

PROPOSED RESIDENTIAL DEVELOPMENT at rear of 75 Backgate, Cowbit



DRAINAGE STATEMENT (4 DWELLINGS) for BROADGATE HOMES LTD



**Silverdale, 116 Humberston Avenue
Humberston
North East Lincs
DN36 4SU**

sites.google.com/site/hallinfrastructuredesign

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Drainage Statement

Document 1	Drawing No 19-234-01 – Topographical Survey. Drawing No 1901-FPA-03 rev C – Site Layout.
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Document 3	Drawing No 2002/02 rev A – Domestic Drainage Construction and Ancilliary Details.
Document 4	Microdrainage permeable driveway calculations.
Document 5	AWS Ltd pre-planning report ref 143347/92000479/1/0040225.
Document 6	Ground Investigation report C15078.

Drainage Statement for Proposed Housing Development at Rear of 75 Backgate, Cowbit, Lincolnshire.

Hall Infrastructure Design Ltd have been engaged by Broadgate Homes Ltd, to prepare a basic drainage statement to complement design drawings undertaken for a proposed residential development at the above site.

1. Topography and Site Layout.

A topographical survey, drawing no 19-234-01 (**doc 1**), has been produced by Daniel Charles Surveys Ltd.

A site layout, drawing no 1901-FPA-03 rev C (**doc 1**), has been produced by Broadgate Homes Ltd.

2. Existing Site.

The site is an existing green field behind nos 75, 77 & 79 Backgate accessed from an existing track between nos 71 and 75 Backgate. It is generally rectangular in shape with an average width of 45m and length of 83m which, including the access track, has a total site area of 0.391 Ha. Levels vary between 3.40m ODN in the south west corner of the site and 2.46m ODN in the north east corner with the existing road centreline level at the site entrance on Backgate being 2.94m ODN.

3. Infiltration Testing.

Soil infiltration testing has been undertaken by Ground Engineering Ltd in November 2020 and their report ref C15078 (**doc 6**) confirms a rate of 5.59×10^{-6} ms and a conservative 1% CBR (actual values between 1.4% and 2.8%) to be used to prepare the technical aspects of this drainage statement.

4. The Design – Surface Water.

Domestic Drainage Layout drawings no 2002/01-A (**doc 2**) and 2002/02-A (**doc 3**) have been produced based on the information provided by the client. The most effective infiltration solution is a large shallow structure, such as a permeable paved driveway, as this provides storage, at a shallow depth with a large effective infiltration base area. The proposed permeable tarmac drive and individual gravel drives have therefore been designed with their sub base reservoir layer providing storage for the runoff from the impermeable areas being all roof areas, gravel drives and tarmac drive. Microdrainage calculations (**doc 4**) confirm that the 100 year plus 40% climate change event can be accommodated in the 710mm deep 30% void sub base reservoir layer of the tarmac section of private driveway, filling to 556mm, without exceedence with a 50% drain down time of 255 minutes (well within the 1440 minutes permitted).

5. The Design – Private Permeable Tarmac Driveway.

The client wishes for the main private access driveway to be paved in permeable tarmac materials. During the planning process a request has been made to provide evidence that the access road will be suitable for fire tenders weighing 18 tonnes. To demonstrate this the construction thicknesses of the private access driveway have been specified in accordance with construction chart 1 of the Lincolnshire County Council Development Road Specification and Construction Guide May 2018. This chart is used for all estate roads in the County up to 0.25 MSA (million standard axles) and is suitable for removal vans, refuse lorries, fire tenders and the like.

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6. Flood Risk.

A Flood Risk Assessment has been produced by RM Associates in January 2020.

7. Finished Floor Levels.

Finished floor levels for habitable dwellings have been proposed at 3.01m ODN as set out in the Flood Risk Assessment produced by RM Associates in January 2020.

8. The Design – Foul Water.

There is an existing 150mm diameter AWS Ltd foul sewer located within the site along the western boundary as shown on the domestic drainage layout drawing 2002/01-A (**doc 2**). AWS Ltd have, in their Pre-Planning report ref 143347/92000479/1/0040225 dated 14th February 2019 (**doc 5**), confirmed that the proposed dwellings can be connected into their existing manhole ref 4301 in the north west corner of the site. AWS Ltd have also confirmed in their email, dated 17 December 2019, that, should soil percolation testing prove not to be viable, they have assessed an alternative surface water connection to manhole 4452 in Milfoil Lane at NGR TF 26449 17399 and have confirmed that a discharge rate of 5 l/s is acceptable. This is subject to providing sufficient surface water hierarchy evidence at section 106 application stage. As the on site testing demonstrates that soil percolation is viable the option to connect to their piped network is not required.

9. Conclusion / Summary.

The site does not need to be drained using SuDS principles as it is below the “major development” threshold of 1 hectare and 10 dwellings.

Notwithstanding this the client wishes to use SuDS principles as it represents the most suitable solution for this small site with low density development.

The calculations show that, based on the suggested soil percolation rate, the network of permeable paved access driveway and individual gravel driveways can cater for the surface water runoff from these areas together with roof areas for the 100 year plus 40% climate change without exceedence with a 50% drain down time well within permitted limits.

The client wishes to provide a sustainable solution utilising infiltration techniques for all development areas, as set out in the Flood Risk Assessment produced by RM Associates in January 2020.

G.W.Hall 11.12.20

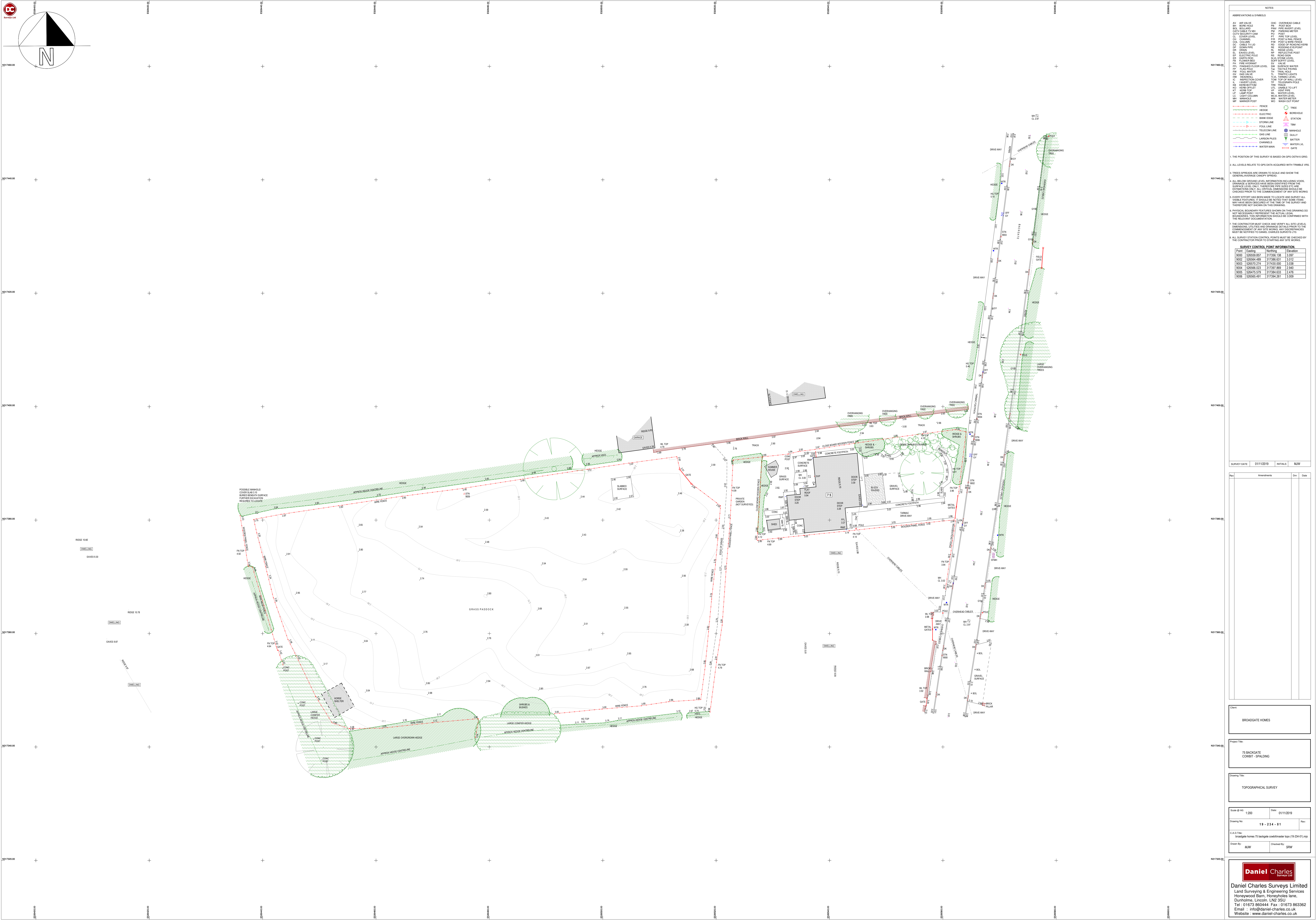
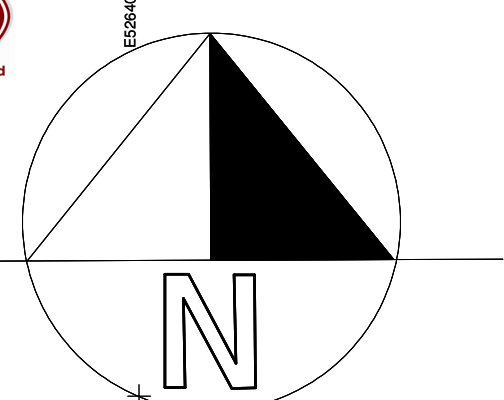
Document 1

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[illegible]

- THE POSITION OF THIS SURVEY IS BASED ON GPS OSTYNIS GRID.
ALL LEVELS RELATE TO GPS DATA ACQUIRED WITH TRIMBLE VMS.
- THREE SPREADS ARE DRAWN TO SCALE AND SHOW THE
APPROXIMATE POSITION OF THE SURVEY.
- ALL BELOW GROUND LEVEL INFORMATION INCLUDING Voids,
DRAINAGE & SERVICES HAVE BEEN IDENTIFIED FROM THE
EXISTENCE OF RECORDS AND NOT BY THE SURVEY. THE
ESTRATORS (ONLY) ALL CHITICK DIMENSIONS SHOULD BE
OBTAINED FROM THE RECORDS.
- EVERY EFFORT HAS BEEN MADE TO LOCATE AND SURVEY ALL
VISIBLE FEATURES; IT SHOULD BE NOTED THAT SOME ITEMS
CANNOT BE OBSERVED OR MEASURED AND THEREFORE
THEREFORE NOT SHOWN ON THIS DRAWING.
- PHYSICAL SURFACE FEATURES SHOWN ON THIS DRAWING DO
NOT REPRESENT THE EXACT POSITION OF THE SURVEY
BOUNDARIES. THIS BOUNDARY FEATURE SHOULD BE CONFIRMED WITH
THE CONTRACTOR.
- THE CONTRACTOR MUST CHECK AND VERIFY ALL SITE LEVELS
AND LOCATIONS OF ALL SERVICES AND UTILITIES. THE
COMMITMENT OF ANY SITE SURVEY, ANY DISCREPANCY
MAY NOT BE NOTIFIED TO DANIEL CHARLES SURVEYS LTD.
- ALL INFORMATION CONTAINED HEREIN MAY BE CHECKED
THE CONTRACTOR PRIOR TO STARTING ANY WORK.

