

PROPOSED RESIDENTIAL DEVELOPMENT at PARK LANE, DONINGTON



DRAINAGE STATEMENT FOR CALDERDALE HOMES LTD

HALL
-infrastructure-
DESIGN

9 St Marys Park
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Drainage Statement

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Document 5	Ground Investigation Report C13751 Ground Engineering Ltd – March 2016.
Document 6	AWS Pre-Planning Assessment Report ref 00015875 – August 2016.
Document 7	Extract from Black Sluice IDB district map.

Drainage Statement for Proposed Housing Development at Park Lane, Donington, Lincolnshire.

Hall Infrastructure Design Ltd have been engaged by Calderdale Homes (Eastern) Ltd c/o Robert Doughty Consultancy Ltd to prepare a drainage statement for a proposed residential development at the above site. A proposed site layout drawing, reference GH02-A1-1:500, produced by Robert Doughty Consultancy Ltd has been provided to Hall Infrastructure Design Ltd from which to produce this statement. A topographical survey drawing, reference AS2128/1-A, produced by Axis Surveys Ltd, has also been provided. This drawing has been amended by Hall Infrastructure Design Ltd to incorporate the site boundaries and existing impermeable areas together with existing drainage information.

This application is for outline planning permission.

This statement details the existing site conditions pre development and the discharges post development and assumes that the development land is uncontaminated and inert.

1. Topography and Site Layout.

The development site is a brown field site situated, currently forming two warehouses together with offices and tarmac and concrete hardstandings, at land to the south of Park Lane / Gleed Avenue in Donington, as shown on the topographical survey drawing AS2128/1-A (doc 1). The site, which is rectangular in shape is accessed from Park Lane with an approximate frontage width of 37m, maximum depth of 36m and a site area of 0.122 Ha. The existing impermeable area is 0.101 Ha which equates to 83%. In the absence of any manholes on the site other than one foul inspection chamber it is assumed that all roof areas and hardstandings discharge via infiltration. Surveyed levels would indicate the presence of a "channel line" in the existing tarmac hardstanding where infiltration could be achieved.

The proposal includes for the construction of a new private access roads / parking courtyard serving nine semi detached and terraced dwellings. The proposed impermeable area has been calculated based on the roof areas of proposed dwellings (0.031 Ha – 25%) and the private access road / parking courtyard (0.039 Ha – 32%) totalling 0.070 Ha which represents 57% of the total site area as shown on the schematic concept drainage plan drawing no 1614/01 (doc 2). It is proposed that roof areas will discharge to the adjacent private access road / parking courtyard which will act as a large shallow infiltration structure to mimic the natural flow path from the site pre-development.

2. Existing green field conditions.

Existing green field runoff values, calculated in accordance with the H R Wallingford greenfield runoff estimation for sites (doc 3) in accordance with DEFRA / Environment Agency Report SC030219 rev E and Interim National Procedure Principle 17, confirm that the impermeable area (0.101 Ha) of the existing site generates a 1 year run off value of 5.00 l/s, 30 year of 5.00 l/s and 100 year of 5.00 l/s, these all being minimum default values.

3. Infiltration Testing.

The client has commissioned a ground investigation for the site from Ground Engineering Ltd and their report, ref C13751 dated March 2016 (doc 5) confirms a soil infiltration rate of 4.88×10^{-7} ms with ground water between 1.80m and 2.00m below existing ground level.

It is recommended that, following demolition and site clearance, further infiltration testing is undertaken at several locations across the site at varying depths to ensure the maximum infiltration potential of the underlying strata is achieved. The author of this report believes that the testing carried out to date will have been prejudiced by the compacted nature of the soil beneath the existing hardstanding areas.

4. The Design – Surface Water.

In accordance with the House of Commons Written Statement (HCWS161 – 18th December 2014) there is an expectation for SuDS to be incorporated in all residential developments of 10 houses or more (major developments) unless demonstrated to be inappropriate. Whilst this site does not fall within the SuDS requirement the client has confirmed they wish to incorporate SuDS within the design as this best mimics the natural pre-development flow path.

Furthermore, in accordance with recognised guidance, Part H of the Building Regulations 2010 and National Planning Policy Framework 2012, there is a hierarchy of where surface water should discharge. This hierarchy should be followed where practicable, and is as follows:

- 1) Infiltration
- 2) Watercourse
- 3) Public sewer

Any proposed surface water drainage system will need to be designed to account for the effects of climate change over the lifetime of the development. Based on the recommendations in Paragraph 13 - Table 5 of the Technical Guide to National Planning Policy Framework 2012 (NPPF-TG) the proposed drainage systems should be sized to allow for a 30% increase in rainfall intensity.

The 2014 DEFRA Draft National Standards and Specified Criteria for Sustainable Drainage states that:

'The drainage system must be designed and constructed so surface water discharged does not adversely impact the water quality of receiving water bodies, both during construction and when operational.'

Based on best practice and EA guidelines it is desirable to incorporate 1 no. water treatment stage within the drainage design for roof water runoff and 2 no. water treatment stages within the drainage design for vehicular surfaces where practicable and subject to the requirements of approving/adopting authorities. Therefore, the design of the drainage system should seek to ensure that all runoff complies with these requirements and SUDS features are incorporated into the drainage design to provide pollution reduction.

Lincolnshire County Council, the Lead Local Flood Authority (LLFA) in this area will be the approving body for this application.

Addressing each method in turn:

Infiltration

Grass areas and soft landscaping areas are proposed in the development totalling 0.052 Ha (43%), as shown on the schematic concept drainage plan, drawing no 1614/01 (doc 2).

Permeable materials (e.g. permeable block paving) are proposed to the private access road / parking courtyard totalling 0.039 Ha (16%), which will be constructed with a 500mm deep sub base reservoir layer with aggregate providing 30% free volume voids, as shown on the schematic concept drainage plan drawing no 1614/01 (doc 2).

Domestic curtilage roof areas totalling 0.031 Ha (25%) are proposed to discharge to the sub base reservoir layer of the adjacent private access road / parking courtyard, as shown on the schematic concept drainage plan drawing no 1614/01 (doc 2).

Infiltration can therefore be used as the method of disposal of surface water from all domestic curtilage areas of the development, as detailed below, subject to the relevant approvals. For robustness and, to ensure no overland exceedence flows, infiltration structures have been designed to the 100 year plus 30% climate change standard:

Domestic curtilage roof areas (0.031 Ha) will connect in to the sub base reservoir layer of the adjacent permeable paved private access road / parking courtyard (0.039 Ha). For the given contributing area (0.070 Ha) Microdrainage calculations (doc 4) confirm that the sub base reservoir layer would fill to 132mm depth in a 2 year storm event. The 50% drain down time is calculated at 1351 minutes, within the 24 hour (1440 minutes) maximum permitted. The base of the sub base reservoir layer would be set so as to be at least 1m above the water table. This can be finalised at detailed design stage. A typical permeable paved construction detail is included on the schematic concept drainage plan (doc 2) together with a detail showing how the roof areas can be connected to the sub base reservoir layer, which, in order to comply with paragraph 9 of the Technical Guide to the NPPF 2012, demonstrates how the infiltration structure can be monitored and maintained to ensure it will continue to function correctly for the lifetime of the development and prevent any increase in flood risk on or off site.

A further Microdrainage calculation (doc 4) confirms that the sub base reservoir layer would fill to 475mm depth in a 100 year plus 30% climate change storm event and this therefore confirms that there would be no overland flows from the structure therefore not being detrimental to existing and proposed dwellings.

Watercourse

There are no proposals for any surface water to discharge to watercourse at this stage as Black Sluice IDB drainage map (doc 7) indicates that there are no watercourses or culverts in the vicinity of the development.

Public Sewer

There are no proposals for any surface water to discharge to public sewer at this stage as Anglian Water Services Ltd have confirmed in their Pre-Planning Assessment Report ref 00015875 dated August 2016 (doc 6) that they do not have any surface water sewers in the vicinity of the development. There is potentially an existing highway drain located in the footpath opposite the site access however this has been discounted at this stage as connection to it would not mimic the natural flow path from the site pre-development.

5. Flood Risk.

Flood risk does not form any part of this drainage statement as this is being dealt with by others.

6. Finished Floor Levels.

Finished floor levels do not form any part of this drainage statement as this is being dealt with by others. For the purpose of this report a finished level has been assumed at 300mm above the existing surveyed ground levels.

7. The Design – Foul Water.

Foul water drainage does not form part of this drainage statement as this is being dealt with by others however Anglian Water Services Ltd have confirmed in their Pre-Planning Assessment Report ref 00015875 dated August 2016 (doc 6) that the site may be connected to their existing manhole ref 6706 in Park Lane.

8. Conclusion.

With the information provided to date it has been demonstrated that the proposed development site can comply with the set discharge requirements. Sustainable Urban Drainage Systems can be incorporated within the design (permeable pavements etc) with final attenuation for the infrastructure being in the sub base reservoir layer of the proposed access road / parking courtyard. The use of water butts and other rainwater harvesting techniques for the roof water runoff could be considered at the detailed design stage and these would provide additional storage over and above that demonstrated in this statement.

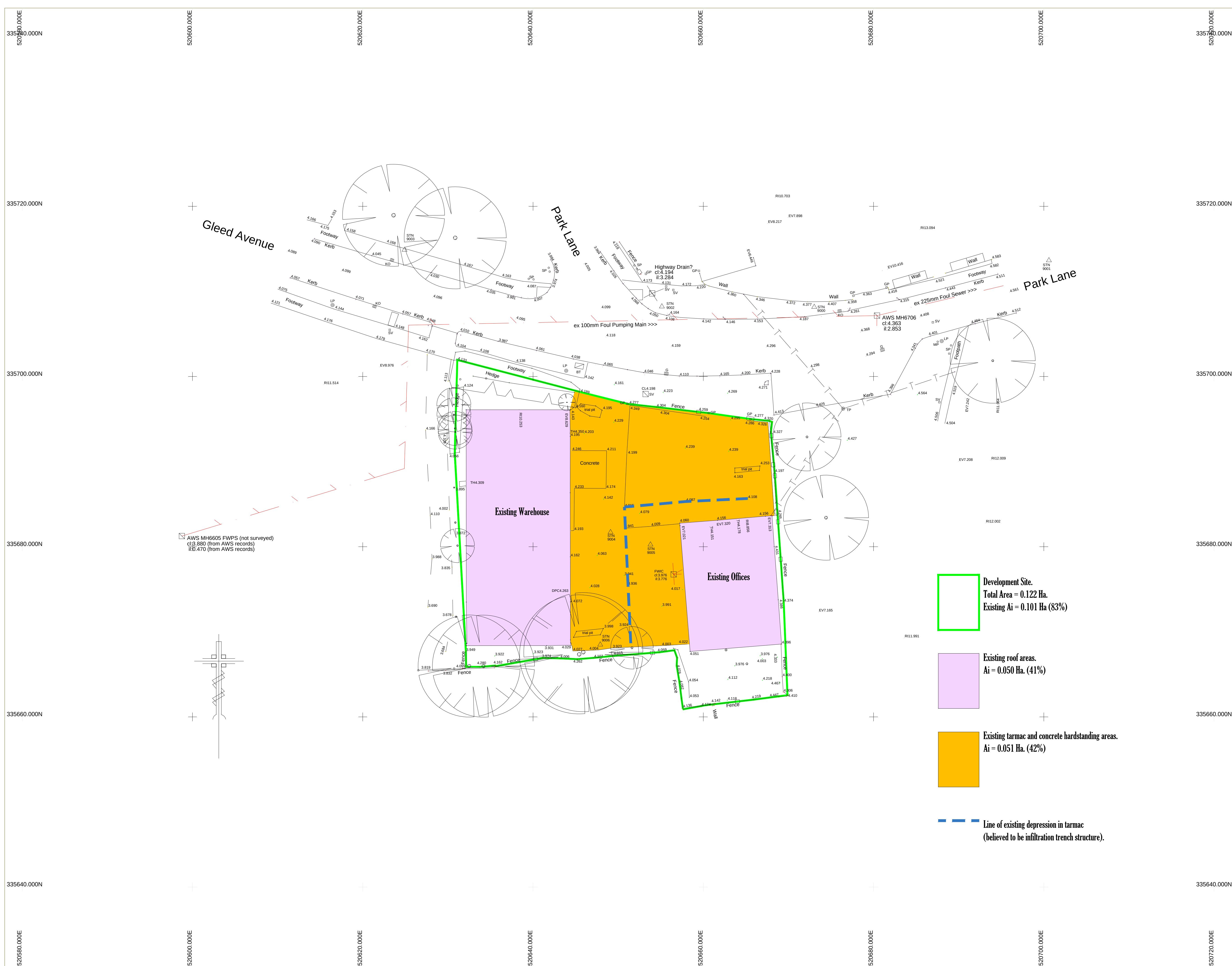
All elements of the surface water drainage system can be demonstrated to comply with paragraph 9 of NPPF-TG.

This statement contains schematic concept drainage proposals. The detailed design for the development would proceed following receipt of planning approval.

Detailed design does not form any part of the current design remit.

G.W.Hall 22.09.16

Document 1



KEY:		
	BUILDING	
	FENCE	
	HEDGE	
	CHANNEL	
	WALL	
	BANK EDGE	
	STORM DRAINAGE	
	FOUL DRAINAGE	
	CHANGE OF SURFACE	
	OVERHEAD ELECTRIC	
	OVERHEAD TELEPHONE	
	TREE	
	BOREHOLE	
	MANHOLE	
	CONTROL STATION	
	ROD EYE	
	BOLLARD	
	RIDGE	
	SIGN POST	
	STAY	
	PIPE CROWN	
	STOP VALVE	
	BENCH MARK	
	THRESHOLD	
	TRAFFIC LIGHT	
	TELEGRAPH POLE	
	TRAFFIC SIGNAL	
	VENT COLUMN	
	VENT PIPE	
	WATER LEVEL	
	WATER METER	
	WALL TOP	

- NOTES:
- Survey plotted to OS National Grid.
 - All levels related to OS Datum.
 - GPS/GLONASS ETRS89 observations transformed to OSGB36 using OSTN02 Transformation.
 - ETRS89 ellipsoid heights converted to heights above mean sea level using National Geoid Model OSGM02.

