



**BELLWAY HOMES LTD (WESSEX) & THE
BORROW FOUNDATION LTD
PADNELL GRANGE
WATERLOOVILLE**

**FLOOD RISK ASSESSMENT AND
DRAINAGE STRATEGY**

MARCH 2019



the journey is the reward

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BORROW FOUNDATION LTD
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DRAINAGE STRATEGY**

MARCH 2019

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Bellway Homes Ltd (Wessex) & The Borrow Foundation Ltd
Padnell Grange
Waterlooville
Flood Risk Assessment and Drainage Strategy

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1 Introduction

- 1.1 Mayer Brown Ltd has been commissioned by Bellway Homes Ltd & The Borrow Foundation Ltd to undertake a Flood Risk Assessment (FRA) and Drainage Strategy in support of a planning application for a proposed residential development located at Padnell Grange, Waterloooville.
- 1.2 According to the Environment Agency's (EA) indicative flood map (see Appendix A) the (approx.) 2.83 hectare site is located in a low risk Flood Zone 1 area.
- 1.3 As outlined in NPPF, for development proposals on sites comprising more than one hectare in area in a Flood Zone 1, the FRA should consider i) the vulnerability of flooding from sources other than river and sea flooding, ii) the potential to increase flood risk elsewhere through the addition of hard surfaces and iii) the effect of the new development on surface water runoff.
- 1.4 This FRA considers the impact of the proposed development in addition to the common ways in which flooding can occur. The conditions currently existing in the location of the site are described, together with the methods used to identify and assess potential impacts caused from the development proposals. The mitigation measures proposed have been identified in order to avoid and/or reduce the impacts caused by introducing the development proposals.
- 1.5 This FRA and drainage strategy has been compiled in accordance with "National Planning Policy Framework (NPPF)" published by Communities and Local Government in July 2018, "Technical Guidance to the National Planning Policy Framework" and 'CIRIA C624: Development and Flood Risk Guidance'.

2 Site Location and Description

Site Location

- 2.1 The application site is located in the north east of Waterlooville with Padnell Road running to the north and Waterlooville Golf Course to the east.
- 2.2 The site falls under the administrative boundary of Havant Borough Council. The postcode of the site is PO8 8ED and the approximate co-ordinates to the centre of the site are E469891, N111093.
- 2.3 The area surrounding the application site is predominantly residential with Waterlooville Golf Course to the east. Access is available from Padnell Road to the north.

Topography

- 2.4 The application site covers a total area of approximately 2.83 hectares and is a brownfield site, however, is predominantly soft landscaping.
- 2.5 A topographical survey was undertaken by Siteline in July 2011 (updated in July 2017) and can be seen in Appendix C. The topography of the site is gently sloping in nature with ground levels ranging between 64.00m AOD at the north west boundary to 56.00m AOD at the north east boundary.

Geology

- 2.6 A Ground Investigation Report was carried out by Soils Limited in August 2017. It identifies that the site is underlain by the Lambeth Group which typically comprises soft to firm brownish red mottled light grey slightly sandy clay (see Appendix D).

Hydrology

- 2.7 The Hermitage Stream is located approximately 0.5km south of the site. There are also some drainage ditches located to the east of the site on Waterlooville Golf course and a watercourse to the north.

Existing Drainage

- 2.8 The site generally doesn't have a surface water system. Many of the down pipes from the buildings drain straight onto the ground and run-off overland into the surrounding network of ditches.
- 2.9 In July 2017 a CCTV survey of the site was commissioned to confirm the location and condition of the network. The CCTV survey (found in full in Appendix E) confirmed the

location of the existing drainage network and that generally the condition of both the surface water and foul network was poor.

- 2.10 The CCTV Survey also shows that some of the surface water pipes run towards the southern boundary and discharge into the foul sewer network.
- 2.11 Figure 2.1, which can be found in full in Appendix H, details where the buildings on site are believed to drain to. This has mainly been based on the topography of the site.