Point	Easting	Northing	Elevation
9000	526559.857	317358.138	3.097
9002	526664.489	317386.631	3.012
9003	526570.274	317430.000	3.038
9004	526566.023	317397.869	2.940
9005	526475.579	317384.633	2.476
9006	526565.491	317394.261	3.009

Ref	Attachments	Doc	Class

Client:

BROADGATE HOMES

Project Title:

75 BACKGATE
COWBIT - SPALDING

TOPOGRAPHICAL SURVEY

Scale @ A1:	1:200	Date:	01/11/2019
Drawing No:			Rev:
19 - 234 - 01			
C.A.D. Title:			
broadgate homes 75 backgate cowbifinaster topo (19-234-01).rjp			
Drawn By:		Checked By:	
MJW		SRW	



Daniel Charles Surveys Limited
Land Surveying & Engineering Services
Honeywood Barn, Honeyholes lane,
Dunholme, Lincoln. LN2 3SU
Tel : 01673 860444 Fax : 01673 863362
Email : info@daniel-charles.co.uk
Website : www.daniel-charles.co.uk



Point	Existing	Northing	Elevation
9000	536555.857	317356.138	1.997
9002	536564.489	317386.531	1.972
9003	536570.222	317435.000	1.938
9004	536565.023	317387.889	2.540
9005	536475.579	317384.526	2.475
9006	536565.481	317344.287	2.035

BOUNDARY TREATMENT

- PA12 - 1.2m high timber palisade
- CB18 - 1.8m timber closeboard
- CB18TT - 1.8 high timber closeboard plus 0.3m trellis top
- H18- 1.8m high Herras fencing to be erected during construction
- PG - 0.9m wide timber personnel gate

C.R.C.P

2.4m x 1.8m Communal Refuge Collection Point in 600mm² slabs - for plots 1-4 + No. 75.

LIGHTING

- Private lighting to dwellings + garage with daylight sensor
- LB 1.0m high private lighting bollard with daylight sensor

SURFACE TREATMENT

- F6 - 600mm wide private footpath
- F9 - 900mm wide private footpath
- LL - Level landing to principle entrance

Gradient no greater than 1:15

- Permeable tarmac
- Gravel
- Grass

LANDSCAPING

- Existing landscaping
- Front garden to be turfed unless stated otherwise

CONDITION 9 - During the construction of the development no tree or shrub felling, lopping or clearance shall take place between mid February - end of July

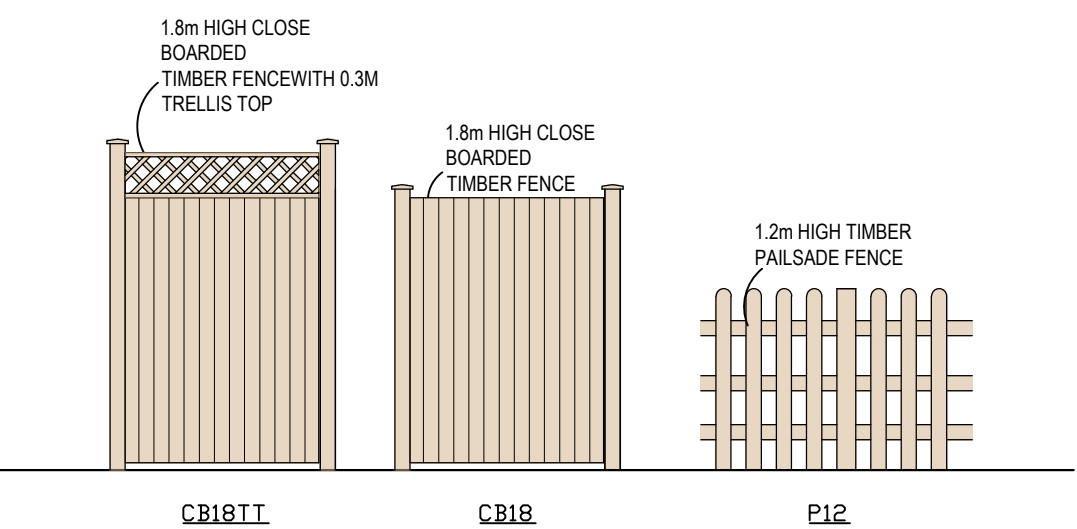
CONDITION 10 - None of the existing trees or hedges to the site shall be cut down, up-rooted, destroyed, topped or lopped unless first agreed in writing by the Local Planning Authority. If any tree which is to be retained dies or is to be removed it shall be replaced within twelve months thereafter with a tree of such size and species which shall be first agreed in writing by the Local Planning Authority.

CONDITION 14 - Before the access is brought into use all obstructions exceeding 0.6m high shall be cleared from the land within the visibility splays.

CONDITION 15 - C.R.C.P has been positioned on site and all plots will be provided with a garden cart to assist with moving waste to the collection point.

CONDITION 16 - The water consumption of each dwelling should not exceed the requirement of 110 litres per person per day.

CONDITION 6
Cross sections see site plan and Drawing No. 1901-CS-01.
HH Incorporate Hedgehog Highway to consist of 130mm x 130mm cut out at bottom corner of new perimeter fencing.



CONDITION 7
TREE PROTECTION NOTE
Dashed line denotes position of Herras 1.8m high fencing to remain firmly in position throughout the whole duration of construction.
UNDER NO CIRCUMSTANCES MUST THE FENCE BE MOVED.
• No materials, equipment, site huts, fuels or other items shall be placed or stored within the areas enclosed by the fencing so erected and ground levels within those areas shall not be altered, nor shall any excavation be made,
• No burning of materials or other items shall take place within 3 metres of the crown spread of any of the trees to be retained,
• No services shall be routed under the spread of the crowns of the trees to be retained.
• No trees to be cut down, up rooted, destroyed, topped or lopped unless agreed with the Local Planning Authority.
• If any tree which is to be retained dies or is to be removed it shall be replaced within twelve months thereafter with a tree of such size and species which shall be first agreed in writing by the Local Planning Authority.

CONDITION 8
Bird nest boxes & bat roost units.
BA1 - Bat box
PS1 - pair of sparrow terrace bird boxes

ensure units are not installed directly above doors or windows.

HH Incorporate Hedgehog Highway to consist of 130mm x 130mm cut out at bottom corner of new perimeter fencing.

Project Title:
Proposed Residential Development
land rear of No.75 Backgate,
Cowbit, Spalding, Lincs
PE12 6AP

Broadgate Homes Limited

Broadgate House,
Weston Hills,
Spalding, Lincs.
PE12 6DB
T: 01406 380 532
E: info@broadgate-homes.com
W: www.broadgate-homes.com

Drawing, Proposed Site Layout

Application Site Area: 0.98 acres / 0.39 ha

Scale: 1:250

Drawn By: CW Date: Dec 2019 Drawing No: 1901-FPA-03

Rev: A Description: Amendments to private drive

Rev: B Description: Amendments to perimeter fencing

Rev: C Description: Planning amendments

Rev: C Date: 24.11.20

Document 2

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Point	Easting	Northing	Elevation
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9005	526475.579	317384.633	2.476
9006	526565.491	317394.261	3.009



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NOTES:
ALL SEWERS TO BE CONSTRUCTED IN ACCORDANCE WITH THE PROCEDURES AND SPECIFICATIONS OF SEWERS FOR ADOPTION 6TH EDITION (MARCH 2006).
ALL SEWERS AND LATERAL GRANS WITHIN DOMESTIC CURTLAGE OF DIAMETER 100mm TO BE EITHER CLAY PIPES EXTRA STRENGTH OR PVC-U TO BS EN 1401:1:1996 & BS 4886:2000.
ALL PREWORK TO BE LAID SOFFIT TO SOFFIT UNLESS OTHERWISE STATED.
ALL HIGHWAY DRAINAGE PIPES TO BE TYPICAL WITH CLASS 5 BEDDING (14mm - 5mm GRAVEL BED & SURROUND UNLESS DENOTED OTHERWISE). CONCRETE PROTECTION PROVIDED WHERE THE PIPE CROSSES A VEHICULAR SURFACE AND COVER IS LESS THAN 1.2m.
PRECAST CONCRETE PRODUCTS AND IN-SITU CONCRETE TO CONTAIN A MINIMUM CLASS 3 S.R.C. STRUCTURAL CONCRETE TO BE IN ACCORDANCE WITH BS 5329 AND NOT TO BE LESS THAN GRADE F202 WHEN REINFORCED AND GEND IN ALL OTHER SITUATIONS.
CAST CONCRETE SHALL BE FINISHED TO PRODUCE A FAIR SURFACE WHERE EXPOSED AND SHALL HAVE A TROUGH FINISH IN ALL OTHER SITUATIONS. FINISHES AS DEFINED IN CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY - 5TH EDITION.
STEELWORK SHALL BE IN ACCORDANCE WITH BS4449.
NO PRIVATE SURFACE WATER SHALL DISCHARGE ON TO THE ADJOINING HIGHWAY.
NO PRIVATE STRUCTURAL FEATURES SHALL OVERHANG THE ADJOINING HIGHWAY.
NO PRIVATE RETAINING WALLS EXCEEDING 1.37m SHALL BE WITHIN 3.66m OF THE HIGHWAY BOUNDARY.