CONTROL STATIONS			
Stn:	Eastings:	Northings:	Height:
9000	520673.028	335708.166	4.326
9001	520700.596	335713.643	4.619
9002	520655.138	335708.224	4.188
9003	520624.910	335714.884	4.176
9004	520649.105	335681.697	4.021
9005	520653.795	335680.243	3.982
9006	520647.897	335668.487	4.014

Rev:	Amendments:	Date:
A	ex impermeable areas added	21.09.16

Client:
**ROBERT DOUGHTY
CONSULTANCY**

Project Title:
**PARK LANE
DONINGTON
LINCOLNSHIRE**

Drawing Title:
OGL SURVEY

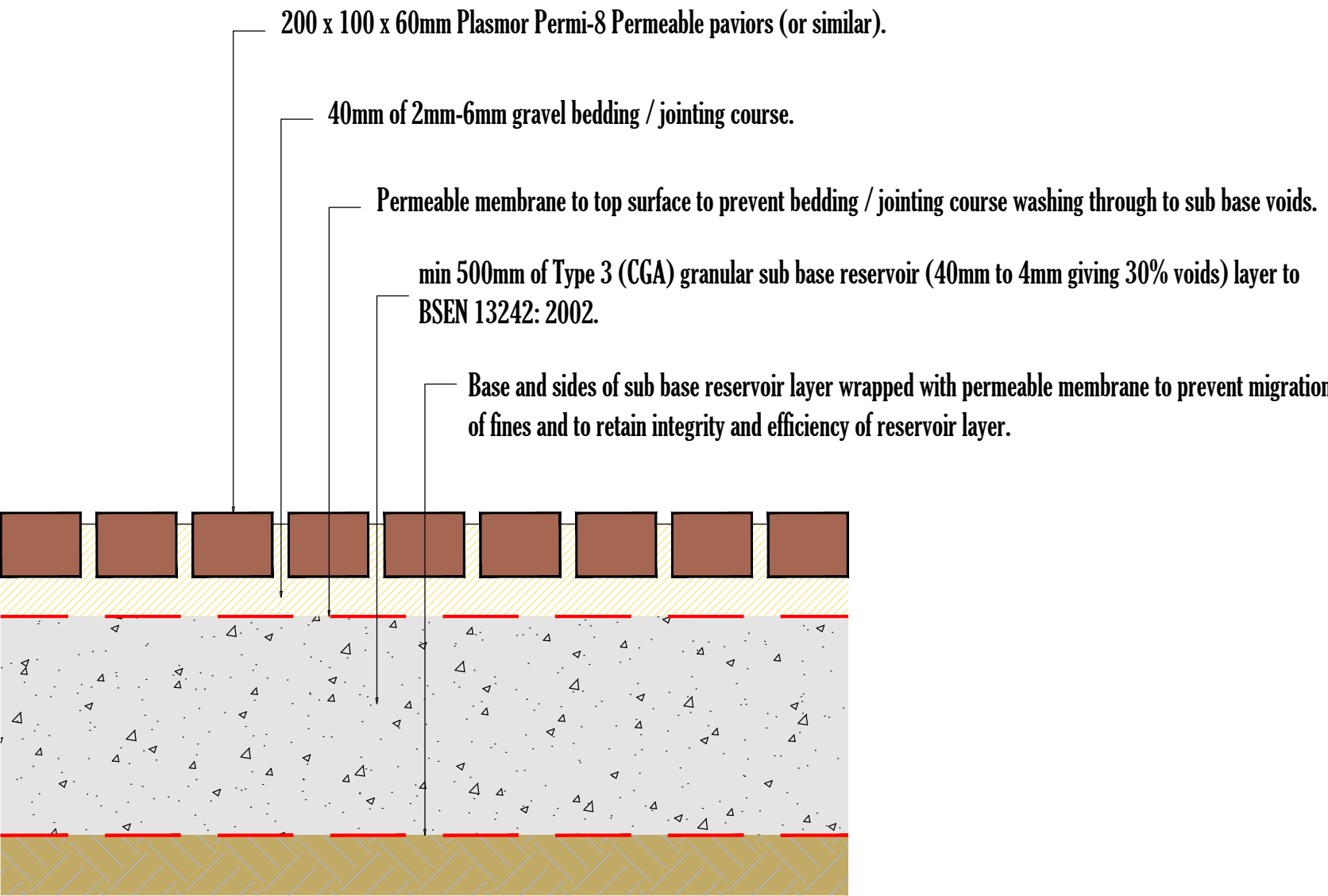
Scale:	1:200	Date:	5 FEB 2016
Drawing No:	AS2128/1	Rev:	A
C.A.D. Title:	RDCDONINGTON010216		
Drawn By:	D.J. SMITH	Checked By:	G.W.HALL

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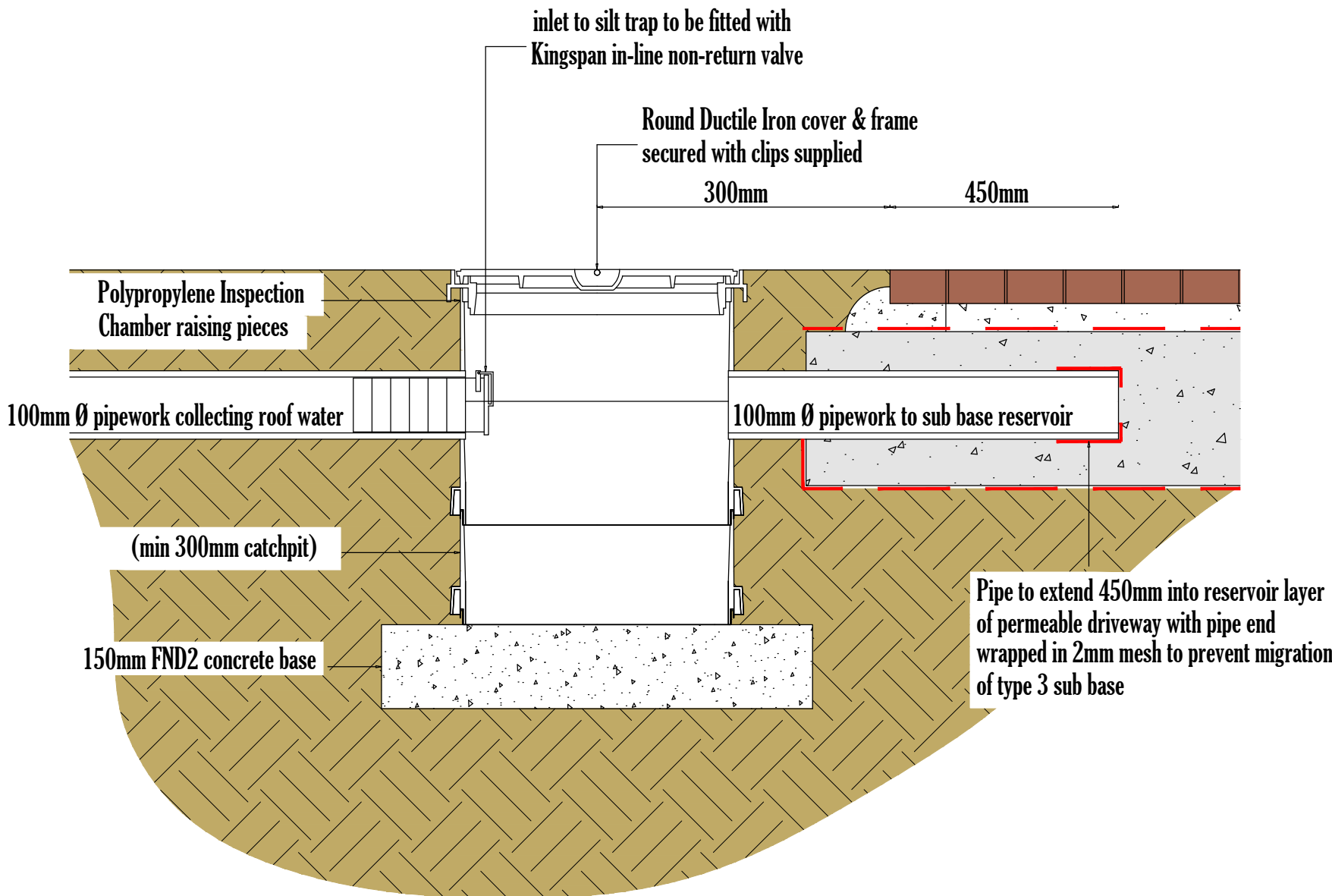
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Document 2



INDIVIDUAL DOMESTIC CURTILAGE PERMEABLE PAVED DRIVEWAY DETAIL - not to scale.



st / sco - SILT TRAP / SOURCE CONTROL OUTLET DETAIL - domestic curtilage roof water to domestic curtilage permeable paved driveway - scale 1:20.

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NOTES:

Impermeable Area Schedule.

Development Site (this application).
Total Area = 0.122 Ha.
Ai = 0.070 Ha. (57%)

Domestic Curtilage Roof Areas.
Ai = 0.031 Ha. (25%)
to be connected to adjacent permeable paved parking courtyard
sub base reservoir layer.

Domestic Curtilage Parking Courtyard.
Ai = 0.039 Ha. (32%)
To be paved with permeable materials with levels set to shed
towards central area and away from buildings / site boundaries.

DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
CHECK ON SITE AND ALL DISCREPANCIES TO BE
REPORTED TO HALL infrastructure DESIGN Ltd.

AMENDMENTS:

REF.	DESCRIPTION.	DATE.	BY.

CLIENT:
Calderdale Homes (Eastern) Ltd
c/o Robert Doughty Consultancy Ltd

PROJECT:
Park Lane
Donington

TITLE:
Schematic Concept Drainage Plan

SCALE:	DATE:	SIZE:
1:200	September 2016	A1

DRAWING No:	DRAWN BY:	CHECKED BY:
1614/01	<i>August</i>	<i>August</i>

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Document 3

Site name: Park Lane
Site location: Donington

Site coordinates

Latitude: 52.90506° N
Longitude: 0.2076° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Reference: gcrugr0f69fp / 0.12
Date: 21 Sep 2016

Site characteristics

Total site area	0.12	ha
Significant public open space	0.02	ha
Area positively drained	0.1	ha

Methodology

Greenfield runoff method	IH124
Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type
SOIL type	2
HOST class	N/A
SPR	0.30

Hydrological characteristics

	Default	Edited	
SAAR	558	558	mm
M5-60 Rainfall Depth	20	20	mm
'r' Ratio M5-60/M5-2 day	0.4	0.4	
FEH/FSR conversion factor	0.84	0.84	
Hydrological region	5	5	
Growth curve factor: 1 year	0.87	0.87	
Growth curve factor: 10 year	1.65	1.65	
Growth curve factor: 30 year	2.45	2.45	
Growth curve factor: 100 year	3.56	3.56	

Greenfield runoff rates

	Default	Edited	
Qbar	0.14	0.14	l/s
1 in 1 year	0.12	0.12	l/s
1 in 30 years	0.34	0.34	l/s
1 in 100 years	0.50	0.50	l/s

Please note that a minimum flow of 5 l/s applies to any site

Document 4

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9 St Mary's Park Louth Lincolnshire LN11 0EF	Parking Courtyard Park Lane Donington	
Date 22.09.16 File parking courtyard 30.SRCX	Designed by GWH Checked by GWH	
Causeway	Source Control 2016.1	

Summary of Results for 2 year Return Period

Half Drain Time : 1351 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	3.442	0.042	0.1	4.9	O K
30 min Summer	3.454	0.054	0.1	6.3	O K
60 min Summer	3.467	0.067	0.1	7.8	O K
120 min Summer	3.480	0.080	0.1	9.4	O K
180 min Summer	3.488	0.088	0.1	10.3	O K
240 min Summer	3.494	0.094	0.1	11.0	O K
360 min Summer	3.501	0.101	0.1	11.9	O K
480 min Summer	3.506	0.106	0.1	12.4	O K
600 min Summer	3.509	0.109	0.1	12.8	O K
720 min Summer	3.511	0.111	0.1	13.1	O K
960 min Summer	3.513	0.113	0.1	13.3	O K
1440 min Summer	3.515	0.115	0.1	13.5	O K
2160 min Summer	3.515	0.115	0.1	13.5	O K
2880 min Summer	3.513	0.113	0.1	13.3	O K
4320 min Summer	3.507	0.107	0.1	12.6	O K
5760 min Summer	3.500	0.100	0.1	11.7	O K
7200 min Summer	3.493	0.093	0.1	10.9	O K
8640 min Summer	3.486	0.086	0.1	10.1	O K
10080 min Summer	3.480	0.080	0.1	9.3	O K
15 min Winter	3.447	0.047	0.1	5.5	O K
30 min Winter	3.461	0.061	0.1	7.1	O K
60 min Winter	3.475	0.075	0.1	8.8	O K
120 min Winter	3.490	0.090	0.1	10.6	O K
180 min Winter	3.499	0.099	0.1	11.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	37.995	0.0	23
30 min Summer	24.615	0.0	37
60 min Summer	15.352	0.0	66
120 min Summer	9.374	0.0	126
180 min Summer	6.986	0.0	186
240 min Summer	5.663	0.0	244
360 min Summer	4.205	0.0	364
480 min Summer	3.395	0.0	482
600 min Summer	2.875	0.0	602
720 min Summer	2.509	0.0	722
960 min Summer	2.025	0.0	956
1440 min Summer	1.496	0.0	1182
2160 min Summer	1.105	0.0	1560
2880 min Summer	0.892	0.0	1964
4320 min Summer	0.659	0.0	2772
5760 min Summer	0.531	0.0	3584
7200 min Summer	0.450	0.0	4392
8640 min Summer	0.393	0.0	5184
10080 min Summer	0.350	0.0	5944
15 min Winter	37.995	0.0	22
30 min Winter	24.615	0.0	37
60 min Winter	15.352	0.0	66
120 min Winter	9.374	0.0	124
180 min Winter	6.986	0.0	182

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9 St Mary's Park Louth Lincolnshire LN11 0EF	Parking Courtyard Park Lane Donington	
Date 22.09.16 File parking courtyard 30.SRCX	Designed by GWH Checked by GWH	
Causeway	Source Control 2016.1	