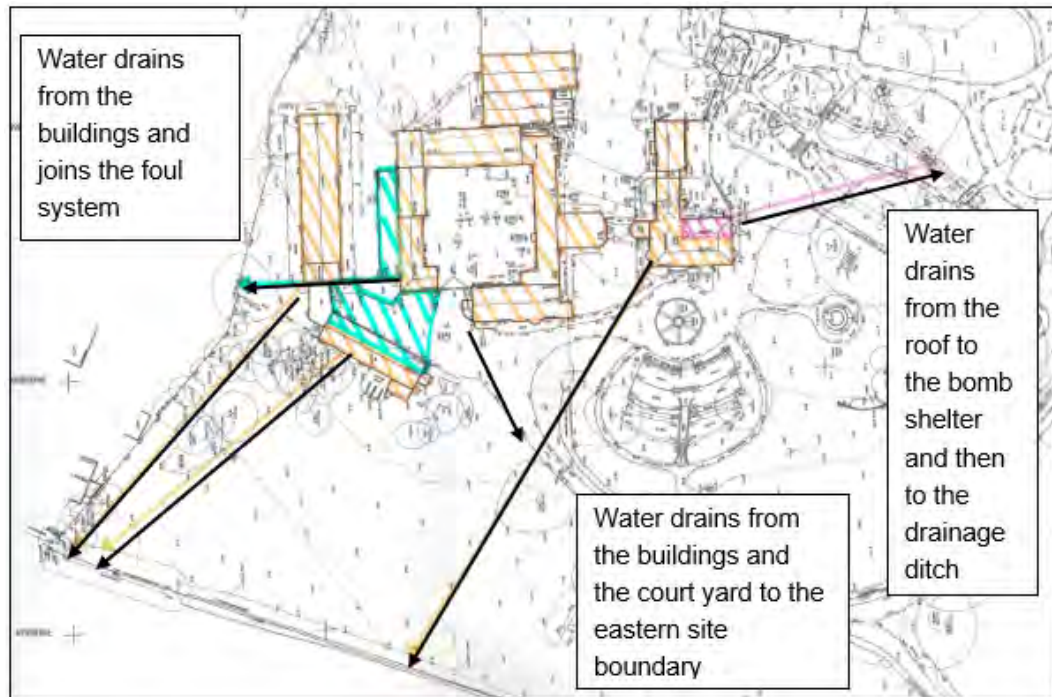


Figure 2.1: Estimated Existing Drainage

- 2.12 It is considered that the existing foul drainage serving the site discharges to the surrounding Southern Water sewer network, refer to Appendix F.

3.1 The proposed development is for 86 new residential units with associated parking and soft landscaping. Access will be via Padnell Road. Refer to Appendix G and Figure 3.1 below.



3.2 In terms of hard landscaping, below is an approximate breakdown of how the 2.83ha site will be divided:

- Buildings: 0.49ha
- Roads, car parking and associated hardstanding: 0.78ha
- Total Hard Landscaping: 1.27ha
- Total Soft Landscaping: 1.56ha
- Site Boundary: 2.83ha

3.4 The proposed surface water drainage for the development is addressed in section 5.0 of this report.

4 Flood Risk and Mitigation Measures

4.1 In theory there are five principal types/sources of flooding that could affect the proposed development. These are described below with proposed mitigation measures described where necessary.

- **Fluvial** – The site is located in a low risk Flood Zone 1. This means that it has an annual probability of <0.1% of experiencing flooding from fluvial sources. There are no mitigation measures required so it will not be addressed further in this FRA.
- **Tidal** – The site is located in a low risk Flood Zone 1. This means that it has an annual probability of <0.1% of experiencing flooding from tidal sources. There are no mitigation measures required so it will not be addressed further in this FRA.
- **Groundwater** – The Havant Borough Council SFRA has limited information on the risk of groundwater at the site. However, the Ground Investigation Report undertaken by Soils Limited concluded that groundwater was only encountered in two of the boreholes drilled at a depth of 3m. The clay layers in the Lambeth Formation form a low permeability layer (aquitard) which should stop any vertical movement of groundwater. This means that there are no mitigation measures required so it will not be addressed further in this FRA.
- **Surface Water Runoff** – The EA Surface Water Flood Map (Appendix B) indicates that parts of the site are located in an area with a low to high risk of flooding from Surface Water. The development has been designed such that natural flow paths will be maintained. Flooding from surface water is therefore considered low risk and will not be addressed further in this FRA. However, the proposed surface water drainage for the development is addressed in section 5.0 of this report.
- **Infrastructure Failure** – The SFRA does not raise flooding from infrastructure as an issue in the area. Therefore, flooding from infrastructure failure is considered a low risk and there are no mitigation measures required so it will not be addressed further in this FRA.

Flood Mechanism	Source	Flood Risk to the Development	Mitigation Required?
Fluvial	N/A	Low	No
Tidal	N/A	Low	No
Groundwater	Underlying geology and groundwater levels	Low	No
Surface Water / Overland Flow	Runoff from surrounding elevated land and highway corridors	Low-High	Natural flow paths considered in development design.
Infrastructure Failure	Surface water systems and Water mains	Low	No

Table 4.1: Flood Risk Summary

5 Proposed Surface Water Drainage

Existing Surface Water Drainage

- 5.1 The site generally doesn't have a surface water system. Many of the down pipes from the buildings drain straight onto the ground (see Figure 5.1) and run-off overland into the surrounding network of ditches.