Domestic Curtilage Drainage Notes

Plot 1 DENOTES PLOT NUMBER
3.300 DENOTES SUGGESTED FINISHED FLOOR LEVEL (AS PER FRA RECOMMENDATION)
(2.80) DENOTES EXISTING GROUND LEVEL.
100mm Ø (min 1.80) SURFACE WATER HOUSE DRAIN (PRIVATE).
100mm Ø (min 1.80) FOUL WATER HOUSE DRAIN (PRIVATE).
SVP SVP ADAPTOR
WA WASH BASIN WASTE ADAPTOR
BAG BACK INLET GULLY
RE RODDING EYE
POLYPROPYLENE ACCESS CHAMBER (PRIVATE) - FOUL
POLYPROPYLENE MINI ACCESS CHAMBER (PRIVATE) - FOUL
POLYPROPYLENE ACCESS CHAMBER (PRIVATE) - STORM
POLYPROPYLENE MINI ACCESS CHAMBER (PRIVATE) - STORM
POLYPROPYLENE ACCESS CHAMBERS (TYPE 3) TO BE USED UP TO 3m DEEP.
POLYPROPYLENE ACCESS CHAMBERS (TYPE 4) TO BE USED UP TO 2m DEEP SERVING MAX 3 PLOTS.
ALL CHAMBERS ON SEWERS AND LATERALS WITHIN GARDEN AREAS, FOOTWAYS AND DRIVEWAYS TO BE FITTED WITH BS EN 124 GRATE B/W COVERS.
CHAMBERS WITHIN PARKING COURTYARDS TO BE FITTED WITH BS EN 124 GRATE D AND COVERS.
CHAMBERS WITHIN FOOTWAYS AND PARKING COURTYARDS TO BE PROVIDED WITH 150mm DEEP C20 CONCRETE COLLAR.
WHERE CHAMBERS ARE WITHIN 1.2m OF ANY BUILDING AND THE INVERT LEVEL OF THE CHAMBER IS MORE THAN 800mm DEEP ENSURE BUILDING FOUNDATION IS LOCALLY DEEPENED SO THAT BOTTOM OF FOUNDATION IS 150mm BELOW CHAMBER INVERT LEVEL.
DOMESTIC DRAINAGE TO BE Laid UPVC OR CLAY.
100mm Ø DOMESTIC DRAINAGE TO BE Laid NO FLATTER THAN 1:80 GRADIENT.

Impermeable Area Schedule.

- Development Site (this application).
Total Area = 0.391 Ha.
Proposed Ai = 0.000 Ha. (all areas to infiltration)
- Domestic Curtilage Roof Areas (4 dwellings).
Ai = 0.071 Ha. (18%) plus 6% development creep Ai = 0.075 Ha (19%)
to be connected to permeable driveways sub base reservoir layer to infiltration.
Based on 5.59x10-6ms rate and 1% CBR (as per report C15078).
- Domestic Curtilage Individual Driveways (load category 1).
Ai = 0.059Ha. (6%)
To be paved with gravel to infiltration.
Based on 5.59x10-6ms rate and 1% CBR (as per report C15078).
- Domestic Curtilage Communal Driveway.
Ai = 0.050 Ha. (13%)
To be paved with permeable tarmac to infiltration.
Based on 5.59x10-6ms rate and 1% CBR (as per report C15078).
Sub base reservoir layers of individual driveways and communal driveway linked to provide one large infiltration structure.
Sub base reservoir layers designed to cater for 100 year plus 40% climate change events without exceedence. NB Sub base reservoir layers can be reduced in depth by incorporating cellular crate storage if preferred.

NOTE:
AS THE DEVELOPMENT IS LESS THAN 1 HECTARE AND LESS THAN 10 PLOTS IT IS NOT CLASSED AS A MAJOR DEVELOPMENT AND SuDS LEGISLATION DOES NOT APPLY. ALL ROADS AND SEWERS PROPOSED FOR THIS DEVELOPMENT ARE TO REMAIN PRIVATE.
AN AWS SECTION 106 SEWER CONNECTION PERMIT WILL BE REQUIRED FOR THE CONNECTION TO THE EXISTING AWS LTD FOUL SEWER).
AN LCC HIGHWAYS WORKS LICENSE WILL BE REQUIRED FOR THE NEW VEHICULAR ACCESS CROSSING (AND STOPPING UP OF THE TWO EXISTING VEHICULAR CROSSINGS). NO ADOPTION AGREEMENTS ARE REQUIRED.



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Document 3

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Maximum depth from cover level to soffit of pipe for areas not subject to vehicle loading or areas subject to light vehicle loading = 3m, non entry.

150mm deep concrete collar

Temporarily cap chamber shaft during construction with geotextile

Joint between base and shaft and shaft components to be fitted with watertight seals

Depth between 1.0m and 2.0m from cover level to soffit of pipe

Access restricted to 350mm diameter or 300mm x 300mm

Mixed Base Polypropylene inspection chamber with additional raising pieces as required. Internal dimensions 450mm diameter

Type 1 sub base bedding

Excavation with varies depending on depth associated trench support requirements.

Base unit to have all connections with soft soil no lower than that of main pipe

600mm long rocker pipe

150mm Ø inlet >>>

150mm Ø outlet >>>

Bedding material if required

Invert of connecting pipe to be at least 50mm above that of the main pipe

Driveway / footway construction

Cover to suit BS EN 124 leading B125 - driveways & footways minimum 300mm x 300mm or 350mmØ clear opening when <1m deep maximum 300mm x 300mm or 350mmØ clear opening when >1m deep

cover to suit BS EN 124 loading B125 - driveways & footways
minimum 300mm x 300mm or 350mmØ clear opening when <1m deep
maximum 300mm x 300mm or 350mmØ clear opening when >1m deep

150mm Topsoil and surf / turf

Access opening restricted to 350mm diameter or 300mm x 300mm

Mixed Base Polypropylene inspection chamber with additional raising pieces as required.
Internal dimensions 475mm diameter.

Type 1 sub base backfill.
Excavation width varies depending on depth and associated trench support requirements.

Base unit to have all connections with soffit level set no lower than that of main pipe.
600mm long rock pipe.

Depth between 1.0m and 2.0m cover level = soffit of pipe

Joints between base and shaft and shaft components to be fitted with watertight seals

Temporarily cap chamber shaft during construction with geotextile

150mm Ø inlet >>>

150mm Ø outlet >>>

Bedding material if required

Invert of connecting pipe to be at least 50mm above that of the main pipe.

Maximum depth from cover level to soffit of pipe for areas not subject to vehicle loading or areas subject to light vehicle loading = 2.0m, non entry.

cover to suit BS EN 124 loading B125 - driveways & footways
minimum 300mm x 300mm or 350mm Ø clear opening when <1m deep
maximum 300mm x 300mm or 350mm Ø clear opening when >1m deep

Driveway / footway construction

Access opening 300mm diameter fitted with
350mm x 350mm cover
Min Access Polypropylene inspection chamber.
Internal dimensions 300mm diameter.

Type 1 sub base backfill unit
Excavation with varies depending on depth.

Base unit to have all connections with stiff level
set no lower than that of main pipe.
600mm long rocker pipe.

Temporary cap chamber shaft
during construction with geotextile
150mm deep concrete collar

Joints between base and shaft
and shaft components to be
fitted with watertight seals

100mm Ø inlet >>>

100mm Ø outlet >>>

Bedding material
if required

Invert of connecting pipe to be at least
50mm above that of the main pipe.

The diagram illustrates the construction of a trench for a 100mm diameter pipe. The pipe is shown in cross-section, with bedding material (if required) at the bottom. The trench walls are lined with a material that has a 150mm topsoil and seed layer on top. A 300mm diameter access opening is provided, fitted with a 350mm x 350mm cover. The access is made of polypropylene inspection chamber material, with internal dimensions of 300mm diameter. The base of the access is a Type 1 sub-base (sacrificial), with an excavation width that varies depending on the depth. The base unit must have all connections with the off-site level set no lower than that of the main pipe. A 600mm long rocker pipe is also shown. The trench is covered to suit BS EN 124 loading B125 - driveways & footways, with a minimum 300mm x 300mm or 350mm Ø clear opening when <1m deep, and a maximum 300mm x 300mm or 350mm Ø clear opening when >1m deep. The joints between the base and shaft, and the shaft components, are to be fitted with watertight seals. The trench is temporarily capped during construction with geotextile.

cover to suit BS EN 124 loading B125 - driveways & footways
 minimum 300mm x 300mm or 350mm Ø clear opening when <1m deep
 maximum 300mm x 300mm or 350mm Ø clear opening when >1m deep

150mm Topsoil and seed / turf

Access opening 300mm diameter fitted with 350mm x 350mm cover
 Min Access Polypropylene inspection chamber.
 Internal dimensions 300mm diameter.
 Type 1 sub-base (sacrificial)
 Excavation width varies depending on depth.

Base unit to have all connections with offsite level set no lower than that of main pipe.
 600mm long rocker pipe.

100mm Ø inlet >>>

100mm Ø outlet >>>

Bedding material if required

Invert of connecting pipe to be at least

Temporarily cap chamber shaft during construction with geotextile

Joints between base and shaft and shaft components to be fitted with watertight seals

Diagram illustrating a 45° bend in a main channel. The main flow is 100mm Ø. The bend is labeled "45° inlet = 100mm". The side inlets and outlets are labeled "PPIC Mini Access Chamber 300mm Ø with 4 x 100mm connections (as shown)". The bend is labeled "Bends of up to max 45° angle can be used on any inlet".

Where chambers are positioned on 90° corners always use the main channel by fitting a 45° bend on the inlet and outlet

Unused inlets to be sealed and watertight

Diagram illustrating the PPIC Mixed base unit with 4 x 150mm Ø connections and 2 x 100mm connections (as shown).

Key features and connections:

- Main Flow = 150mm Ø
- 45° inlet = 100mm
- 90° inlet = 150mm reduced to 100mm
- Bends of up to max 45° angle can be used on any inlet
- Use inlet adaptor and 100 mm coupling to reduce diameter from 150mm to 100mm
- PPIC Mixed base unit with 4 x 150mm Ø connections and 2 x 100mm connections (as shown)

When chambers are positioned on 90° corners always use the main channel by fitting a 45° bend on the inlet and outlet