Summary of Results for 2 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	3.506	0.106	0.1	12.4	O K
360 min Winter	3.515	0.115	0.1	13.5	O K
480 min Winter	3.520	0.120	0.1	14.1	O K
600 min Winter	3.524	0.124	0.1	14.6	O K
720 min Winter	3.527	0.127	0.1	14.9	O K
960 min Winter	3.530	0.130	0.1	15.3	O K
1440 min Winter	3.532	0.132	0.1	15.4	O K
2160 min Winter	3.530	0.130	0.1	15.3	O K
2880 min Winter	3.527	0.127	0.1	14.9	O K
4320 min Winter	3.517	0.117	0.1	13.7	O K
5760 min Winter	3.506	0.106	0.1	12.4	O K
7200 min Winter	3.494	0.094	0.1	11.1	O K
8640 min Winter	3.483	0.083	0.1	9.8	O K
10080 min Winter	3.474	0.074	0.1	8.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	5.663	0.0	240
360 min Winter	4.205	0.0	358
480 min Winter	3.395	0.0	474
600 min Winter	2.875	0.0	588
720 min Winter	2.509	0.0	702
960 min Winter	2.025	0.0	926
1440 min Winter	1.496	0.0	1354
2160 min Winter	1.105	0.0	1688
2880 min Winter	0.892	0.0	2140
4320 min Winter	0.659	0.0	3032
5760 min Winter	0.531	0.0	3912
7200 min Winter	0.450	0.0	4688
8640 min Winter	0.393	0.0	5456
10080 min Winter	0.350	0.0	6248

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Causeway		Source Control 2016.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.070

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.039	4	8	0.031

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Model Details

Storage is Online Cover Level (m) 4.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00176	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	39.1
Max Percolation (l/s)	108.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	3.400	Cap Volume Depth (m)	0.500

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Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 4860 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	3.535	0.135	0.1	15.8	O K
30 min Summer	3.577	0.177	0.1	20.8	O K
60 min Summer	3.621	0.221	0.1	25.9	O K
120 min Summer	3.666	0.266	0.1	31.2	O K
180 min Summer	3.692	0.292	0.1	34.3	O K
240 min Summer	3.710	0.310	0.1	36.4	Flood Risk
360 min Summer	3.733	0.333	0.1	39.1	Flood Risk
480 min Summer	3.750	0.350	0.1	41.1	Flood Risk
600 min Summer	3.763	0.363	0.1	42.6	Flood Risk
720 min Summer	3.773	0.373	0.1	43.8	Flood Risk
960 min Summer	3.787	0.387	0.1	45.4	Flood Risk
1440 min Summer	3.804	0.404	0.1	47.3	Flood Risk
2160 min Summer	3.812	0.412	0.1	48.3	Flood Risk
2880 min Summer	3.811	0.411	0.1	48.2	Flood Risk
4320 min Summer	3.797	0.397	0.1	46.6	Flood Risk
5760 min Summer	3.782	0.382	0.1	44.8	Flood Risk
7200 min Summer	3.767	0.367	0.1	43.1	Flood Risk
8640 min Summer	3.753	0.353	0.1	41.4	Flood Risk
10080 min Summer	3.740	0.340	0.1	39.8	Flood Risk
15 min Winter	3.551	0.151	0.1	17.7	O K
30 min Winter	3.598	0.198	0.1	23.3	O K
60 min Winter	3.648	0.248	0.1	29.1	O K
120 min Winter	3.699	0.299	0.1	35.0	O K
180 min Winter	3.728	0.328	0.1	38.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	121.269	0.0	23
30 min Summer	79.695	0.0	38
60 min Summer	49.937	0.0	68
120 min Summer	30.267	0.0	128
180 min Summer	22.297	0.0	188
240 min Summer	17.851	0.0	246
360 min Summer	12.957	0.0	366
480 min Summer	10.330	0.0	486
600 min Summer	8.659	0.0	606
720 min Summer	7.492	0.0	726
960 min Summer	5.959	0.0	964
1440 min Summer	4.309	0.0	1444
2160 min Summer	3.110	0.0	2164
2880 min Summer	2.466	0.0	2880
4320 min Summer	1.775	0.0	3932
5760 min Summer	1.405	0.0	4560
7200 min Summer	1.171	0.0	5328
8640 min Summer	1.008	0.0	6056
10080 min Summer	0.889	0.0	6864
15 min Winter	121.269	0.0	23
30 min Winter	79.695	0.0	38
60 min Winter	49.937	0.0	68
120 min Winter	30.267	0.0	126
180 min Winter	22.297	0.0	184

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Date 22.09.16 File parking courtyard.SRCX	Designed by GWH Checked by GWH	
Causeway	Source Control 2016.1	

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	3.748	0.348	0.1	40.8	Flood Risk
360 min Winter	3.775	0.375	0.1	44.0	Flood Risk
480 min Winter	3.795	0.395	0.1	46.3	Flood Risk
600 min Winter	3.810	0.410	0.1	48.0	Flood Risk
720 min Winter	3.821	0.421	0.1	49.4	Flood Risk
960 min Winter	3.839	0.439	0.1	51.4	Flood Risk
1440 min Winter	3.859	0.459	0.1	53.8	Flood Risk
2160 min Winter	3.872	0.472	0.1	55.4	Flood Risk
2880 min Winter	3.875	0.475	0.1	55.7	Flood Risk
4320 min Winter	3.865	0.465	0.1	54.6	Flood Risk
5760 min Winter	3.846	0.446	0.1	52.3	Flood Risk
7200 min Winter	3.826	0.426	0.1	50.0	Flood Risk
8640 min Winter	3.808	0.408	0.1	47.9	Flood Risk
10080 min Winter	3.789	0.389	0.1	45.7	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	17.851	0.0	244
360 min Winter	12.957	0.0	362
480 min Winter	10.330	0.0	480
600 min Winter	8.659	0.0	598
720 min Winter	7.492	0.0	716
960 min Winter	5.959	0.0	952
1440 min Winter	4.309	0.0	1418
2160 min Winter	3.110	0.0	2120
2880 min Winter	2.466	0.0	2796
4320 min Winter	1.775	0.0	4112
5760 min Winter	1.405	0.0	5312
7200 min Winter	1.171	0.0	5688
8640 min Winter	1.008	0.0	6576
10080 min Winter	0.889	0.0	7464

Hall Infrastructure Design Ltd		Page 3
9 St Mary's Park Louth Lincolnshire LN11 0EF	Parking Courtyard Park Lane Donington	
Date 22.09.16 File parking courtyard.SRCX	Designed by GWH Checked by GWH	
Causeway	Source Control 2016.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.070

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.039	4	8	0.031

Hall Infrastructure Design Ltd		Page 4
9 St Mary's Park Louth Lincolnshire LN11 0EF	Parking Courtyard Park Lane Donington	
Date 22.09.16 File parking courtyard.SRCX	Designed by GWH Checked by GWH	
Causeway	Source Control 2016.1	

Model Details

Storage is Online Cover Level (m) 4.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00176	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	39.1
Max Percolation (l/s)	108.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	0
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	3.400	Cap Volume Depth (m)	0.500

Document 5

GROUND ENGINEERING

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GROUND INVESTIGATION REPORT

NEW HOUSING DEVELOPMENT
LAND OFF PARK LANE
DONINGTON
LINCOLNSHIRE

Report Reference C13751

On behalf of:-

Calderdale Homes (Eastern) Limited
c/o Salway & Wright
32 The Crescent
Spalding
Lincolnshire
PE11 1AF

March 2016

CALDERDALE HOMES (EASTERN) LIMITED

ROBERT DOUGHTY CONSULTANCY LIMITED

TOWN PLANNERS & LANDSCAPE ARCHITECTS

GROUND INVESTIGATION REPORT

FOR NEW HOUSING DEVELOPMENT

AT

LAND OFF PARK LANE

DONINGTON

LINCOLNSHIRE

Report Reference No. C13751

March 2016

INTRODUCTION

The client, Calderdale Homes (Eastern) Limited, proposes to construct a residential development at their site off Park Lane, Donington, Lincolnshire. The proposed layout and building loads were not known at the time of report writing but the proposed houses were anticipated to be 'lightly loaded'.

Ground Engineering Limited was commissioned by the client, under the direction of town planners Robert Doughty Consultancy, to carry out a ground investigation to determine the nature and geotechnical properties of the underlying soils, in relation to the design and construction of the foundations. A desk study and contamination assessment were not required within the scope of this report.

LOCATION, TOPOGRAPHY AND GEOLOGY OF THE SITE

The site of the proposed new housing is on the southern side of Park Lane, at its junction with Gleed Avenue, and immediately to the west of Millson's Close, Donington, Lincolnshire. The National Grid Reference for the centre of the site is TF 2065 3569 and its location is shown on a plan following this report text.

At the time of the investigation in January 2016 the site comprised an asphalt surfaced yard, with single-storey workshop and office buildings in the south-eastern corner and along the western side of the site. To the south of the building in the south-east of the site was an undeveloped parcel of land with wood, plaster coving and black plastic bags littering the area. The site was approximately 35m wide fronting Park Lane by 27m deep. The site was bound by Millson's Close to the east; the gardens of houses off Station Street (A152) to the south; a private track providing access to the rear of houses fronting Gleed Avenue to the west; and Park Lane to the north. Trees were present on the southern part of the site which included a Fir and an unidentified deciduous tree. A privet hedge and two coniferous trees were also present in the north-western corner of the site fronting Park Lane. Trees including Silver Birch were also present in the communal grassed area in Millson's Close to the east.

The site stands at about 4mOD in the flat lying Lincolnshire Fens.

The geological map, sheet 128 (1995), shows superficial Terrington Beds (Tidal Flat Deposits) covering the site, overlying the solid geology of the Oxford Clay at depth. A borehole record close to the northern edge of the site found 7.60m of superficial Alluvium, covering gravel to 7.75m depth, and in turn Boulder Clay and solid geology Oxford Clay at depth.

SITE WORK

The site work conducted on 22nd January 2016 comprised four machine excavated trial pits (TP1 to TP4). The trial pit positions are shown on the exploratory hole location plan following this report text.

Public utility service drawings were sourced by Ground Engineering Limited before the site work and consulted prior to determining the exploratory hole positions. Prior to excavation, a service scan was made at each position using a CAT (Cable Avoidance Tool) to check for the absence of detectable buried services that may otherwise have been damaged by the investigation.

The exploratory hole records, presented following the exploratory hole location plan, give the descriptions and depths of the various strata encountered, details of all samples taken and the groundwater conditions observed during and on completion of excavation.

Machine Excavated Trial Pits

Trial pits TP1 to TP4 were excavated using a JCB 3CX machine to depths of between 0.50m and 2.50m. Trial pit TP4 was limited to 0.50m depth due to very restricted access to that area. The exposed strata were sampled and recorded by a Geoenvironmental Engineer. Representative small and bulk disturbed samples of soil were taken at regular intervals throughout the depth of each trial pit.

A soakaway test was carried out within trial pit TP1 in broad accordance with BRE Digest 365 in order to allow the assessment of the soil infiltration rate. The general method of the test was to excavate the trial pit with vertical sides trimmed square to the base. The dimensions were accurately measured and recorded, and the pit was then filled with clean water. The rate of water dissipation from the pit was measured by recording the depth of water relative to a datum at frequent time intervals. The test was monitored for 142 minutes, and as the water

had not drained away sufficiently the water was not topped up and the test was not repeated a second time. The results are presented and follow the respective trial pit record.

The trial pits were emptied of any remaining water and backfilled with compacted arisings upon completion.

LABORATORY WORK

The samples were inspected in the laboratory and assessments of the soil characteristics have been taken into account during preparation of the exploratory hole records. The soil descriptions have been made in accordance with BS5930:2015. The geotechnical test results, undertaken in accordance with BS1377:1990, are presented following the exploratory hole records.

The moisture contents and index properties of selected soil samples were determined as a guide to soil classification and behaviour. The liquid limit was determined by a cone penetrometer.

The particle size distributions of selected samples were obtained by sieve analysis. The particle size distribution passing the 63 μ m sieve was obtained by pipette sedimentation. The results of these tests are given as particle size distribution curves at the end of this report.

California Bearing Ratio (C.B.R.) tests were performed on selected recompacted samples. The samples were recompacted using a 2.5kg rammer within a CBR mould. The tests consisted of jacking into the remoulded soil a cylindrical plunger with a cross sectional area of 1935mm². A force of 50N was applied initially to seat the plunger on the soil surface during each test and then the plunger was made to penetrate the soil at a uniform rate of 1mm/min. Readings of force were taken at intervals of penetration of 0.25mm to a penetration not exceeding 7.50mm. The CBR value is the ratio of the force required to achieve 2.50mm or 5.00mm penetration to standard forces expressed as a percentage.

Selected samples of soil were analysed to determine the concentration of soluble sulphates. The pH values were also determined.

GROUND CONDITIONS

The ground conditions comprised made ground to depths of between at least 0.50m and at least 2.00m, which rested on the expected superficial Tidal Flat Deposits and underlying Marine Sand. The superficial deposits were found to at least the base of the exploratory holes at 2.50m depth. The solid geology of the Oxford Clay was not encountered within 2.50m depth by this investigation.

Made Ground

Asphalt hardstanding was found at surface in TP1, TP2 and TP3, to between 0.05m and 0.15m depth. Made ground was encountered beneath the asphalt, and from surface in TP4, to depths of between at least 0.50m (TP4) and at least 2.00m (TP3), which beneath the asphalt was initially a light brown gravel sub-base fill of angular and sub-angular limestone. The gravel sub-base fill was encountered to depths of between 0.20m and 0.30m below ground level.

Beneath the hardstanding and sub-base where present, and from surface in TP4, dark brown and brown, slightly sandy, slightly gravelly to gravelly, clayey silt fill, varying to silty clay fill, with occasional cobbles of brick and metal rods encountered. Trial pit TP3 was completed in silt fill at 2.00m depth when a suspected brick culvert was encountered, and trial pit TP4 was completed in made ground at 0.50m due to extremely limited access to the area behind the building. The gravel fraction comprised angular to rounded flint, coal, ash, concrete, brick and a rare suspected cement-bound asbestos sheet fragment (TP3).

Tidal Flat Deposits

The anticipated superficial Tidal Flat Deposits were met in TP1 and TP2, beneath the made ground, at depths of 1.00m and 0.80m respectively, and found to at least the base of TP1 at 2.00m depth and 1.00m depth in TP2, a thickness of between 0.20m and at least 1.00m.