Figure 5.1: Existing Down Pipes

- 5.2 In July 2017 a CCTV survey of the site was commissioned to confirm location and condition of the network. The CCTV survey (found in full in Appendix E) confirmed the location of the existing drainage network and that generally the condition of both the surface water and foul network was poor.
- 5.3 Figure 5.2, which can be found in full in Appendix H, details where the buildings on site are believed to drain to. This has mainly been based on the topography of the site.

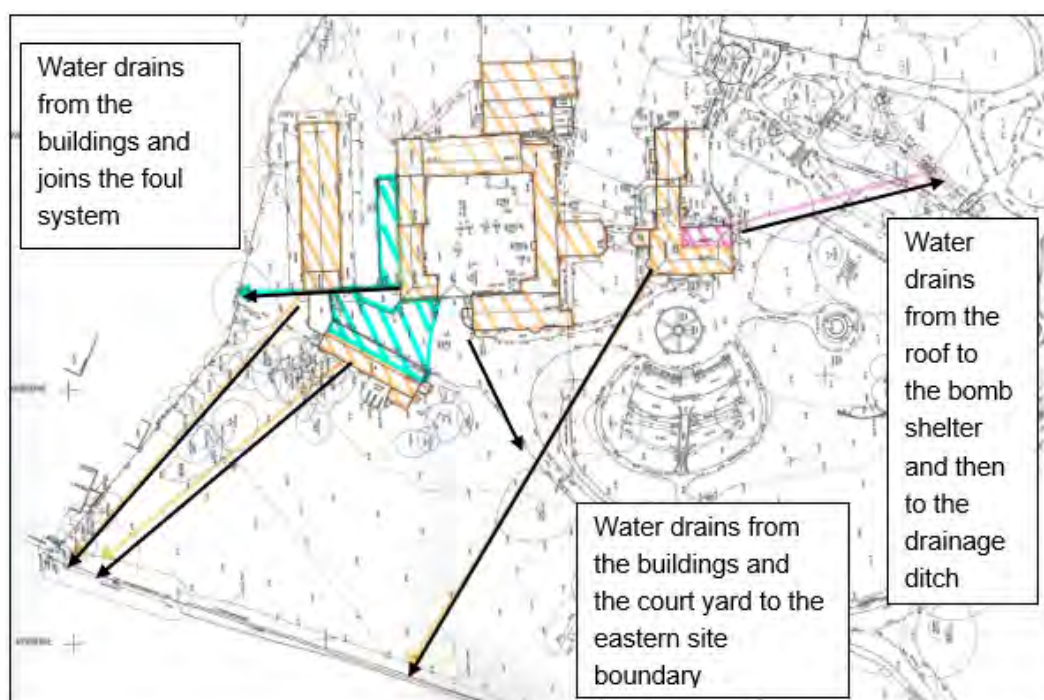


Figure 5.2: Estimated Existing Drainage Layout

Infiltration & Underlying Geology

- 5.4 A Ground Investigation Report was carried out by Soils Limited in August 2017. It identifies that the site is underlain by the Lambeth Group which typically comprises soft to firm brownish red mottled light grey slightly sandy clay which is an impermeable substance (see Appendix D).
- 5.5 Infiltration testing was attempted by Soils Limited as part of the Ground Investigation Report in two boreholes however the tests did not complete within the monitoring period.
- 5.6 It is therefore considered that infiltration drainage is not suitable at the development site.

Sustainable Drainage (SuDS) and Drainage Hierarchy

- 5.7 Hampshire County Council as the Lead Local Flood Authority (LLFA) are predominantly concerned about the quantity, rate and quality of surface water run-off leaving the development site. It is proposed that surface water leaving the development should not exceed the existing greenfield QBAR rate of flow.
- 5.8 Sustainable Urban Drainage Systems (SUDS) are a range of techniques that aim to mimic the way rainfall drains in natural systems and so reduces the hydraulic and hydrological impact on the local area and downstream catchments. There are a number of options available to impose surface water restrictions on proposed development plots such as oversized sewers, below ground storage tanks, attenuation ponds and basins, swales, permeable paving, or infiltration systems.