Unused inlets to be sealed and watertight

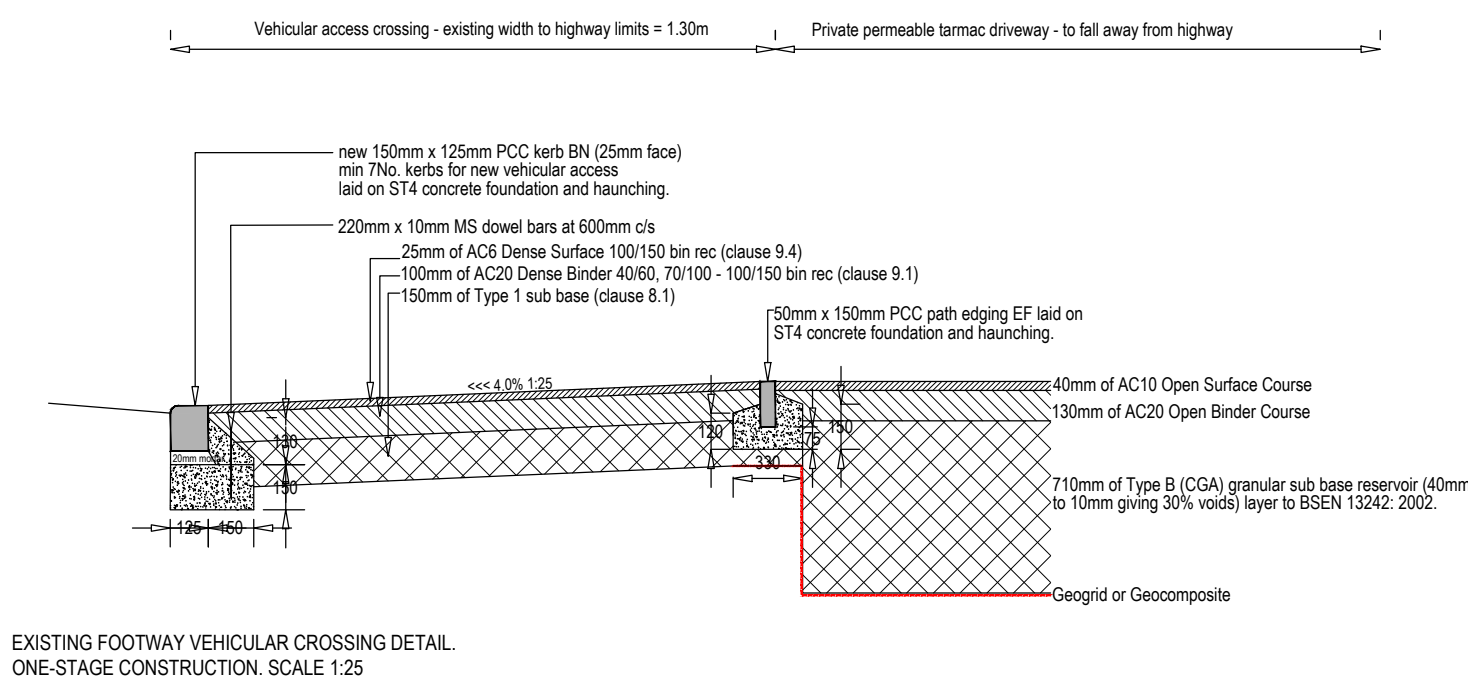


Diagram illustrating a cross-section of a combined sewerage system (CSS) installation. The diagram shows a 90° bend in the pipe, labeled "90° Bend". The pipe is connected to a "Waste pipe adaptor" and a "Waste pipe". The "F.F.L." (Finished Floor Level) is indicated. The pipe is shown with a "Short length of pipe cut to suit". The pipe is connected to a "back inlet gull (big) hopper with integral grid". The hopper is shown with a "450mm min." (minimum) depth. The hopper is connected to a "P-Trap" and a "Concrete bed". The "Bedding # required" is indicated as "600mm long". The "G.L." (Ground Level) is also shown.

gravel (40mm)

gravel (40mm)

PERMEABLE GRAVEL DRIVEWAY DETAIL

The diagram illustrates a cross-section of a driveway and its connection to a drainage system. On the left, a vertical structure represents a house or wall, with a horizontal line labeled 'F.F.L.' (Finish Floor Level) indicating the ground level. A 'rainwater pipe' is shown extending from the house down to a 'drainage ditch' on the right. The pipe is labeled 'rainwater pipe' and has an arrow pointing towards the ditch. The pipe is shown 'to direct flow to adjacent permeable surface'. The driveway surface is shown as a layer of gravel or stones, labeled 'driveway level to fall away from house'. Below the driveway surface is a 'permeable surface' (likely a gravel layer) and a 'drainage ditch' (a trench filled with gravel). The ditch is labeled 'drainage ditch' and 'drainage ditch to house and driveway'. The ditch is shown 'to direct flow to adjacent permeable surface'.

[illegible]

Diagram illustrating the minimum cover depths for trench walls.

minimum cover depths.
 350mm in garden areas not subject to vehicle loadings.
 500mm in driveways and parking areas not subject to vehicle loadings.

The diagram shows a cross-section of a trench with various layers and dimensions. Key dimensions include 100mm for the top layer, 100mm for the trench wall, 150mm for the trench bottom, and 1200mm for the trench width. A 45-degree angle is indicated for the trench wall.

The diagram is divided into three regions:

- not permitted** (top region)
- permitted location where pipe $\leq$ DN150 (trench walls should be entirely in permitted area)** (middle region)
- permitted location (trench walls should be entirely in permitted area)** (bottom region)

Additional labels include "Foundation (eg strip, raft, trench fill)", "not normally permitted (consult the Undertaker)", and "not permitted" (bottom left).

Figure 1: Typical trench wall and foundation details. The diagram illustrates the required dimensions and construction for trench walls and foundations. Key features include:

- Dimensions:**
 - Maximum trench depth: 850mm
 - Minimum trench width: 100mm
 - Minimum distance between trench walls: 100mm
 - Minimum distance between trench walls for dual pipe: 1100mm
 - Minimum distance between trench walls for single pipe: 900mm
- Foundation Types:**
 - Trench fill foundation
 - Trench walls
 - Strip foundation
- Permitted Area:** A shaded area indicating the permitted location where pipe < DN150 trench walls should be entirely in the permitted area.
- Not Permitted:** Areas where trench walls or foundations are not permitted, such as within the trench fill or strip foundation.

Permeable communal domestic curtilage driveways (tarmac)

2000 x 150 mm tarmac paving
 150mm of ACC open binder course above
 75mm of Type 8 GCA granular sub-base material (40mm to 10mm passing 30% voids) (see BS EN 12424: 2002, should specify material by supplier to achieve design voids then this shall be Type 8 GCA granular sub-base)
 Base of sub-base material layer finished with gravel or geotextile to prevent migration of fines
 Perimeter treated with flush 50mm x 150mm PCC path edging on ST14 concrete foundation
 CONSTRUCTION THICKNESSES BASED ON CONSTRUCTION CHART 1 OF LINCOLNSHIRE COUNTY COUNCIL DEVELOPMENT ROAD SPECIFICATION AND CONSTRUCTION MAY NOT BE SUITED TO SOFTEN PERMEABLE TARMAC MATERIALS. CONSTRUCTION CHART 1 IS USED FOR ALL ESTATE ROADS IN THE COUNTY UP TO 220 MSA (million standard axles) AND IS SUITABLE FOR REDUCED VARIATION LOADS (FREE TRUCKING AND THE LIKE)

50mm x 150mm PCC path edging EF laid on ST14 concrete foundation and haunching

4500 nominal width between edgings

2800 finished driveway level

make up levels to suit.

2.50m existing ground level

2.20m existing topsoil

1.90m percolation testing level

50mm x 150mm PCC path edging EF laid on ST14 concrete foundation and haunching

make up levels to suit.

BASED ON 1% CBR & 59x10-6ms INFILTRATION RATE.

For 1:100 year plus 40% climate change event the sub base reservoir layer will fill to a depth of 556mm with a 255 minutes 50% drain down time.

Sub base reservoir layer is 740mm thick therefore percolation

Diagram illustrating the roof water collection system components and dimensions:

- Round Ductile Iron cover & frame secured with clips supplied (300mm x 450mm)
- Polypropylene inspection chamber raising pieces
- 100mm Ø pipe collecting roof water
- 100mm Ø pipe to sub base reservoir
- 150mm FN concrete base
- Pipe to extend 450mm into reservoir layer of permeable driveway with pipe end wrapped in 2mm mesh to prevent migration of type 3 sub-base

ROOF FINISH

GULLY GIRD TO BS EN 124 CLASS D 400 AS PER CLAUSE 5.9.4

MINIMUM COURSES STANDARD SQUARE PCC SEATING BIRDS TO BS9111+000

STOPPED ROOFING EYE AND CHAIN

16mm COMPRESSIBLE FILLER EXPANSION JOINT

BULWIM IMPREGNATED INSULATING BOARD TO BS EN 120 AND BS EN 317) OR SIMILAR APPROVAL

750 min

450 Ø

GULLY LATERALS NOT TO EXCEED 150mm IN LENGTH 150mm THICK ST4 (C16/20) CONCRETE SURROUND TO OUTLET PIPE FOR FIRST METRE UNDER VERGE OR TOTAL LENGTH UNDER CARBARRWAY

150mm ST4 (C16/20) CONCRETE SURROUND WITH SS CEMENT

Document 4

HALL infrastructure **DESIGN** Ltd

Silverdale, 116 Humberston Avenue, Humberston, North East Lincs DN36 4SU

Tel: 01472 814137 Email: hall.design@btinternet.com Website: sites.google.com/site/hallinfrastructuredesign

Registered in England No 7053336 VAT No 124 7735 11

Hall Infrastructure Design Ltd		Page 1
116 Humberston Avenue Humberston North East Lincs DN36 4SU	permeable driveway with roofs rear of No 75 Backgate, Cowbit	
Date 08/12/2020	Designed by GWH	
File plots 1 to 4 driveway with Causeway	Checked by GWH Source Control 2020.1	

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 255 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m ³)	Status
15 min Summer	2.186	0.266	2.8	39.9	O K
30 min Summer	2.267	0.347	2.8	52.1	O K
60 min Summer	2.340	0.420	2.8	63.0	O K
120 min Summer	2.390	0.470	2.8	70.5	O K
180 min Summer	2.398	0.478	2.8	71.7	O K
240 min Summer	2.391	0.471	2.8	70.6	O K
360 min Summer	2.369	0.449	2.8	67.3	O K
480 min Summer	2.347	0.427	2.8	64.1	O K
600 min Summer	2.325	0.405	2.8	60.8	O K
720 min Summer	2.304	0.384	2.8	57.5	O K
960 min Summer	2.262	0.342	2.8	51.3	O K
1440 min Summer	2.186	0.266	2.8	39.9	O K
2160 min Summer	2.093	0.173	2.8	25.9	O K
2880 min Summer	2.027	0.107	2.8	16.0	O K
4320 min Summer	1.969	0.049	2.8	7.4	O K
5760 min Summer	1.960	0.040	2.2	5.9	O K
7200 min Summer	1.953	0.033	1.9	5.0	O K
8640 min Summer	1.948	0.028	1.6	4.3	O K
10080 min Summer	1.945	0.025	1.4	3.8	O K
15 min Winter	2.221	0.301	2.8	45.2	O K
30 min Winter	2.314	0.394	2.8	59.1	O K
60 min Winter	2.399	0.479	2.8	71.8	O K
120 min Winter	2.461	0.541	2.8	81.1	O K
180 min Winter	2.476	0.556	2.8	83.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Time-Peak (mins)
15 min Summer	130.939	0.0	21
30 min Summer	85.941	0.0	36
60 min Summer	53.779	0.0	64
120 min Summer	32.554	0.0	122
180 min Summer	23.966	0.0	180
240 min Summer	19.180	0.0	214
360 min Summer	13.913	0.0	274
480 min Summer	11.087	0.0	338
600 min Summer	9.290	0.0	408
720 min Summer	8.036	0.0	474
960 min Summer	6.389	0.0	608
1440 min Summer	4.617	0.0	868
2160 min Summer	3.331	0.0	1232
2880 min Summer	2.640	0.0	1560
4320 min Summer	1.899	0.0	2204
5760 min Summer	1.502	0.0	2936
7200 min Summer	1.252	0.0	3664
8640 min Summer	1.078	0.0	4408
10080 min Summer	0.950	0.0	5104
15 min Winter	130.939	0.0	21
30 min Winter	85.941	0.0	35
60 min Winter	53.779	0.0	64
120 min Winter	32.554	0.0	120
180 min Winter	23.966	0.0	176