/

The Tidal Flat Deposits comprised brown, sandy, clay/silt. The sand fraction was generally fine grained. Trial pit TP1 was completed within Tidal Flat Deposits.

Marine Sand

Beneath the Tidal Flat Deposits in TP2 at 1.00m depth, to at least the base of the trial pit at 2.50m depth, Marine Sand was encountered. The Marine Sand generally comprised light brown and orange brown, very silty sand, which was dark brown and slightly organic at 1.50m to 1.70m depth. The sand fraction was generally fine grained.

Groundwater

No groundwater was met in TP1, TP2 and TP4. Groundwater was met at 1.80m in TP3, and standing at 2.00m depth on completion.

Observations

Live roots were observed to at least 2.00m depth in TP3, which was excavated close to a mature deciduous tree by the southern boundary.

Evidence of Contamination

The made ground encountered during this investigation was not noted to have olfactory or visual evidence of fuel contamination. The made ground contained fragments of coal, ash, concrete and brick. A rare suspected cement-bound asbestos sheet fragment was also found at 0.50m to 0.80m depth in TP3.

COMMENTS ON THE GROUND CONDITIONS IN RELATION TO FOUNDATION DESIGN AND CONSTRUCTION

The investigation confirmed the site to be underlain by a variable thickness of made ground resting on the expected superficial Tidal Flat Deposits and underlying Marine Sand. The proposed building loads were not known at the time of report writing, however the houses were anticipated to be 'lightly' loaded. The underlying superficial silts have adequate bearing properties and may provide a suitable founding stratum. Foundations may need to be locally deepened due to the presence of a suspected brick culvert beneath the south-western part of the site. The underlying silty Marine Sand would also offer support for traditional foundations for the proposed new houses. Foundation excavations may encounter shallow groundwater. Ground bearing floor slabs could be used locally but would need to be suspended where the made ground is thicker over the suspected culvert.

Traditional Foundations

Foundations should be extended through any made ground, which was found to extend to about 1.00m generally, and to at least 2.00m depth in the south-western part of the site above the suspected culvert.

The naturally deposited Tidal Flat Deposits may provide suitable founding strata for traditional foundations, where encountered at shallow depth. The sandy silt Tidal Flat Deposits would be considered non-shrinkable, but are potentially frost susceptible and a minimum footing depth in this stratum of 0.60m should be adopted in order to avoid the potentially damaging effects of frost action.

Samples of the Tidal Flat Deposits clay/silt had modified plasticity indices of 9% and 10%. These are considered non-shrinkable to having a low volume change potential, based on NHBC Standards Chapter 4.2 'Building near trees' (2014). On an open site, away from the influence of trees, a minimum foundation depth of 0.75m below current or proposed ground

level, whichever is deeper, would be required within the naturally deposited clays in order to be below the zone of seasonal volume change in accordance with the NHBC Standards.

It is likely that some of the proposed houses will be within influencing distance of high water demand trees where clay soils are present at shallow depth. Trees were present on the site and included Cypress, Fir and an unidentified deciduous tree.

Based on high water demand English Oak and Cypress trees, and moderate water demand Fir trees, a minimum foundation depth between 0.75m and 1.00m would locally be required in these clay soils based on the current tree positions and NHBC Standards at 5m distance. The foundations would need to be at least 25m from mature English Oak trees, 15m from mature Fir trees and 12m from mature Cypress trees, for the adoption of the minimum foundation depth of 0.75m in clay soils. Within these distances foundation depths will depend on the proximity of trees to new foundations, which should be determined using the NHBC Standards where clay forms the base of foundation excavations. Tree species along the site boundaries and distances to proposed dwellings should be verified before final design of foundation depths based on NHBC Standards.

Foundations should be taken at least 0.50m below the last vestiges of live roots in clay soils. Live roots were encountered to at least 2.00m depth within TP3 in made ground soils. The depth of roots is likely to vary across the site, and is likely to be deeper closer to the trees adjacent the site boundaries. Foundations would not need to be deepened within the underlying sand once it is reached. Strip footings could be 'stepped' up along the length of wall runs where foundation depths vary due to the influence of trees. Steps should not exceed 0.50m and further guidance is provided in the aforementioned NHBC document.

It is assumed that new trees will be planted within the vicinity of proposed houses. Recommendations for foundation depths related to proposed tree planting are also provided in the NHBC Standards and the volume change potential should be considered for any proposed landscaping within a housing scheme on the site.

In summary, it would be prudent to adopt a minimum depth of 0.75m for foundations for the new buildings, and will need locally to be taken to 1.00m below ground level, in order to penetrate the depths of potential root-induced desiccation within this site.

Bearing Capacity

The non-shrinkable, silty sand of the Marine Sand would provide a suitable founding stratum for the proposed buildings. The naturally deposited silty sand, where present from a depth of 0.75m, has an allowable bearing pressure of 115kN/m² for foundations up to 1.20m wide, which should be sufficient for the proposed houses and limit immediate settlement to within 25mm.

The naturally deposited Tidal Flat Deposit clay/silt, at a depth of 0.75m has a net safe bearing capacity of 80kN/m², increasing to 95kN/m² at 1.50m depth, beneath a 0.60m wide strip footing. These bearing capacities incorporate a factor of safety of 3.0 against shear failure and should be sufficient to support the proposed houses. Settlements are likely to be less than 25mm, although some differential settlements will occur where foundations straddle different soil types. Care should be taken where foundations cross from sand to clay and precautionary measures adopted to minimise differential movements.

Excavations

The made ground together with the underlying soils should be easily removed within excavations for the proposed buildings. The sides of excavations within the made ground are likely to be stable in the short term, but excavations should not be relied upon to stand unsupported, particularly when groundwater is encountered.

Excavations could be expected to encounter groundwater within the Tidal Flat Deposits or Marine Sand with resulting side instability, although groundwater was encountered below 1.80m depth in the trial pits. Care should be taken not to excavate below the water table in the absence of suitable side support and groundwater control, such as dewatering via screened

sumps or even well-points. The silt/clay soils are prone to softening and deterioration, in the presence of either surface water or groundwater, with loss of their modest bearing properties. Care should be taken to keep the excavations dry.

The base of foundation excavations should be inspected on completion to ensure that the condition of the soil complies with that assumed in design. Should pockets of inferior material or made ground be present, they should be removed and replaced with well graded, well compacted hardcore or lean mix concrete. The excavated surfaces should be protected from deterioration and a blinding layer of concrete used where foundations are not completed without delay. The excavated surfaces should be protected from deterioration using a blinding layer of concrete, since the silt/clay soils are prone to rapid deterioration if exposed to water, with resulting loss of their modest bearing properties. Care should therefore be exercised to ensure that neither surface water nor groundwater is allowed to collect in the base of excavations.

Excavations should either avoid or bridge over the suspected culvert crossing the southern part of the site at a depth of 2.00m, and further investigation will be required to determine the details of this feature.

Attention should be given where personnel are to enter deep excavations, when sides should either be safely battered back, or close side support provided, in order to comply with statutory safety requirements and prevent sidewall collapse.

Floor Slabs

Where the proposed houses are in an area close to extant or former trees, the floor slab should be suspended on the foundations in order to avoid any differential movements between them. A suspended floor slab would avoid any volume change movements within any root affected clays, providing that the sub-floor gaps recommended in NHBC Standards Chapter 4.2, Tables 9 and 10, are adopted. Similarly, the floor slabs should be suspended if the suspected culvert is to remain.

Ground bearing floor slabs could be adopted for new buildings where the naturally deposited silty sand is present at shallow depths and where they are remote from trees in clay soils. It may be possible to proof-roll soils present at sub-grade level, although supporting floor slabs across the variable Tidal Flat and Marine Sand deposits are likely to result in some long term minor differential movements beneath them. Settlement of a floor slab bearing on the non-shrinkable silty sand would be negligible.

Drainage

The soakaway test (TP1) gave a soil infiltration rate (f) of $4.88 \times 10^{-7} \text{m/s}$ for the sandy silt Tidal Flat Deposits soils. This result rates Tidal Flat Deposits as having a 'poor' drainage potential according to BS8004:1986.

Perched groundwater was met in trial pit TP3 at 1.80m below ground level, within made ground soils and associated with the suspected culvert in the southern part of the site. Soakaway drainage on this site may deteriorate over time as the chambers could become blocked with silt. Provision should be made for regular cleaning.

Hardstanding

Made ground and Tidal Flat Deposits (clay/silt) were encountered at sub-grade level across this site.

Based on Interim Advice Note (IAN) 73/06 (2009) 'Design Guidance for Road Pavement Foundations (Draft HD25)', Table 5.1 recommends design CBR values of 1% for silt, 3% for clay with a plasticity index of 10%, with a thin pavement construction, and a design CBR value of 20% for a poorly graded sand. Laboratory determined CBR values were between 2.5% and 3.4% for slightly sandy, gravelly, clayey silt fill soils. Therefore a conservative design CBR value of 2.5% could be adopted for hardstanding design on this site. The soils have a high silt content and would be considered to be frost susceptible, requiring a minimum pavement thickness of 450mm.

The sub-grade should be suitably compacted and inspected with any made ground, topsoil, loose, very soft or organic soils being removed and replaced with suitable well-graded coarse-grained fill. Care should be taken not to allow the exposed soil at sub-grade level to become exposed to inclement weather conditions as the condition of the silty soils will rapidly deteriorate in the presence of water.

Sulphate Conditions

Sulphate analysis of selected samples of soil yielded soluble sulphate concentrations within Design Sulphate Class DS-1 of the BRE Special Digest 1, Table C2 (2005), presented in Appendix 1. The pH results of samples ranged between 7.3 and 7.9, indicating alkaline conditions.

These results indicate an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1 for buried concrete. This ACEC Class should be considered when specifying a Design Chemical Class (DC Class) for buried concrete on this site, as detailed in the above cited BRE document.

