJECT** RESIDENTIAL DEVELOPMENT 102 EAST ROAD WEST MERSEA ESSEX.	**TITLE** OUTLINE SURFACE WATER DRAINAGE STRATEGY	**CLIENT** BlueSquare Homes NEW BUILD DEVELOPMENTS	**Revisions** DATE No.	SCALE 1 : 500 (A1) DATE AUG. 2020. FILE No. 4126. DRG No. 130. PJ.	

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