Hall Infrastructure Design Ltd		Page 2
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Source Control 2020.1		

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	2.472	0.552	2.8	82.8	O K
360 min Winter	2.442	0.522	2.8	78.3	O K
480 min Winter	2.414	0.494	2.8	74.1	O K
600 min Winter	2.383	0.463	2.8	69.4	O K
720 min Winter	2.350	0.430	2.8	64.6	O K
960 min Winter	2.287	0.367	2.8	55.0	O K
1440 min Winter	2.171	0.251	2.8	37.6	O K
2160 min Winter	2.037	0.117	2.8	17.6	O K
2880 min Winter	1.970	0.050	2.8	7.5	O K
4320 min Winter	1.956	0.036	2.0	5.4	O K
5760 min Winter	1.949	0.029	1.6	4.3	O K
7200 min Winter	1.944	0.024	1.3	3.6	O K
8640 min Winter	1.941	0.021	1.2	3.1	O K
10080 min Winter	1.938	0.018	1.0	2.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	19.180	0.0	232
360 min Winter	13.913	0.0	294
480 min Winter	11.087	0.0	368
600 min Winter	9.290	0.0	444
720 min Winter	8.036	0.0	518
960 min Winter	6.389	0.0	662
1440 min Winter	4.617	0.0	926
2160 min Winter	3.331	0.0	1264
2880 min Winter	2.640	0.0	1480
4320 min Winter	1.899	0.0	2204
5760 min Winter	1.502	0.0	2928
7200 min Winter	1.252	0.0	3672
8640 min Winter	1.078	0.0	4368
10080 min Winter	0.950	0.0	5136

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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	0.403	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.183

Time (mins) Area			Time (mins) Area		
From:	To:	(ha)	From:	To:	(ha)
0	4	0.108	4	8	0.075

Hall Infrastructure Design Ltd		Page 4
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Causeway	Source Control 2020.1	

Model Details

Storage is Online Cover Level (m) 2.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.02012	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	100.0
Max Percolation (l/s)	138.9	Slope (1:X)	0.0
Safety Factor	1.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	1.920	Membrane Depth (m)	170

Document 5

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Registered in England No 7053336 VAT No 124 7735 11

**Pre-Planning
Assessment Report**

**LAND REAR OF 75 BACKGATE, COWBIT, SPALDING, LINCS. PE12 6AP
143347/92000479/1/0040225**

Section 1: Proposed development

Thank you for submitting a pre-planning enquiry. This has been produced for BROADGATE HOMES LTD DART. Your reference number is **143347/92000479/1/0040225**. If you have any questions upon receipt of this report, please contact the Pre-Development team on 03456 066087 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
Dwellings	4

The anticipated residential build rate is:

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12
Build rate	4	0	0	0	0	0	0	0	0	0	0	0

Site grid reference no.

TF2650317371

Development type

Greenfield

Planning application status

Unknown

The comments contained within this report relate to the public water mains and sewers indicated on our records. Your attention is drawn to the disclaimer in the useful information section of this report.

Section 2: Assets affected

Our records indicate that we have the following types of assets within or overlapping the boundary of your development site as listed in the table below.

Additionally, it is highly 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. We are unable to permit development either over or within the easement strip without our prior consent. The extent of the easement is provided in the table below. Please be aware that the existing water mains/public sewers should be located in highway or open space and not in private gardens. This is to ensure available access for any future maintenance and repair and this should be taken into consideration when planning your site layout.

Water and Used water easement information		
Asset type	Pipe size (mm)	Total easement required (m)
Water mains	50	4.50 m either side of the centre line
Sewer mains	150	3.00 m either side of the centre line
Sewer mains	150	3.00 m either side of the centre line
Sewer mains	150	3.00 m either side of the centre line

If it is not possible to avoid our assets then these may need to be diverted in accordance with Section 185 of the Water Industry Act (1991). You will need to make a formal application if you would like a diversion to be considered.

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 localised reinforcement mains to enable us to provide water to your development site.

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

The water supply to the proposed development site can be provided from the existing mains. Anglian Water cannot reserve capacity and therefore you are recommended to formally apply for a connection at your earliest convenience. Please note that available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

Connection point(s)

Connection Point
CP-0578

Address
Backgate Cowbit

National Grid Reference (NGR)
TF2656817397

Water Infrastructure & Costs

As a result of the recent charging rules published by Ofwat, our charging regime has changed. Your development site will be required to pay a Zonal charge for each new property connecting to our water supply network that benefits from Full planning permission.

Payment of the Zonal charge must be made before premises are connected to our water supply network. More information on the Zonal charge can be found at <http://www.anglianwater.co.uk/developers/charges>

The Zonal charge consists of two elements. The first is called the 'Fixed Element' which is the same in nature to the Infrastructure charge applied prior to April 2018. The second is called the 'Variable Element' which may vary each financial year.

The elements are combined together to create the 2018/19 Zonal charge for Water:

Fixed Element	£ 370
Variable Element	£ 88.50

In most circumstances zonal charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage). However, if the new connection is to non-household premises, the fixed element is calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge. Details of the relevant multiplier for each fitting can be found at our web-page: <http://www.anglianwater.co.uk/developers/charges/>

The total Zonal charge payable for your site for Water is:

Zonal charge per new connection - Water	No. Of Units	Total amount payable
£ 458.50	4	£ 1,834.00

The estimated* Onsite Water Mains cost for your site is:

Estimated Onsite Water Mains	
Onsite water mains costs	£ 288.00

*A detailed cost breakdown will be provided on receipt of a formal application for a new water main.

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 <http://www.anglianwater.co.uk/developers/self-lay>.

You will also need to budget for connection costs. 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 <http://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 this development is in the catchment of Cowbit Water Recycling Centre, which currently does not have capacity to treat the flows from your development site. Anglian Water are obligated to accept the foul flows from your development with the benefit of planning consent and would therefore take the necessary steps to ensure that there is sufficient treatment capacity should the planning authority grant planning permission.

Used water network

Our assessment has been based on development flows connecting to the nearest foul water sewer of the same size or greater pipe diameter to that required to drain the site. The infrastructure to convey foul water flows to the receiving sewerage network is assumed to be the responsibility of the developer. Conveyance to the connection point is considered as Onsite Work and includes all work carried out upstream from the point of connection, including making the connection to our existing network. This connection point has been determined in reference to the calculated discharge flow and on this basis, a 150mm internal diameter pipe is required to drain the development site. The nearest practicable connection is to the 150mm diameter sewer at manhole 4301 located on the Western boundary of the site at National Grid Reference NGR TF2643817380. The cover level is 3.15m and the invert level is 0.94m. Anglian water has assessed the impact of gravity flows from the 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. Please note that Anglian Water will request a suitably worded condition at planning application stage to ensure this strategy is implemented to mitigate the risk of flooding.

It is assumed that the developer will provide the necessary infrastructure to convey flows from the site to the network. Consequently, this report does not include any costs for the conveyance of flows.

Surface water disposal

You indicated on the Pre-Planning Application form that a connection to the public surface water sewer network is not required as infiltration and a connection to a watercourse is to be utilised. A new surface water sewer can be used as a mechanism to discharge 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. Therefore a capacity assessment has not been made on the public surface water network. However, should this situation change and you wish to have a surface water connection assessment on the local network, then we will provide this free of charge if requested within 12 months of this report and you are able to provide the relevant evidence that your original strategy was unviable.

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>

The proposed method of surface water disposal is not relevant to Anglian Water; we suggest that you contact the relevant Local Authority, Lead Local Flood Authority, the Environment Agency or the Internal Drainage Board, as appropriate.

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

As a result of the recent charging rules published by Ofwat, our charging regime has changed. Your development site will be required to pay a Zonal charge for each new property connecting to the public sewer that benefits from Full planning permission.

Payment of the Zonal charge must be made before premises are connected to the public sewer. More information on the Zonal charge can be found at <http://www.anglianwater.co.uk/developers/charges>

The Zonal charge consists of two elements. The first is called the 'Fixed Element' which is the same in nature to the Infrastructure charge applied prior to April 2018. The second is called the 'Variable Element' which may vary each financial year.

The elements are combined together to create the 2018/19 Zonal charge for Sewerage:

Fixed Element	£ 370
Variable Element	£ 101

In most circumstances zonal charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage). However, if the new connection is to non-household premises, the fixed element is calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge. Details of the relevant multiplier for each fitting can be found at our web-page: <http://www.anglianwater.co.uk/developers/charges/>

The total Zonal charge payable for your site for Sewerage is:

Zonal charge per new connection - Sewerage	No. Of Units	Total amount payable
£ 471	4	£ 1,884.00

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 connection costs. Please note that we offer alternative types of connections depending on your needs and these costs are available at our website.

Section 5: Map of Proposed Connection Points

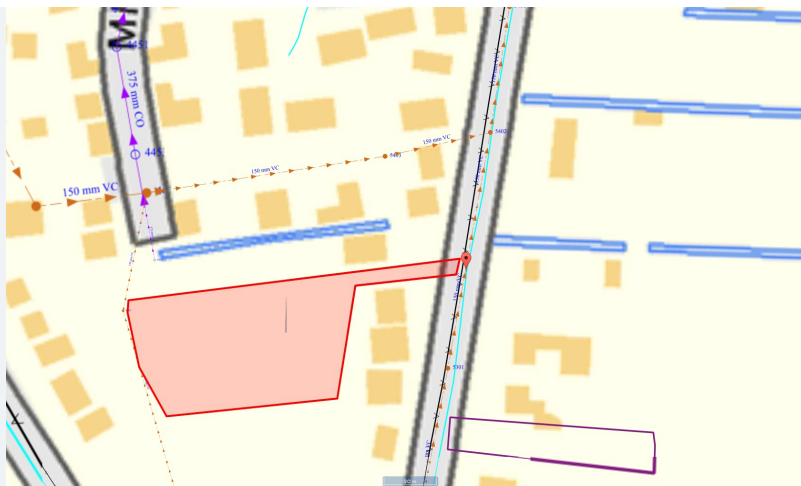


Figure 1: Showing your water point of connection



Figure 2: Showing your used water point of connection

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.uk/developers> or via our Development Services team on 03456 066087.

Details on how you can make a formal application for a new water main, new connection or diversion are available on from our Development Services team on 03456 066087 or via our website at <http://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 Development Services team at: Developer Services, Anglian Water, PO Box 495, Huntingdon, PE29 6YY or Telephone: 0345 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 minute 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 <https://www.lr.org/en/utilities/water-industry-registration-scheme-wirs-wirsae/search/>

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 <http://www.anglianwater.co.uk/developers> or via our Development Services team on 03456 066087.