GROUND ENGINEERING LIMITED

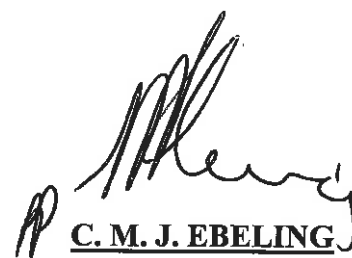


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C. M. J. EBELING

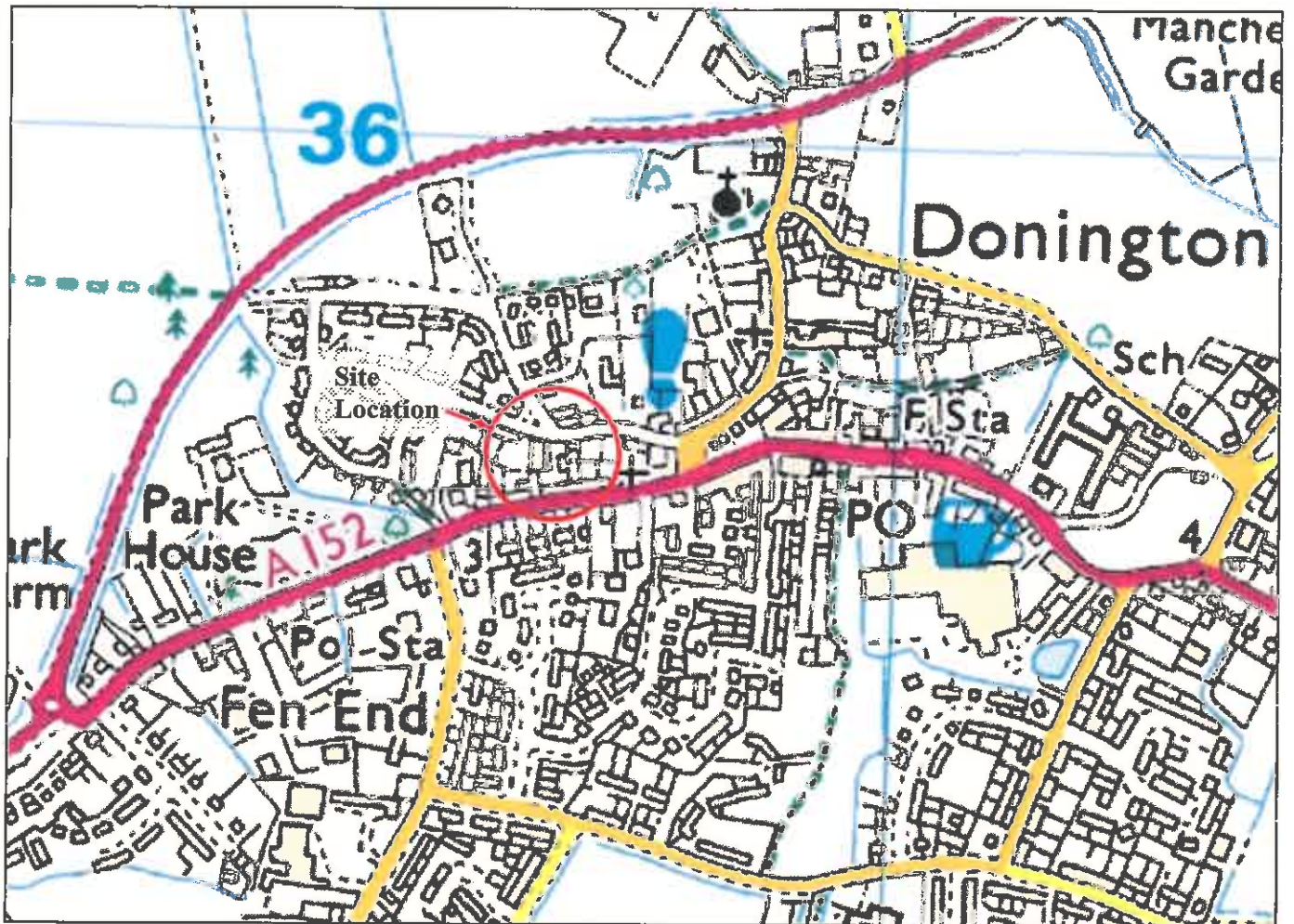
M.Sc.(Eng.), M.A.E.G.,

C.Geol., F.G.S.,

Director

Site Location Plan

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Not To Scale



Project : Land off Park Lane, Donington, Lincolnshire

Client : Calderdale Homes (Eastern) Limited

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Peterborough

Tel : 01733 566566

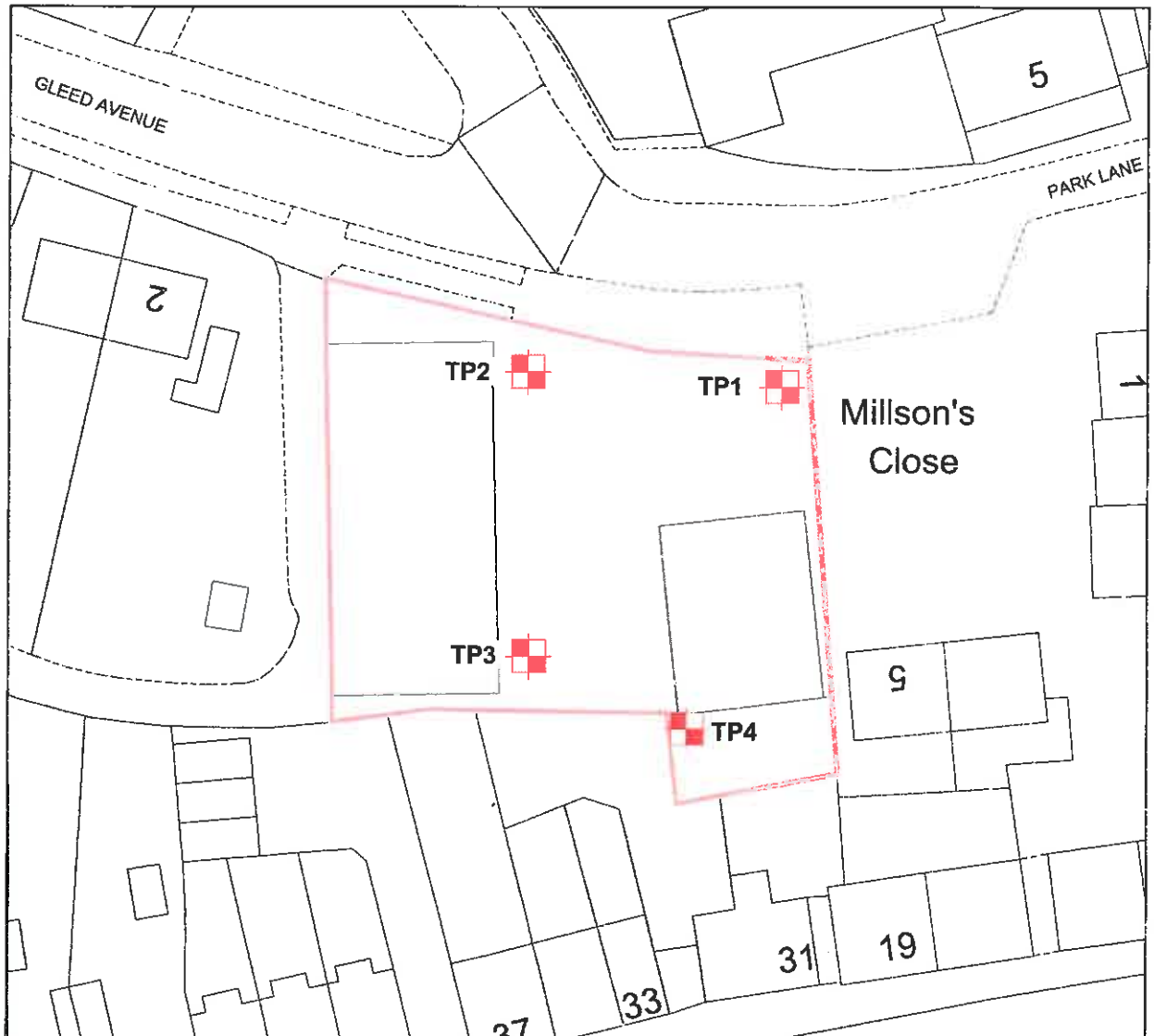
Project No.

C13751

Exploratory Hole Location Plan

Plan based on Robert Doughty Consultancy existing layout drawing 1179-02-EL01

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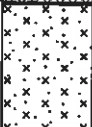
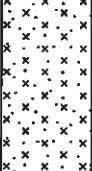
Project : Land off Park Lane, Donington, Lincolnshire

Client : Calderdale Homes (Eastern) Limited

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**Project No.
C13751**

GROUND ENGINEERING LIMITED Tel: 01733-566566 www.groundengineering.co.uk			Site: LAND OFF PARK LANE, DONINGTON		TRIAL PIT TP1	
Date: 22/01/16			Pit Size: 2.40m L x 0.60m W x 2.00m D.		Ground Level:	
Samples and in-situ Tests			(Date)	Description of Strata	Legend	Depth m
Depth m	Type	Result	Water			
0.30 0.30	D1 J1			MADE GROUND - ASPHALT.		0.15 0.20
0.60 0.60	D2 J2			MADE GROUND - Light brown GRAVEL of angular and sub-angular limestone.		0.60
0.90 0.90	D3 J3			MADE GROUND - Firm, brown and dark brown, slightly sandy, slightly gravelly, silty CLAY with occasional cobbles of brick and metal rods. Gravel is angular to sub-rounded brick fragments, concrete, ash and coal.		1.00
1.20 1.20	D4 J4			MADE GROUND - Dark brown, slightly sandy, slightly gravelly SILT. Gravel is angular to sub-rounded coal, ash and brick fragments.		
1.50 1.50	D5 J5			Brown, sandy SILT. Sand is fine grained.		
1.80	D6			(TIDAL FLAT DEPOSIT)		
2.00	D7			Pit completed at 2.00m depth		2.00

KEY	REMARKS
D - Disturbed Sample	1. No live roots observed
B - Bulk Sample	2. Pit dry
U - Undisturbed Sample	3. Pit sides stable
R - Root Sample	4. Soakaway test undertaken at 2.00m depth
W - Water Sample	
J - Jar Sample	
▽ - Water Strike	
▽ - Water Rise	
▽c - Level on completion	
MP - Mackintosh Probe	
P () - Hand Penetrometer	
	Cohesion () kPa
V - Vane Shear Test	
	Cohesion () kPa

Project No 13751	
Scale 1:25	Page 1/1

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land off Park Lane, Donington, Lincolnshire
Client: Calderdale Homes (Eastern) Ltd

Project No: C13751
Sheet No: 1/1

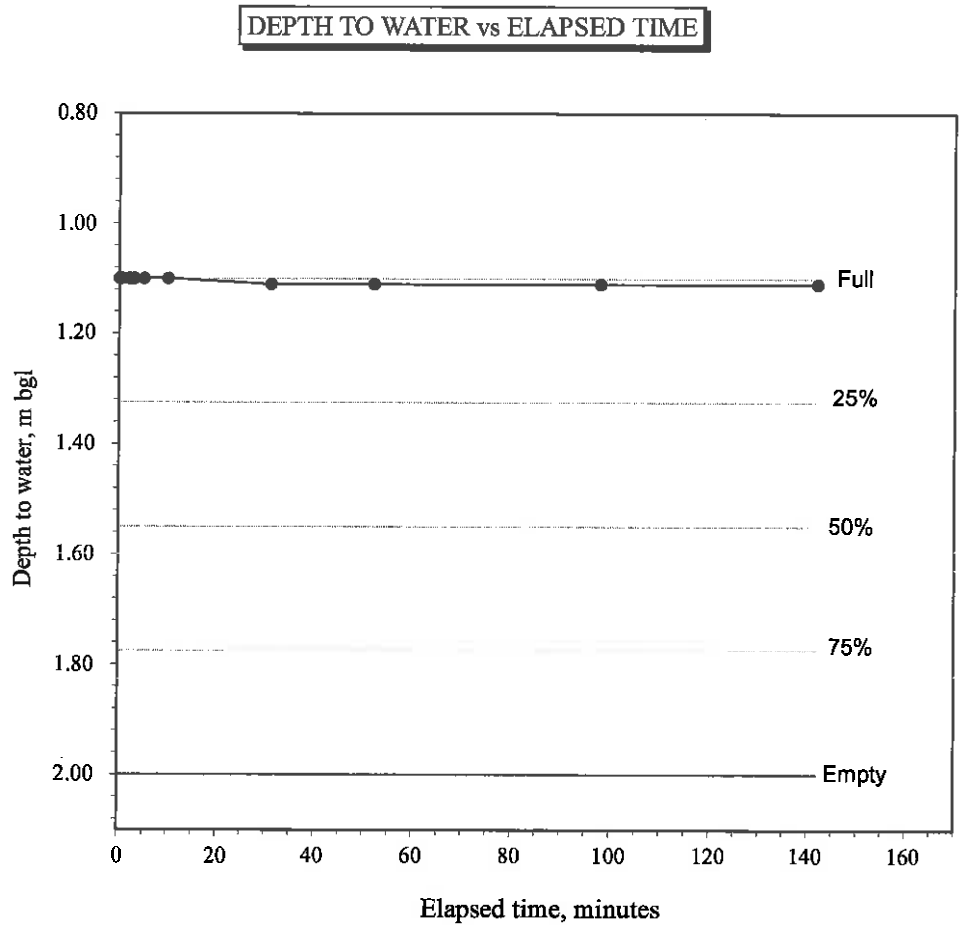
Trial Pit: TP1 FIRST FILLING
Depth: 2.00
Length: 2.40
Width: 0.60

Description of Stratum under test: Brown light brown sandy SILT

Depth to water prior to test: 2m
(below ground level)

Elapsed Time min	Depth to Water m
0	1.10
1	1.10
2	1.10
3	1.10
5	1.10
10	1.10
31	1.11
52	1.11
98	1.11
142	1.11

All dimensions given in metres



$$f = (V75 - V25) / A50(T75 - T25)$$

V75-V25 = 0.648
A50 = 4.140
T75-T25 = 5350

Soil Infiltration Rate $f = \underline{4.88E-07} \text{ m/s}$

GROUND ENGINEERING LIMITED Tel: 01733-588566 www.groundengineering.co.uk			Site: LAND OFF PARK LANE, DONINGTON		TRIAL PIT TP2		
			Date: 22/01/16	Pit Size: 2.70m L x 0.60m W x 2.50m D.		Ground Level:	
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m	O.D. Level m
Depth m	Type	Result					
				MADE GROUND - ASPHALT. MADE GROUND - Light brown GRAVEL of angular and sub-angular limestone.		0.05 0.30	
0.40 0.40	D1 J1			MADE GROUND - Dark brown, slightly gravelly SILT. Gravel is angular to sub-rounded brick fragments, coal and ash.		0.50	
0.60 0.60 0.50-0.80	D2 J2 CBR1			MADE GROUND - Dark brown, slightly sandy, gravelly, clayey SILT. Gravel is fine and medium, angular to sub-rounded brick fragments and ash.		0.80	
0.90	D3			Brown, sandy CLAY/SILT. Sand is fine grained. (TIDAL FLAT DEPOSIT)		1.00	
1.20-1.40 1.20	B1 D4			Light brown and orange brown, very silty SAND. Sand is fine grained. (MARINE SAND)		1.50	
1.60	D5			Dark brown, slightly organic, silty SAND. Sand is fine grained. (MARINE SAND)		1.70	
1.80 1.90-2.10	D6 B2			Light brown and orange brown, very silty SAND. Sand is fine grained. (MARINE SAND)			
2.10	D7						
2.30-2.50	B3					2.50	
				Pit completed at 2.50m depth			
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample Water Strike Water Rise Level on completion MP - Mackintosh Probe P () - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. Live roots observed to 0.80m depth 2. Pit dry 3. Pit sides unstable below 0.40m depth on completion				
							Project No 13751
							Scale Page 1:25 1/1

L I M I T E D
Tel: 01733-566566
www.groundengineering.co.uk

Date: 22/01/16

Pit Size: 2.20m L x 0.60m W x 2.00m D.

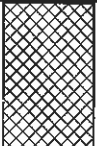
TRIAL PIT
TP3

Ground
Level:

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample ▽ - Water Strike ▽ - Water Rise ▽c - Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa	REMARKS 1. Live roots observed to 2.00m depth 2. Groundwater met at 1.80m depth, and stood at 2.00m depth on completion 3. Pit sides stable 4. Pit abandoned at 2.00m depth due to brickwork obstruction	Project No 13751	
		Scale 1:25	Page 1/1

Project No
13751

Scale	Page
1:25	1/1

GROUND ENGINEERING LIMITED Tel: 01733-568566 www.groundengineering.co.uk			Site: LAND OFF PARK LANE, DONINGTON		TRIAL PIT TP4	
Date: 22/01/16			Pit Size: 1.60m L x 0.80m W x 0.50m D.		Ground Level:	
Samples and in-situ Tests			(Date) Water	Description of Strata	Legend	Depth m
Depth m	Type	Result				O.D. Level m
0.30	D1			MADE GROUND - Brown, slightly sandy, slightly gravelly SILT. Gravel is sub-angular to rounded flint, concrete and brick fragments.		0.50
				Pit completed at 0.50m depth		
KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample J - Jar Sample  Water Strike  Water Rise  Level on completion MP - Mackintosh Probe P() - Hand Penetrometer Cohesion () kPa V - Vane Shear Test Cohesion () kPa			REMARKS 1. Live roots observed to 0.50m depth 2. Pit dry 3. Pit sides stable			
Project No 13751						Scale 1:25
Page 1/1						

LABORATORY TEST RESULTS

CONTRACT LAND OFF PARK LANE, DONINGTON

Trial-pit	Sample	Depth m	Classification				Density		Triaxial Compression						Sulphates (SO ₄)				C.B.R.		Remarks
			Liquid Limit %	Plastic Limit %	Plasticity Index %	Moisture Content %	Bulk Mg/m ³	Dry Mg/m ³	Type	Principal Stress Difference kPa	Cell Pressure kPa	Shear Strength kPa	Angle of Shear Resistance degrees	Total Dry Wt. %	Aqueous Extract mg/l	Water mg/l	pH	Top %	Base %		
TP1	D4/J4	1.20	37	28	9	32								230			7.3			SOIL CLASSIFICATION = MI 9% retained on 425µm sieve	
	D5/J5	1.50												206			7.6				
	CBR1	0.50 - 0.80				22	1.87	1.51										2.7	3.2	5% retained on 20mm sieve	
TP2	D3	0.90	34	24	10	31														SOIL CLASSIFICATION = CL/ ML 1% retained on 425µm sieve	
	D4	1.20															7.9				
	D5	1.60															7.5				
TP3	CBR1	0.50 - 0.80				24	1.86	1.50										2.5	3.4	2% retained on 20mm sieve	