5.9 To determine the most sustainable method of surface water disposal the hierarchy from approved document part H was used, see below:

- **An adequate soakaway or some other adequate infiltration system** – It is considered that infiltration drainage is not possible at the application site as it is underlain by clay. This was confirmed by site specific infiltration tests, refer to Appendix D.
- **A Watercourse** – There is an existing watercourse immediately to the north of the application site.
- **A Sewer** – There is a Southern Water surface water sewer located in Cherry Tree Avenue, refer to Appendix F.

5.10 The proposed discharge location for the site is to the to the existing watercourse to the north of the application boundary, via the existing network of ditches adjacent to the northern boundary, refer to Figure 5.3 below:



Figure 5.3: Watercourse located to the north of the site

Proposed Surface Water Drainage

5.11 A proposed surface water drainage strategy has been undertaken and is contained in Appendix I.

5.12 The proposal is to restrict the discharge rates as close to the existing greenfield rate as is practicable using an attenuation tank and hydrobrake system.

Proposed Discharge Rates & Calculations

- 5.13 The existing greenfield rates from the 2.83 hectare site have been calculated using microdrainage, see below (for full calculations refer to Appendix J):
- Q1 years: 12.6l/s
 - Q30 years: 33.6l/s
 - Q100 years: 47.2l/s
 - QBAR: 14.8l/s
- 5.14 The proposed peak discharge rate will be restricted to the existing QBAR rate of 15l/s.
- 5.15 Microdrainage software has been used to replicate the proposed indicative drainage network for the development. The proposed network calculations can be found in Appendix K.
- 5.16 For the purpose of modelling the drainage strategy, 40% increase in rainfall intensity has been assumed to account for climate change. The proposed development has been designed to current best practice for both piped drainage (Part H of the Building Regulations) (Ref. 4), adoptable sewers (Sewers for Adoption 7th Edition) (Ref. 5) and Sustainable Drainage (CIRIA C753 – The SUDS Manual) (Ref. 6), and any subsequent revisions or further publications of best practice. In this way, the surface water drainage design for the site has been developed in accordance with all relevant standards and guidelines.

Urban Creep

- 5.17 In accordance with Hampshire County Council's Developer Check List (Appendix M), a 10% increase in the impermeable area of buildings has been applied to the microdrainage model to allow for urban creep.
- 5.18 This has been achieved by adding three additional dummy nodes to the microdrainage model to account for the additional building area required, the results of which can be seen in Appendix K.

Surface Water Disposal

- 5.19 The surface water from the development site will be discharged to the existing ditch along the northern boundary which in turn discharges to the existing watercourse to the north of the application boundary, refer to Appendix I for the Proposed Drainage Strategy drawing.
- 5.20 The proposed SuDS features will reduce the rate of discharge by providing storage during heavy rainfall events, reducing the risk of flooding.

5.21 A breakdown of the proposed methods for disposal of surface water run-off from the different elements of the site is as follows:

- Run-off from roofs and roads will be collected using a traditional piped network and drain into an onsite attenuation system and into the existing ditch.
- The roads and parking areas in the vicinity of existing trees will be constructed with permeable paving and a cell web subbase. This will ensure minimal impact on existing trees and provide treatment for the surface water, refer to the Drainage Strategy drawing in Appendix I for further details. Excess water that cannot infiltrate will be collected by the onsite surface water system.
- The access road will continue to discharge directly to the ditch to the north and into the watercourse. This is because no pipes or drainage kerbs can be installed in the access road due to the root protection areas, refer to Appendix I for details.
- The water will flow through a filter trench which will provide treatment to the surface water.
- The surface water from dwellings 1, 80 and 81 will discharge to a permanently wet pond prior to overflowing into the on-site attenuation system.
- A flow control chamber will restrict the flow into the existing ditch to 15l/s. Excess flows will back up into an attenuation tank.

Exceedance Flows

5.22 In the event the capacity of the proposed surface water drainage network is exceeded, the excess water will follow the topography of the ground and flow overland towards the northern and eastern boundary and into the ditch at an unrestricted rate, leaving properties unaffected, refer to Appendix L for the overland flow routes.

Surface Water Treatment

5.23 Table 26.2 of the SuDS Manual identifies the pollution hazard level associated with the land uses within the Proposed Development as being 'Low'. On a scale from 0-1 a 'Low' pollution hazard level relates to the following pollution hazard indices (See table 26.2 of the SuDS Manual). This is applicable to runoff from residential roofs, driveways, paths, residential parking areas and low traffic roads:

- Total Suspended Solids = 0.5
- Metals = 0.4
- Hydrocarbons = 0.4

5.24 Table 26.3 of the SuDS Manual sets out the indicative mitigation indices provided by different SuDS features for discharges to surface water.