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 . 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: <http://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 in this report is based on data currently held by Anglian Water Services Limited ('Anglian Water') or provided by a third party. Accordingly, the information in this report is provided with no guarantee of accuracy, timeliness, completeness and is without indemnity or warranty of any kind (express or implied).

This report should not be considered in isolation and does not nullify the need for the enquirer to make additional appropriate searches, inspections and enquiries. Anglian Water supports the plan led approach to sustainable development that is set out in the National Planning Policy Framework ('NPPF') and any infrastructure needs identified in this report must be considered in the context of current, adopted and/or emerging local plans. Where local plans are absent, silent or have expired these needs should be considered against the definition of sustainability holistically as set out in the NPPF.

Whilst the information in this report is based on the presumption that proposed development obtains planning permission, nothing in this report confirms that planning permission will be granted or that Anglian Water will be bound to carry out the works/proposals contained within this report.

No liability whatsoever, including liability for negligence is accepted by Anglian Water, or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content. Furthermore in no event will any of those parties be liable to the applicant or any third party for any decision made or action taken as a result of reliance on this report.

This report is valid for the date printed and the enquirer is advised to resubmit their request for an up to date report should there be a delay in submitting any subsequent application for water supply/sewer connection(s).

Document 6

HALL infrastructure **DESIGN** Ltd

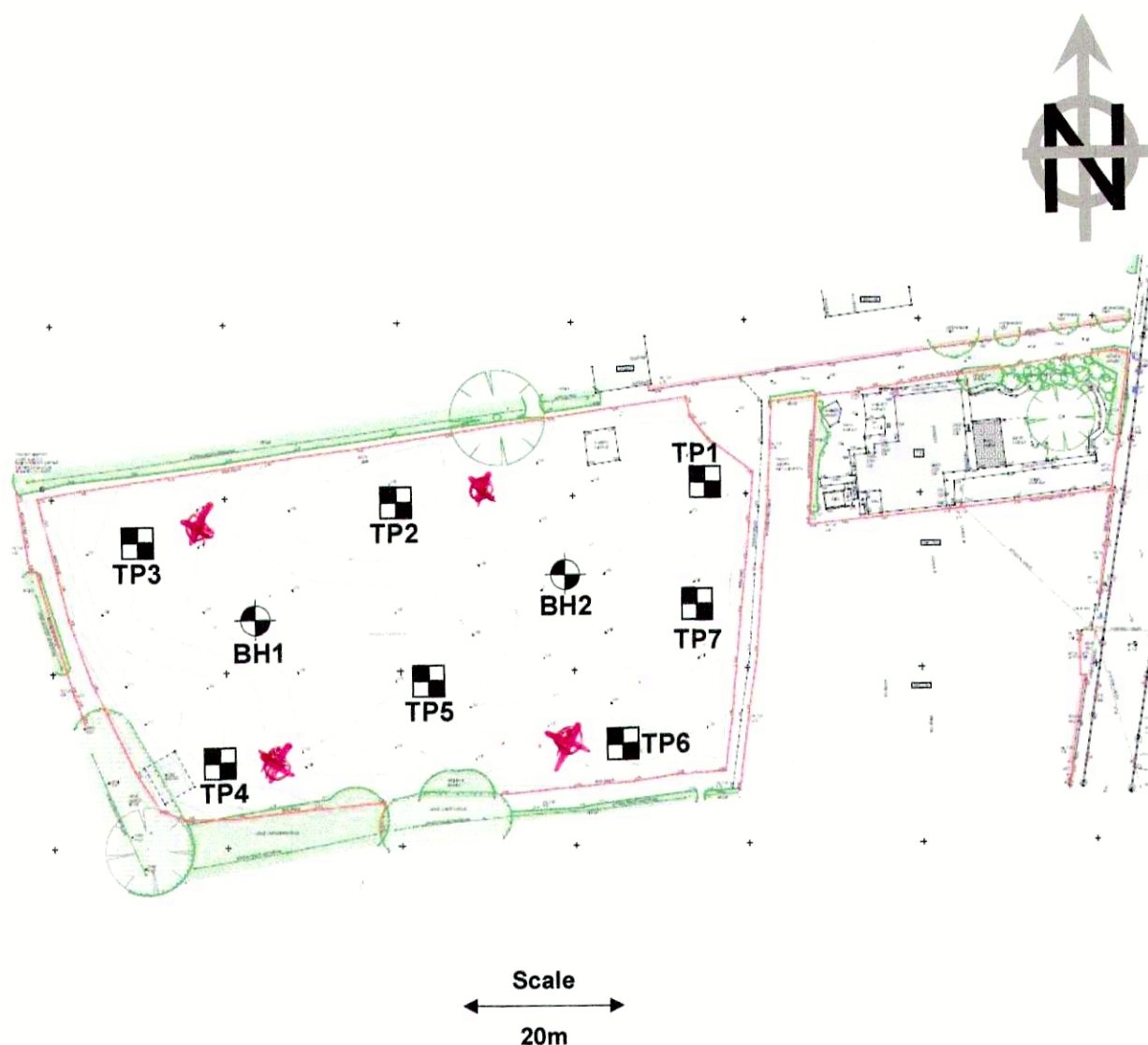
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Tel: 01472 814137 Email: hall.design@btinternet.com Website: sites.google.com/site/hallinfrastructuredesign

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Exploratory Hole Location Plan

Figure 2



KEY



Cable Percussion Boreholes BH1 & BH2



Trial Pits TP1 to TP7

Project : Land to the Rear of 75 Backgate, Cowbit,
Spalding

Client : Broadgate Homes Limited

GROUND
ENGINEERING
LIMITED

Peterborough Tel : 01733 566566

Project No.

C15078

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

Date: 20/11/20

TRIAL PIT
TP8

Ground
Level:

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental 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 at least 0.60m depth 2. Pit dry 3. Pit sides stable	Project No 15078A	
		Scale 1:25	Page 1/1

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

Date: 20/11/20

TRIAL PIT
TP9

Ground
Level:

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental 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 at least 0.60m depth 2. Pit dry 3. Pit sides stable		Project No 15078A	
			Scale	Page
			1:25	1/1

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

Date: 20/11/20

TRIAL PIT
TP10

Ground
Level:

KEY	
D	- Disturbed Sample
B	- Bulk Sample
U	- Undisturbed Sample
R	- Root Sample
W	- Water Sample
ES	- Environmental 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 at least 0.60m depth
2. Pit dry
3. Pit sides stable

Project No
15078A

Scale	Page
1:25	1/1

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

Date: 20/11/20

TRIAL PIT
TP11

Ground
Level:

KEY D - Disturbed Sample B - Bulk Sample U - Undisturbed Sample R - Root Sample W - Water Sample ES - Environmental 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 at least 0.60m depth 2. Pit dry 3. Pit sides stable	Project No 15078A	
		Scale 1:25	Page 1/1

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land Rear of No.75 Backgate, Cowbit, Spalding

Client: Broadgate Homes Ltd.

Project No:C15078A

Sheet No: 1/2

Trial Pit: TP8

Depth: 0.60

Length: 1.20

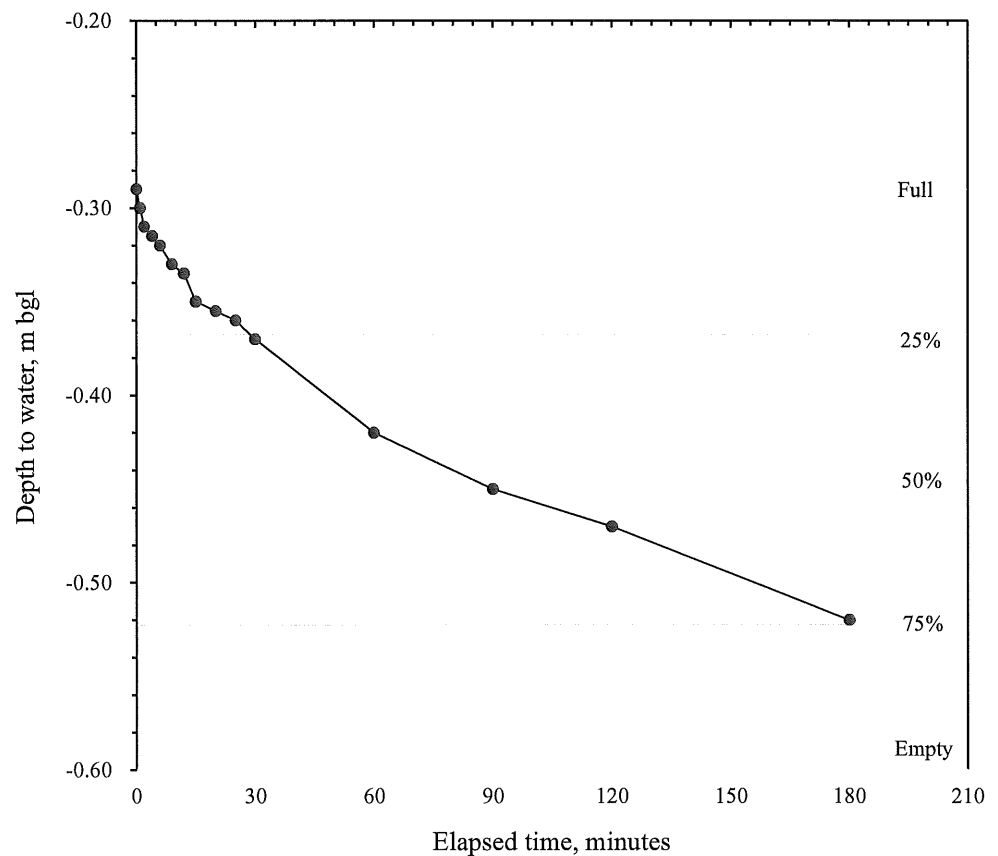
Width: 0.50

Description of Stratum under test: Firm, grey and orange brown, slightly sandy CLAY/SILT

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0.00	0.29
1.00	0.30
2.00	0.31
4.00	0.32
6.00	0.32
9.00	0.33
12.00	0.34
15.00	0.35
20.00	0.36
25.00	0.36
30.00	0.37
60.00	0.42
90.00	0.45
120.00	0.47
180.00	0.52



All dimensions given in metres

$$f = (V75-V25)/A50(T75-T25)$$
$$V75-V25 = 0.09$$
$$A50 = 1.13$$
$$T75-T25 = 150$$

Soil Infiltration Rate

$$f = \underline{9.17E-06} \text{ m/s}$$

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land Rear of No.75 Backgate, Cowbit, Spalding
Client: Broadgate Homes Ltd.