U - UNDISTURBED SAMPLE
D - DISTURBED SAMPLE
B - BULK SAMPLE
W - WATER SAMPLE

C.U. - CONSOLIDATED UNDRAINED
C.D. - CONSOLIDATED DRAINED
Q. - IMMEDIATE UNDRAINED
Q.M. - IMMEDIATE UNDRAINED MULTISTAGE

Aqueous Extract 2:1 Water:Soil

C.B.R. - CALIFORNIA BEARING RATIO



8180

GROUND ENGINEERING

Newark Road Peterborough
t: 01733 566566 f: 01733 315280
e: admin@groundengineering.co.uk

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4

Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
Client Address: Newark Road
Peterborough
PE1 5UA

Contact: Simon Weatherley

Site Name: Land off Park Lane
Site Address: Donington

Certificate Number: PL5295-1/2/710-2

Client Reference: C13751

Lab Job Number: PL5295-1

Date Sampled: Unknown

Date Received: 05.02.2016

Date Tested: 17.02.2016

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

TEST RESULTS

Laboratory Reference: PL5295-1/2

Client Reference: D5 / J5

Pre-treatment for
organic material:

No

Sample Description: Brown slightly clayey very sandy SILT

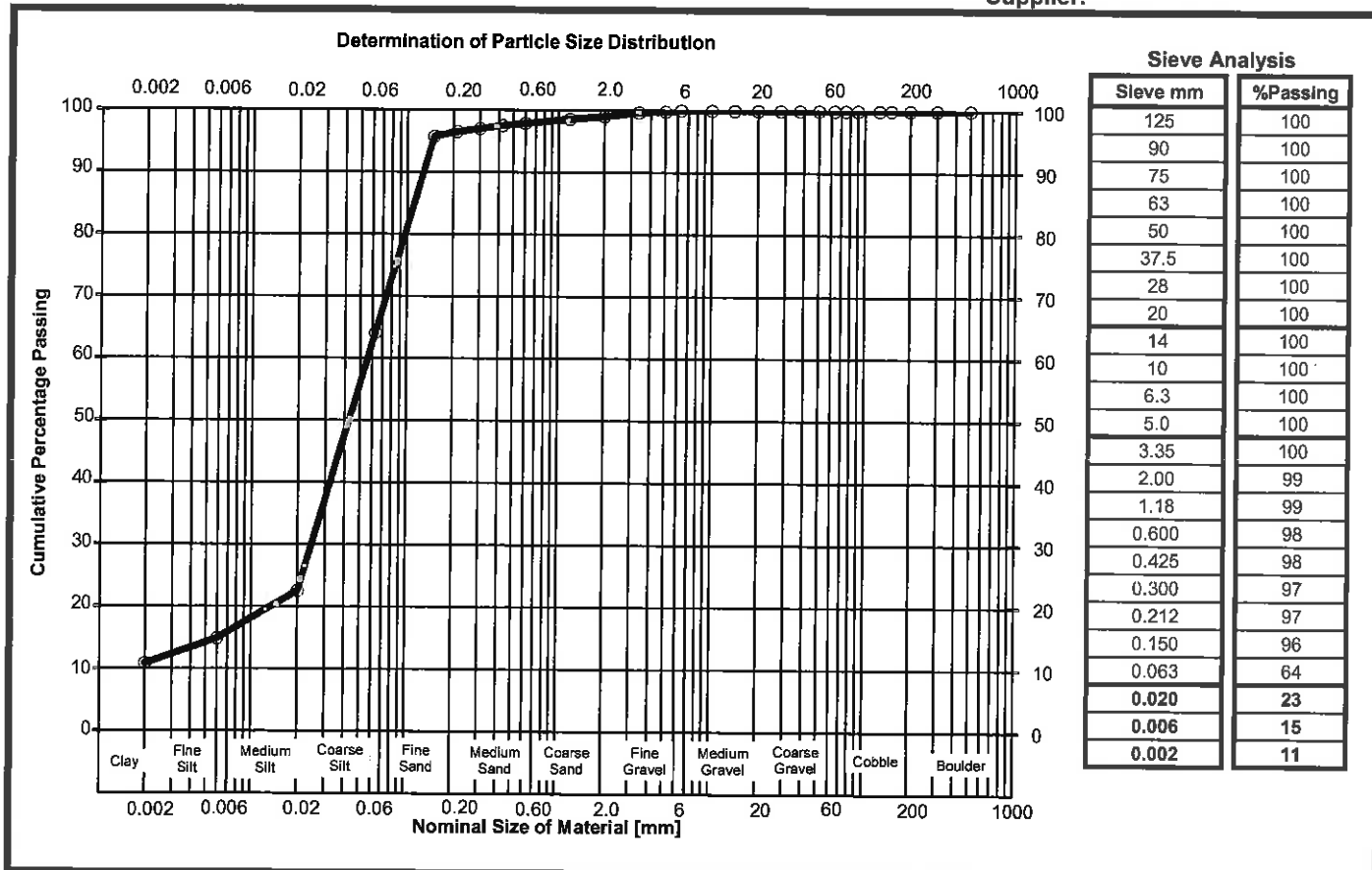
Material Specification: Not Required

Depth: 1.50m

Location: TP1

Source:

Supplier:



Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

Date Reported: 22.02.2016 Page 1 of 1
Form Number: GELab/C/709-2 Version 46

for and on behalf of Ground Engineering Ltd

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Registration Number: 6929574
Reg Office: Ground Engineering Ltd
Newark Rd, Peterborough PE1 5UA



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GROUND ENGINEERING

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e: admin@groundengineering.co.uk

TEST CERTIFICATE**Determination of Particle Size Distribution**

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4
Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
Client Address: Newark Road
Peterborough
PE1 5UA

Contact: Simon Weatherley

Site Name: Land off Park Lane
Site Address: Donington

Certificate Number: PL5295-1/5/710-2

Client Reference: C13751

Lab Job Number: PL5295-1

Date Sampled: Unknown

Date Received: 05.02.2016

Date Tested: 18.02.2016

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

TEST RESULTS

Laboratory Reference: PL5295-1/5

Client Reference: B1

Pre-treatment for
organic material:

No

Sample Description: Brown grey red brown very sandy SILT

Material Specification: Not Required

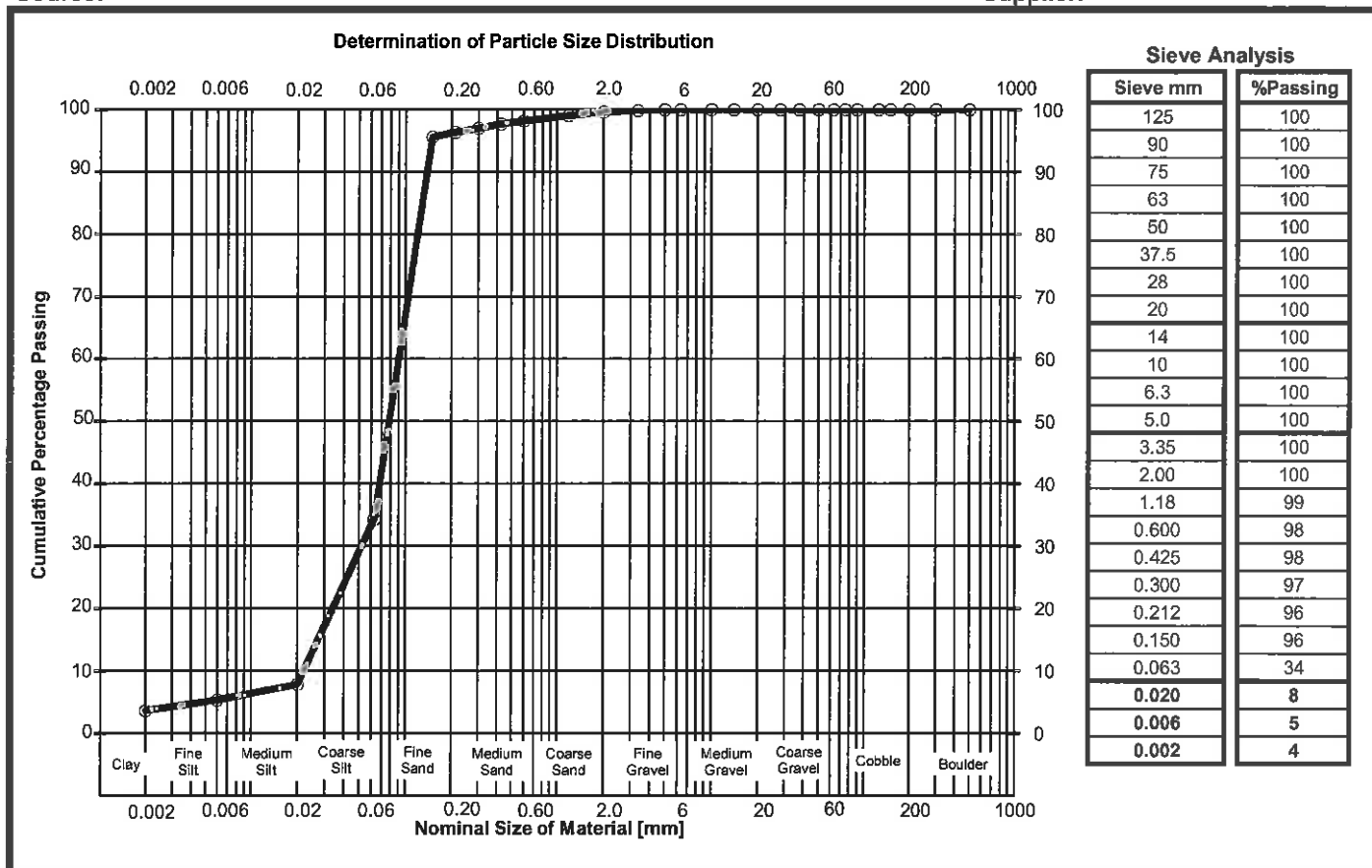
Location: TP2

Source:

Depth Top: 1.20m

Depth Base: 1.40m

Supplier:



Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Ground Engineering Ltd

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Form Number: GELab/C/709-2 Version 46

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TEST CERTIFICATE**GROUND ENGINEERING**

Newark Road Peterborough
 t: 01733 566566 f: 01733 315280
 e: admin@groundengineering.co.uk

Determination of Particle Size Distribution

Tested in Accordance with BS 1377-2: 1990: Clause 9.2 & 9.4

Sieved Grading and Sedimentation by Pipette

Client: Ground Engineering Ltd
 Client Address: Newark Road
 Peterborough
 PE1 5UA

Contact: Simon Weatherley

Site Name: Land off Park Lane
 Site Address: Donington

Certificate Number: PL5295-1/8/710-2

Client Reference: C13751

Lab Job Number: PL5295-1

Date Sampled: Unknown

Date Received: 05.02.2016

Date Tested: 18.02.2016

Certificate of Sampling: N/A

Sampling Certificate No.: N/A

Sampled By: Client

TEST RESULTS

Laboratory Reference: PL5295-1/8

Client Reference: B2

Pre-treatment for
organic material:

N/A

Sample Description: Brown grey red brown very sandy SILT

Material Specification: Not Required

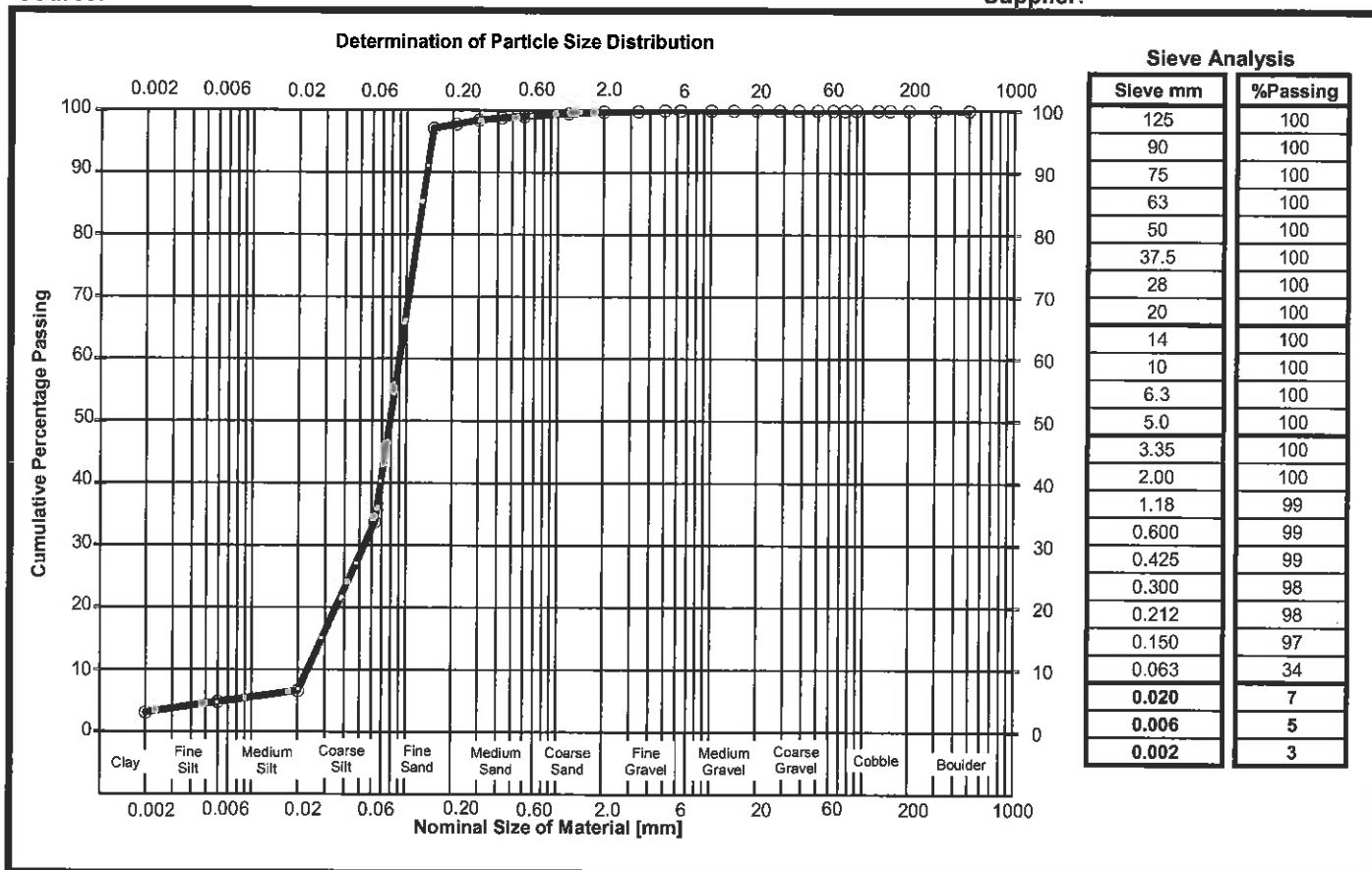
Location: TP2

Source:

Depth Top: 1.90m

Depth Base: 2.10m

Supplier:



Comments: Data relevant to material below 63 microns is outside the current scope of UKAS accreditation

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 22.02.2016 Page 1 of 1

Form Number: GELab/C/709-2 Version 46

Registered in England & Wales

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Newark Rd, Peterborough PE1 5UA

APPENDIX 1

CLASSIFICATION OF AGGRESSIVE CHEMICAL ENVIRONMENT FOR BURIED CONCRETE

TABLE C2 – AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE

(ACEC) CLASSIFICATION FOR BROWNFIELD LOCATIONS^a

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations^a

Sulfate and magnesium		Groundwater		Groundwater		ACEC	
Design Sulfate	2:1 water/soil extract ^b	Groundwater	Total potential sulfate ^c	Static water	Mobile water	Class for location	Class for location
1	2	3	4	5	6	7	8
Class for location	(SO ₄ mg/l)	(Mg mg/l)	(SO ₄ mg/l)	(Mg mg/l)	(SO ₄ %)	(pH) ^d	(pH) ^d
DS-1	< 500		< 400		< 0.24	≥ 2.5	> 6.5 ^d
							5.5–6.5
							4.5–5.5
							2.5–4.5
DS-2	500–1500		400–1400		0.24–0.6	> 5.5	> 6.5
						2.5–5.5	5.5–6.5
							4.5–5.5
							2.5–5.5
DS-3	1600–3000		1500–3000		0.7–1.2	> 5.5	> 6.5
						2.5–5.5	5.5–6.5
							2.5–5.5
DS-4	3100–6000	≤ 1200	3100–6000	≤ 1000	1.3–2.4	> 5.5	> 6.5
						2.5–5.5	2.5–6.5
DS-4m	3100–6000	> 1200 ^e	3100–6000	> 1000 ^e	1.3–2.4	> 5.5	> 6.5
						2.5–5.5	2.5–6.5
DS-5	> 6000	≤ 1200	> 6000	≤ 1000	> 2.4	> 5.5	> 6.5
						2.5–5.5	≥ 2.5
DS-5m	> 6000	> 1200 ^e	> 6000	> 1000 ^e	> 2.4	> 5.5	> 6.5
						2.5–5.5	≥ 2.5

Notes

- ^a Brownfield locations are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).
- ^b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered from previous Digests (Box C7).
- ^c Applies only to locations where concrete will be exposed to sulfate ions (SO₄), which may result from the oxidation of sulfides such as pyrite, following ground disturbance (Appendix A1 and Box C8).
- ^d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).
- ^e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17 000 mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that include the suffix 'z' have primarily to resist acid conditions and may be made with any of the cements in Table D2 on page 42.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.

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Document 6

Pre-Planning Assessment Report

Park Lane, Donington

Section 1: Proposed Development

Thank you for submitting a pre-planning enquiry. This has been produced for Robert Doughty Consultancy Limited. Your reference number is **00015875**. If you have any questions upon receipt of this report, please contact Mark Rhodes on 01733 414690 or email planningliaison@anglianwater.co.uk.

The response within this report has been based on the following information which was submitted as part of your application:

List of Planned Developments	
Type of Development	No. Of Units
C3 Dwellings	9

The anticipated residential build rate is:

Year	2016
Build Rate	9

- The grid reference for the site is TF2063235699.
- The site currently does not have planning permission and is located on a brownfield site.

Section 2: Assets Affected

Our records indicate that there are no public water mains or public sewers or other assets owned by Anglian Water within the boundary or overlapping your development site. However, it is recommended that you carry out a thorough investigation of your proposed working area to establish whether any unmapped public or private sewers and lateral drains are in existence.

Due to the private sewer transfer in October 2011 many newly adopted public used water assets and their history are not indicated on our records. You also need to be aware that your development site may contain private water mains, drains or other assets not shown on our records. These are private assets and not the responsibility of Anglian Water but that of the landowner.

Section 3: Water Supply

In examining the available capacity for your development site we assess the capacity and costs for two categories of water main. These are:

Strategic – these are the offsite potable water mains which deliver water within an area to a large number of development sites often across a number of towns. The strategic provision of these water mains enables us to provide of the cheapest solution across a large geographical area.

Local reinforcement – these are the offsite potable water mains that connect your site to the closest available public water main. Alternatively, reinforcement may be needed to protect existing houses against the loss of water or water pressure.

On most sites we also have two categories of water mains the **Spine Mains** and **Housing Estate Mains (HEMS)**. To support your budgeting arrangements we have also examined the estimated cost for delivering the onsite water mains needed for a site of your size.

Water Supply Network

There is insufficient capacity in the current network to supply this development site and therefore offsite reinforcements are needed. Details of the necessary upgrades and their costs can be found in the water infrastructure and cost section of this report. If you wish to proceed with the development then you will need to complete an application for a new supply. This is recommended to be done at the earliest opportunity as it could take a minimum of 12 months to install any offsite reinforcement works.

Currently, there is no expectation that there will be a need for any strategic main contributions. However, capacity can be reduced at any time due to an increased demand from existing commercial and residential housing as well as from new developments. You are therefore recommended to formally apply for a connection at your earliest convenience.

The connection point for the site will be from the existing 3" GI water main in Park Lane at National Grid Reference (NGR) TF2064835711.

Water Budget Costs

The costs provided in this report are based on the current information available. These costs are provided as an indicative estimate to help inform you on a budget for supplying water to your site.

- The **strategic costs** are based on a proportion of the total strategic scheme cost. These costs are calculated based on the flow rate that your development requires as compared to the total flow rate that the strategic main has been designed against.

- The **local reinforcement** costs have been calculated based on the typical costs of providing a length of water main across a similar distance as required for this development site.
- The onsite **Spine mains** and **HEMS** costs are provided based on historic Anglian Water construction information.

Based on these estimated and predicted costs, the cost to provide water to your site:

Predicted costs for supplying water to your development		
Strategic Water Mains	Based on	N/A
Estimated Local reinforcement Mains		
Park Lane Donington	9 new dwellings - new 3m cross-connection @ TF2098329808 in 125PE at B1397 Gosberton Rise gate	£ 1,000.00
Estimated Onsite Water Mains		
Onsite water mains costs		£ 5,400.00
Total Cost for providing the water infrastructure		£ 6,400.00

The above table provides an estimated breakdown of the costs to supply the water infrastructure. A more detailed cost provision will be provided following a formal application for a new water mains or water connection.

Financing your water costs

You will be required to partly contribute towards the cost of supplying water to your site. The amount that you contribute is dependent on your preferred method of financing the site. The Water Industry Act enables you to finance the water mains via either the relevant deficit or discounted aggregate deficit. A full breakdown of these methods is provided on our website at www.anglianwater.co.uk/developers.

In essence, the two deficit options allow us to offset future revenue (from the end customer after they purchase your houses) from the scheme cost. The scheme cost is determined as a hypothetical fixed rate loan provided over 12 years. The two statutory options are:

1. **Relevant deficit.** This takes the actual annual revenue offset from the actual annual scheme cost repayment. The difference is paid every year over the first twelve years of your site or until the revenue exceeds the annual scheme cost.

2. **Discounted aggregate deficit.** This enables us to offset the estimated future revenue from the scheme cost. This is calculated over the first twelve years of your site and a commuted sum is calculated as an upfront net present value amount.

Your estimated contribution towards the construction costs are provided in the table below:

Scheme Title: Park Lane, Donington	
Developer: Robert Doughty Consultancy Limited	

Year	Occupation Rates
1	0
2	9
3	9
4	9
5	9
6	9
7	9
8	9
9	9
10	9
11	9
12	9
Total	9

Estimated Construction costs	
Onsite water	£ 5,400
Offsite water	£ 1,000
Estimated Scheme Cost	£ 6,400

Your estimated contribution towards construction costs	
Relevant Deficit	£ 653
Discounted Aggregate Deficit	£ 632

In addition, you also have the ability to construct the onsite water mains under a self-lay agreement. In such cases, an Asset Payment is made by Anglian Water following commissioning and adoption of the assets. The Asset Payment is calculated as required in the Water Act 2003. For more information on the self-lay of water mains please see www.anglianwater.co.uk/developers/self-lay.

You will also need to budget for both infrastructure charges and connection costs. The 2016/17 charges are:

Infrastructure Charge	£354.00	per connection
-----------------------	---------	----------------

Please note that we offer alternative types of connections depending on your needs and these costs are available in our annual charges booklet, which can be downloaded from www.anglianwater.co.uk/developers/charges.

Section 4: Water Recycling Services

In examining the used water system we assess the ability for your site to connect to the public sewerage network without causing a detriment to the operation of the system. We also assess the receiving water recycling centre and determine whether the water recycling centre can cope with the increased flow and influent quality arising from your development.

Water Recycling Centre

The foul drainage from the proposed development is in the catchment of Donington Water Recycling Centre, which currently has capacity to treat the flows from your development site. Anglian Water cannot reserve capacity and the available capacity at the water recycling centre can be reduced at any time due to growth, environmental and regulation driven changes.

Used Water Network

Anglian Water has assessed the impact of gravity flows from your planned development to the public foul sewerage network. We can confirm that this is acceptable as the foul sewerage system, at present, has available capacity for your site. The connection point will be to manhole 6706 in Park Lane at NGR TF2068035707.

Anglian Water has also assessed an alternative connection point for gravity flows should the connection above not be suitable due to the site layout or to achieve a gravity connection. The connection point will be to manhole 6605 in Park Lane at NGR TF2060035679.

Surface Water Disposal

There are no public surface water sewers within the vicinity of the proposed development. Therefore Anglian Water will be unable to provide the site with a feasible solution of surface water disposal within the current assets. Alternative methods of surface water disposal will need to be investigated such as infiltration techniques or a discharge to a watercourse in accordance with the surface water management hierarchy as outlined in Building Regulations Part H.

The alternative is that a new surface water sewer is constructed which is used to convey your surface water to a watercourse or as part of a SuDs scheme, where appropriate. Subject to the sewer being designed in accordance with the current version of Sewers For Adoption, the sewer can be put forward for adoption by Anglian Water under Section 104 of the Water Industry Act 1991. If the outfall is to a watercourse, the applicant will be required to obtain consent to discharge via the appropriate body.

If your site has no means of drainage due to third party land then you may be able to requisition Anglian Water, under Section 98, to provide a connection to the public sewer for domestic drainage purposes. As part of this option, you may wish to enter into a works

agreement in accordance with Section 30 of the Anglian Water Authority Act 1977. This will allow you to design and construct the public sewer using Anglian Waters' statutory powers in accordance with Section 159/168 of the Water Industry Act 1991.

As you may be aware, Anglian Water will consider the adoption of SuDs provided that they meet the criteria outline in our SuDs adoption manual. This can be found on our website at <http://www.anglianwater.co.uk/developers/suds.aspx>. We will adopt features located in public open space that are designed and constructed, in conjunction with the Local Authority and Lead Local Flood Authority (LLFA), to the criteria within our SuDs adoption manual. Specifically, developers must be able to demonstrate:

1. Effective upstream source control,
2. Effective exceedance design, and
3. Effective maintenance schedule demonstrating that the assets can be maintained both now and in the future with adequate access.

If you wish to look at the adoption of any SuDs then an expression of interest form can be found on our website at: <http://www.anglianwater.co.uk/developers/suds.aspx>

Trade Effluent

We note that you do not have any trade effluent requirements. Should this be required in the future you will need our written formal consent. This is in accordance with Section 118 of the Water Industry Act (1991).

Used Water Budget Costs

It has been assumed that the onsite used water network will be provided under a section 104 Water Industry Act application. It is recommended that you also budget for both infrastructure charges and connection costs. The 2016/17 charges are:

Infrastructure Charge	£354.00 per connection
-----------------------	------------------------

Please note that we offer alternative types of connections depending on your needs and these costs are available in our annual charges booklet, which can be downloaded from www.anglianwater.co.uk/developers/charges.