Project No:C15078A
Sheet No: 2/2

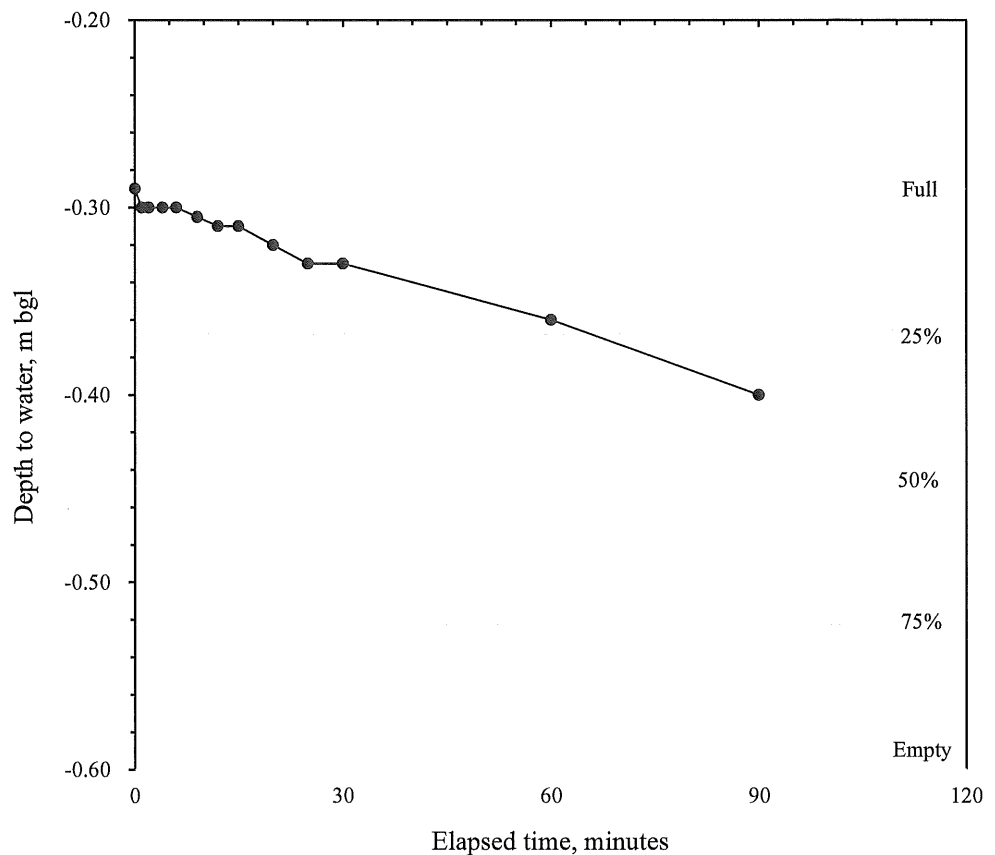
Trial Pit: TP8
Depth: 0.60
Length: 1.20
Width: 0.50

Description of Stratum under test: Firm, grey and orange brown, slightly sandy CLAY/SILT

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0.00	0.29
1.00	0.30
2.00	0.30
4.00	0.30
6.00	0.30
9.00	0.31
12.00	0.31
15.00	0.31
20.00	0.32
25.00	0.33
30.00	0.33
60.00	0.36
90.00	0.40



All dimensions given in metres

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

$$V75-V25 = 0.09$$

$$A50 = 1.13$$

$$T75-T25 = 129 \text{ (Extrapolated)}$$

$$f = \underline{1.07E-05} \text{ m/s}$$

Extrapolated Soil Infiltration Rate

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land Rear of No.75 Backgate, Cowbit, Spalding

Client: Broadgate Homes Ltd.

Project No:C15078A

Sheet No: 1/2

Trial Pit: TP9

Depth: 0.60

Length: 1.10

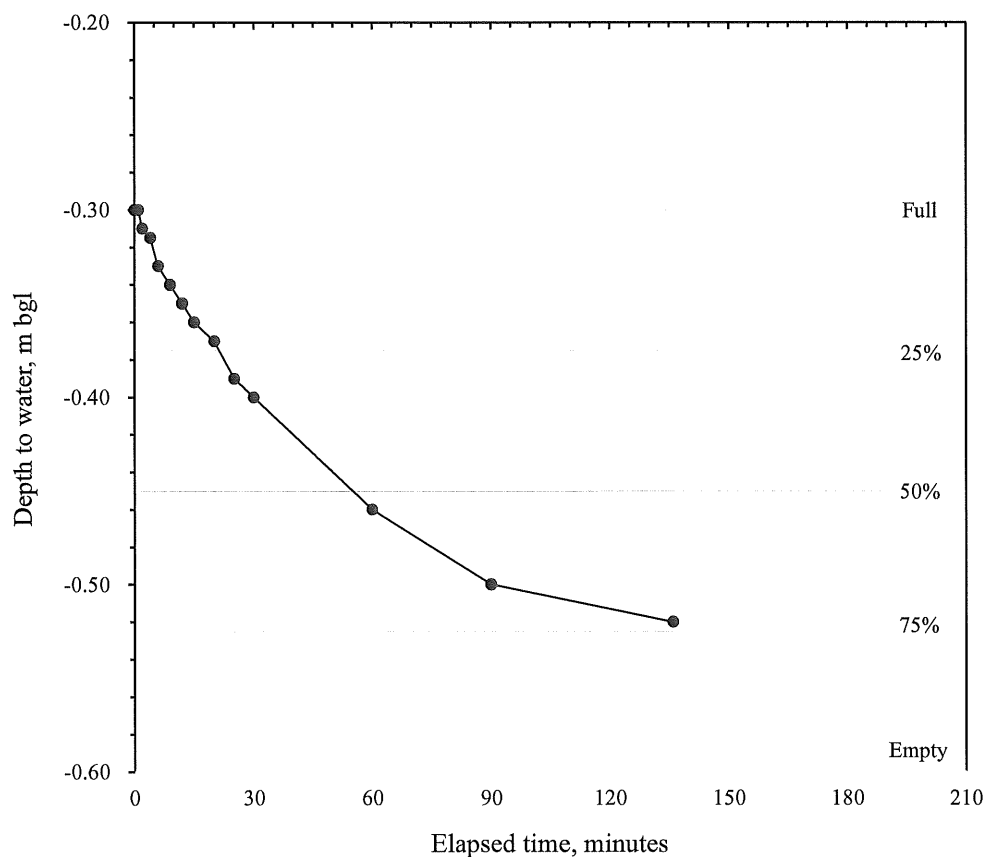
Width: 0.50

Description of Stratum under test: Soft, brown, sandy SILT

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0.00	0.30
1.00	0.30
2.00	0.31
4.00	0.32
6.00	0.33
9.00	0.34
12.00	0.35
15.00	0.36
20.00	0.37
25.00	0.39
30.00	0.40
60.00	0.46
90.00	0.50
136.00	0.52



All dimensions given in metres

$$f = (V75-V25)/A50(T75-T25)$$
$$V75-V25 = 0.08$$
$$A50 = 1.03$$
$$T75-T25 = 125$$
$$f = \underline{1.07E-05} \text{ m/s}$$

Soil Infiltration Rate

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land Rear of No.75 Backgate, Cowbit, Spalding

Client: Broadgate Homes Ltd.

Project No:C15078A

Sheet No: 2/2

Trial Pit: TP9

Depth: 0.60

Length: 1.10

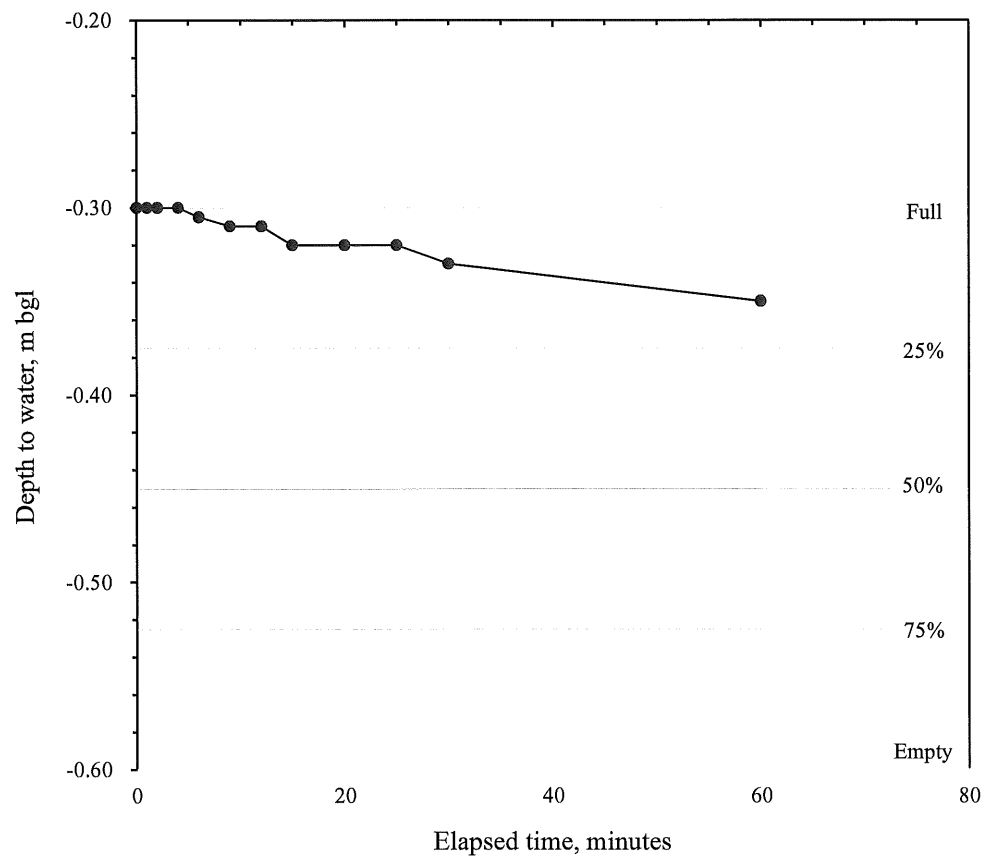
Width: 0.50

Description of Stratum under test: Soft, brown, sandy SILT

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0.00	0.30
1.00	0.30
2.00	0.30
4.00	0.30
6.00	0.31
9.00	0.31
12.00	0.31
15.00	0.32
20.00	0.32
25.00	0.32
30.00	0.33
60.00	0.35



All dimensions given in metres

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

$$V75 - V25 = 0.08$$

$$A50 = 1.03$$

$$T75 - T25 = 234 \text{ (Extrapolated)}$$

$$f = \underline{\underline{5.70E-06}} \text{ m/s}$$

Extrapolated Soil Infiltration Rate

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land Rear of No.75 Backgate, Cowbit, Spalding

Client: Broadgate Homes Ltd.