Section 5: Map of Proposed Connection Points



Figure 1: Showing your water point of connection at Park Lane, Donington

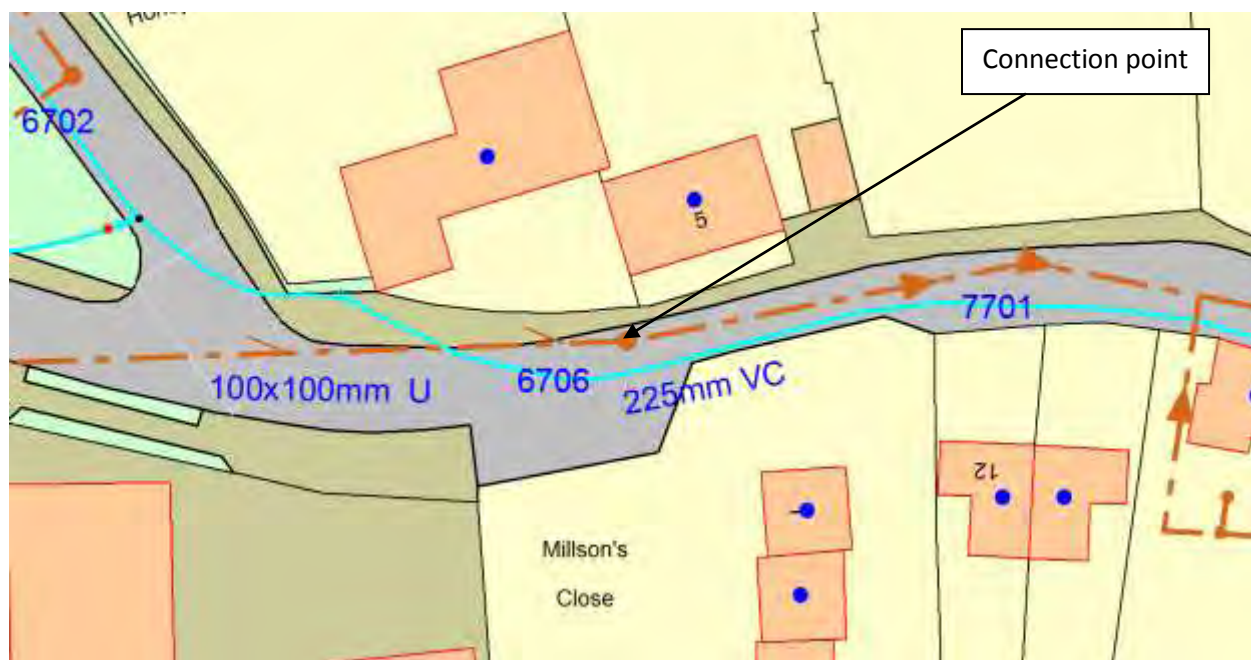


Figure 2: Showing your used water point of connection at manhole 6706 with a Cover Level of 4.39m and an Invert Level of 2.86m

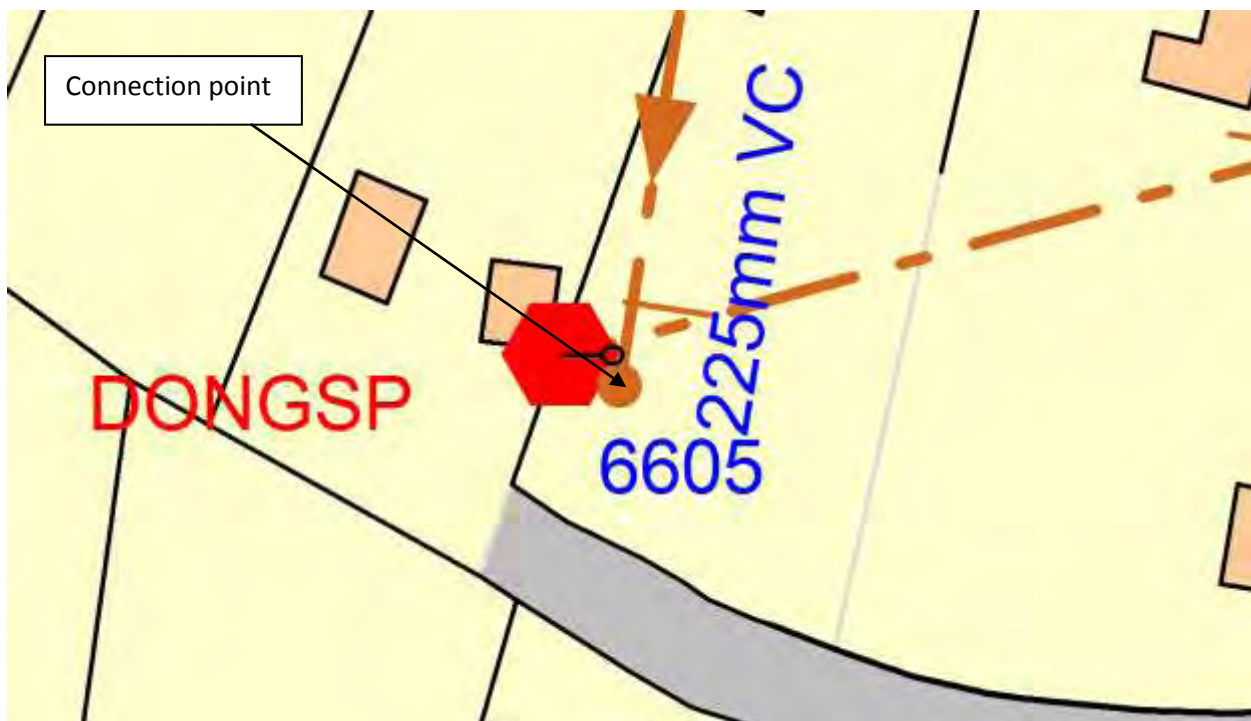


Figure 3: Showing your alternative used water point of connection at manhole 6605 with a Cover Level of 3.88m and an Invert Level of 0.47m

Section 6: Useful Information

Water

Water Industry Act – Key Water Sections:

- **Section 41:** This provides you with the right to requisition a new water main for domestic purposes to connect your site to the public water network.
- **Section 45:** This provides you with the right to have a connection for domestic purposes from a building or part of a building to the public water main.
- **Section 51A - E:** This provides you with the right to provide the water main or service connection yourself and for us to vest them into our company.
- **Section 55:** This applies where you request a supply of water for non domestic purposes.
- **Section 185:** This provides you with the right to make a reasonable request to have a public water main, sewer or public lateral drain removed or altered, at your expense. Details on how to make an application and the s185 form is available on our website at <http://www.anglianwater.co.uk20/developers> or via our Developer Services team on 08457 60 66 087.

Details on how you can make a formal application for a new water main, new connection or diversion are available on from our Developer Services team on 08457 60 66 087 or via our website at www.anglianwater.co.uk/developers

If you have any other queries on the rights to requisition or connect your housing to the public water and sewerage infrastructure then please contact our developer services team at: Developer Services, Anglian Water, PO Box 495, Huntingdon, PE29 6YY or Telephone: 0845 60 66 087 or Email: developerservices@anglianwater.co.uk

Water pressure and flow rate: The water pressure and consistency that we must meet for your site is laid out in the Water Industry Act (1991). This states that we must supply a flow rate of 9 litres per second at a pressure of 10 metres of head to the external stop tap. If your water pressure requirements exceed this then you will need to provide and maintain any booster requirements to the development site.

Self Lay of Water Mains: A list of accredited Self Lay Organisations can be found at www.lloydsregister.co.uk/schemes/WIRS/providers-list.aspx.

Used Water

Water Industry Act – Key Used Water Sections:

- **Section 98:** This provides you with the right to requisition a new public sewer. The new public sewer can be constructed by Anglian Water on your behalf. Alternatively, you can construct the sewer yourself under section 30 of the Anglian Water Authority Act 1977.

- **Section 102:** This provides you with the right to have an existing sewerage asset vested by us. It is your responsibility to bring the infrastructure to an adoptable condition ahead of the asset being vested.
- **Section 104:** This provides you with the right to have a design technically vetted and an agreement reached that will see us adopt your assets following their satisfactory construction and connection to the public sewer.
- **Section 106:** This provides you with the right to have your constructed sewer connected to the public sewer.
- **Section 185:** This provides you with the right to have a public sewerage asset diverted.

Details on how to make a formal application for a new sewer, new connection or diversion are available on our website at www.anglianwater.co.uk/developers or via our Developer Services team on 08457 60 66 087.

Sustainable Drainage Systems:

Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not resilient to climate change in the long term. Therefore our preferred method of surface water disposal is through the use of Sustainable Drainage Systems (SuDS). SuDS are a range of techniques that aim to mimic the way surface water drains in natural systems within urban areas. For more information on SuDS, please visit our website at <http://www.anglianwater.co.uk/developers/suds.aspx>. We also recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for the area to discuss your application.

Private Sewer Transfers: Sewers and lateral drains connected to the public sewer on the 1 July 2011 transferred into Water Company ownership on the 1 October 2011. This follows the implementation of the Floods and Water Management Act (FWMA). This included sewers and lateral drains that were subject to an existing Section 104 Adoption Agreement and those that were not. There were exemptions and the main non-transferable assets were as follows:

- Surface water sewers and lateral drains that did not discharge to the public sewer, e.g. those that discharged to a watercourse.
- Foul sewers and lateral drains that discharged to a privately owned sewage treatment/collection facility.
- Pumping stations and rising mains will transfer between 1 October 2011 and 1 October 2016.

The implementation of Section 42 of the FWMA will ensure that future private sewers will not be created. It is anticipated that all new sewer applications will need to have an approved section 104 application ahead of a section 106 connection.

Encroachment: Anglian Water operates a risk based approach to development encroaching close to our used water infrastructure. We assess the issue of encroachment if you are

planning to build within 400 metres of a water recycling centre or, within 15 metres to 100 metres of a pumping station. We have more information available on our website at <http://anglianwater.co.uk/developers/encroachment.aspx>

Locating our assets: Maps detailing the location of our water and used water infrastructure including both underground assets and above ground assets such as pumping stations and recycling centres are available from www.digdat.co.uk. All requests from members of the public or non-statutory bodies for maps showing the location of our assets will be subject to an appropriate administrative charge. We have more information on our website at: www.anglianwater.co.uk/developers/our-assets/

Summary of charges: A summary of this year's water and used water connection and infrastructure charges can be found at <http://www.anglianwater.co.uk/developers/charges/>

Disclaimer: The information provided within this report is based on the best data currently recorded, recorded within the last 12 months or provided by a third party. The position must be regarded as approximate. If there is further development in the area or for other reasons the position may change.

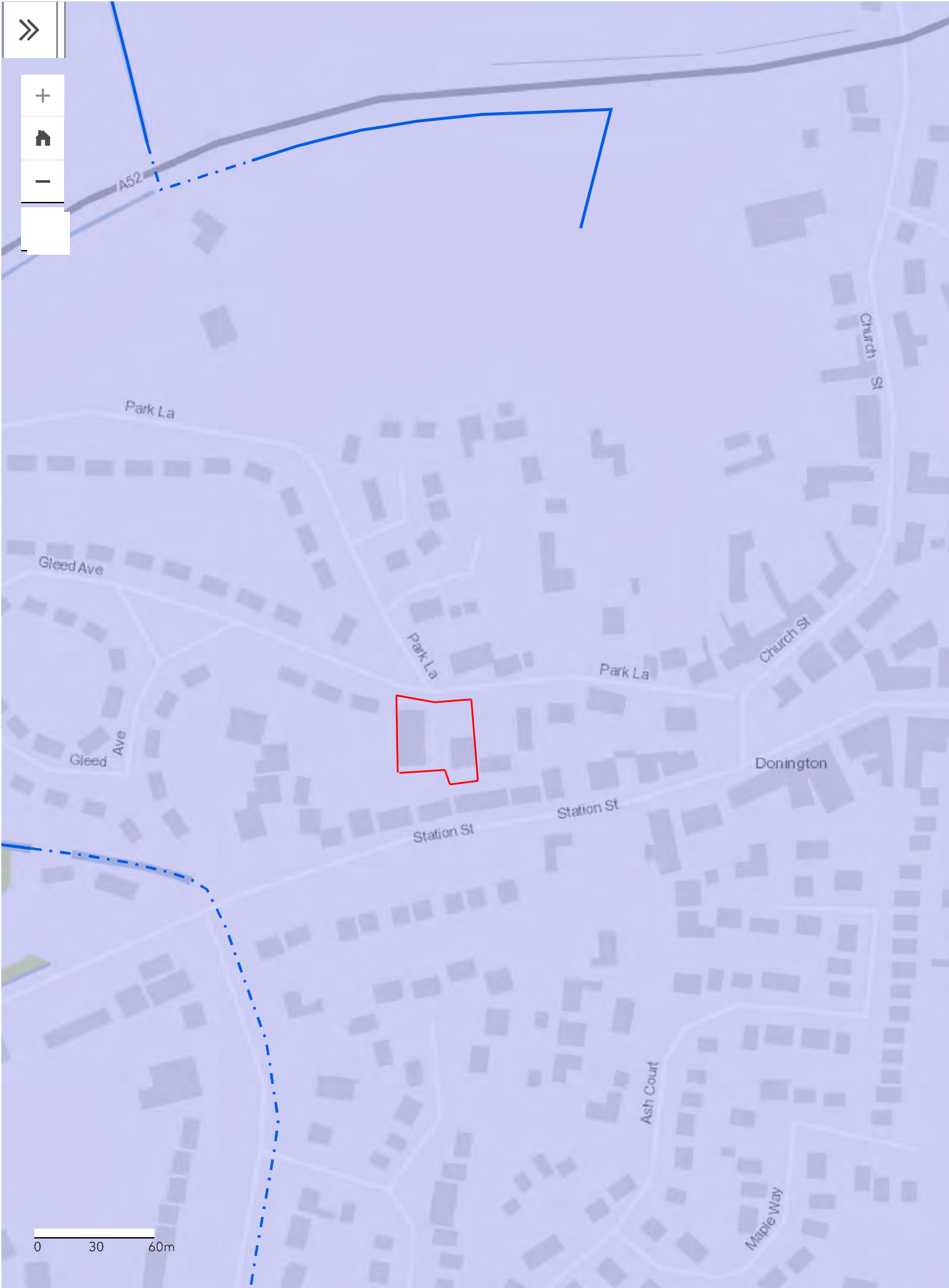
The accuracy of this report is therefore not guaranteed and does not obviate the need to make additional appropriate searches, inspections and enquiries. You are advised therefore to renew your enquiry should there be a delay in submitting your application for water supply/sewer connection to re-confirm the situation.

Any cost calculations provided within the report are estimated only and may be subject to change.

The responses made in this report are based on the presumption that your proposed development obtains planning permission. Whilst this report has been prepared to help assess the viability of your proposal, it must not be considered in isolation. Anglian Water supports the plan led approach to sustainable development that is set out in the National Planning Policy Framework (NPPF). As a spatial planning statutory consultee, we assist planning authorities in the preparation of a sustainable local plan on the basis of capacity within our water and water recycling (formerly referred to as wastewater) infrastructure. Consequently, any infrastructure needs identified in this report must only be considered in the context of up to date, adopted or emerging local plans. Where local plans are absent, silent or out of date these needs should be considered against the definition of sustainability set out in the NPPF as a whole.

No liability whatsoever including liability for negligence is accepted by Anglian Water Services Limited 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 drain or disposal main or any item of apparatus.

Document 7



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