Project No:C15078A

Sheet No: 1/1

Trial Pit: TP10

Depth: 0.60

Length: 1.30

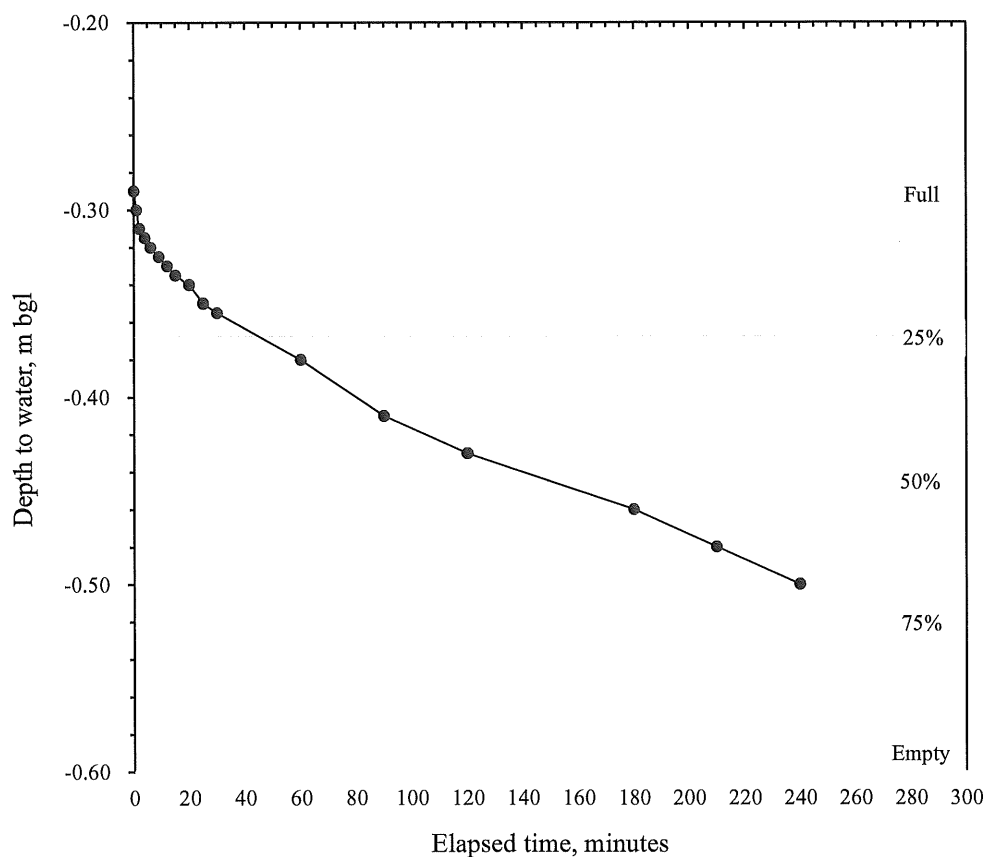
Width: 0.50

Description of Stratum under test: Soft, light brown, sandy SILT

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0.00	0.29
1.00	0.30
2.00	0.31
4.00	0.32
6.00	0.32
9.00	0.33
12.00	0.33
15.00	0.34
20.00	0.34
25.00	0.35
30.00	0.36
60.00	0.38
90.00	0.41
120.00	0.43
180.00	0.46
210.00	0.48
240.00	0.50



All dimensions given in metres

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

$$V75-V25 = 0.10$$

$$A50 = 1.21$$

$$T75-T25 = 230 \text{ (Extrapolated)}$$

Extrapolated Soil Infiltration Rate

$$f = \underline{\underline{6.04E-06}} \text{ m/s}$$

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land Rear of No.75 Backgate, Cowbit, Spalding

Client: Broadgate Homes Ltd.

Project No:C15078A

Sheet No: 1/2

Trial Pit: TP11

Depth: 0.60

Length: 1.15

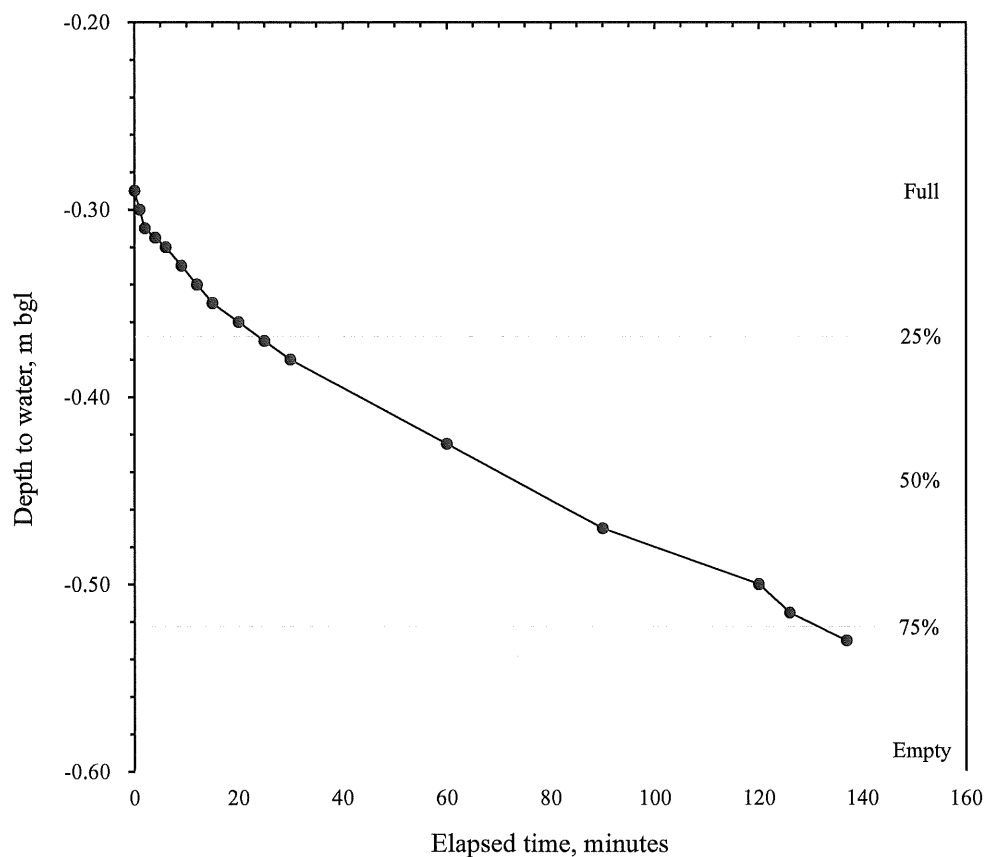
Width: 0.45

Description of Stratum under test: Soft, dark brown, slightly sandy SILT

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0.00	0.29
1.00	0.30
2.00	0.31
4.00	0.32
6.00	0.32
9.00	0.33
12.00	0.34
15.00	0.35
20.00	0.36
25.00	0.37
30.00	0.38
60.00	0.43
90.00	0.47
120.00	0.50
126.00	0.52
137.00	0.53



All dimensions given in metres

$$f = (V75 - V25) / A50(T75 - T25)$$
$$V75 - V25 = 0.08$$
$$A50 = 1.01$$
$$T75 - T25 = 101$$
$$f = \underline{1.31E-05} \text{ m/s}$$

Soil Infiltration Rate

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: Land Rear of No.75 Backgate, Cowbit, Spalding

Project No:C15078A

Client: Broadgate Homes Ltd.

Sheet No: 2/2

Trial Pit: TP11

Depth: 0.60

Length: 1.15

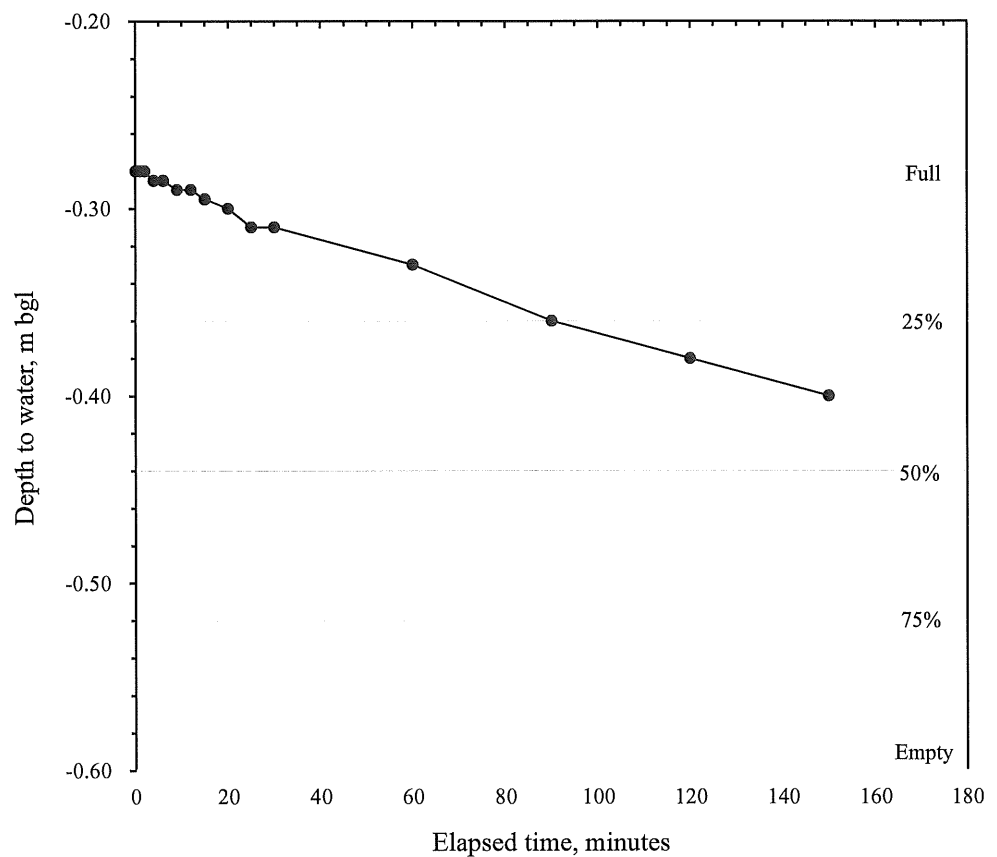
Width: 0.45

Description of Stratum under test: Soft, dark brown, slightly sandy SILT

Depth to water prior to test: Dry
(below ground level)

DEPTH TO WATER vs ELAPSED TIME

Elapsed Time min	Depth to Water m
0.00	0.28
1.00	0.28
2.00	0.28
4.00	0.29
6.00	0.29
9.00	0.29
12.00	0.29
15.00	0.30
20.00	0.30
25.00	0.31
30.00	0.31
60.00	0.33
90.00	0.36
120.00	0.38
150.00	0.40



All dimensions given in metres

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

$$V75-V25 = 0.08$$

$$A50 = 1.03$$

$$T75-T25 = 240 \text{ (Extrapolated)}$$

$$\text{Extrapolated Soil Infiltration Rate } f = \underline{5.59E-06} \text{ m/s}$$