Permeable Paving

- 5.25 The roads and parking areas in the vicinity of trees will be constructed using permeable paving (cellweb) allowing the rainwater falling onto permeable paved areas to be treated by the microorganisms as it passes through the drainage medium.
- 5.26 Permeable paving provides sufficient pollution mitigation for runoff from low hazard land uses and provides mitigation indices of 0.7, 0.6 and 0.7, which are in excess of the requirement set out in paragraph 5.21.

Filter Trench

- 5.27 A filter trench will also be provided as part of the proposed surface water drainage strategy and will be used to treat the surface water run-off from the site. A filter trench is a linear drain which comprises a ditch with permeable material inside for the filtration of surface water. Filter trenches can reduce pollutant levels in the surface run-off by filtering out fine sediments.

Adoption and Maintenance

- 5.28 The proposed surface water network will remain in private ownership, maintained by a Management Company organised by the Developer. This should enable tight control over the operation and maintenance of the drainage/SuDS systems on site.

Design Criteria

- 5.29 The positive drainage will be designed in accordance with Sewers for Adoption, and BS EN 752 – Drain and sewer systems outside buildings and the Building Regulations - part H (2015).
- 5.30 The surface water network design and rate of surface water runoff would be based on the Modified Rational method and designed in accordance with the Wallingford Procedure. In order to carry out the design of the networks, a number of Global Variables are used. These Global Variables/parameters are related to the location of the site in the UK and have been obtained from Maps for “design and analysis of urban storm drainage – Wallingford procedure”. These are as follows;
- Region = England & Wales
 - $M(5-60) = 19.70\text{mm}$
 - Ration (r) = 0.328
- 5.31 The positive surface water system would be designed such that:
- The pipes remain unsurcharged during the 1 in 2 year design storm;

- The system should not flood during the worst case 1 in 30 year storm with a free outfall;
- The surface water run-off from the proposed development would be contained on site for up to and including the worst case 1 in 100 year storm event, plus an additional 40% for climate change;
- The pipe velocities are such that self-cleansing is achieved at lesser more moderate storm intensities :-
 - o Pipe roughness (ks) = 0.6
 - o Minimum pipe velocity at full flow = 0.75m/s
 - o Percentage Impermeable areas:
 - Buildings = 100%
 - Carriageways, footpaths and parking = 100%
 - Private and Communal Parking = 100%

6 Proposed Foul Drainage

Existing Sewer

- 6.1 It is considered that the existing foul drainage serving the site discharges to the surrounding Southern Water sewer network, refer to Appendix F.
- 6.2 A study identified that the existing foul discharge from the Padnell Grange site was to the south towards Cherry Tree Avenue via an existing 100mm connection, and that a significant area of roof and hardstanding also drained to this sewer.

Proposed Layout

- 6.3 The proposed foul sewers serving the development will connect to the existing Southern Water foul sewer network in Cherry Tree Avenue.
- 6.4 All sewers will flow on a gravity basis (no pumps required) and flow towards to south of the site, passing through Waterloooville Golf Course (to the east) adjacent to the existing footway at the south of the site, and to the proposed connection point with the Southern Water foul sewer network in Cherry Tree Avenue. The connection point with the Southern Water network is located 180m to the south of the application site as shown on the drainage strategy drawing in Appendix I.
- 6.5 A Section 106 application to connect will be made to Southern Water in order to gain permission to connect to the public sewer.

Proposed Foul Flows

- 6.6 The application is for 86 new dwellings. Using the flow calculation of 4000l per dwelling per day, this will generate a peak flow of 3.98l/s (see below calculations).
- $6 \times \text{DWF} \times 86:$ $(4000 \times 86) / 86,400 = 3.98 \text{ l/s}$
 - Peak Flow: 3.98l/s
 - **Note:**
6 DWF equates to 4000 litres / dwelling or 200 litres per person x 3 people / property x 6 for peak factor + 10% for infiltration).
86,400 equals seconds in a day to convert from litres per day to litres per second

Design Criteria

- 6.7 The proposed foul sewers will be designed in accordance with Sewers for Adoption, BS EN 12056 – Gravity Drainage Systems Inside buildings, and Building Regulations - part H (2015).

Adoption & Maintenance

- 6.8 Proposed foul sewers serving more than one property will be adopted by Southern Water under a Section 104 agreement, which will ensure they are maintained in perpetuity. Private sewers will be maintained by the proprietors of the individual dwellings.

7 Conclusion

7.1 The development is located in a low risk Flood Zone 1 area so the proposed levels will be dictated by boundary and engineering constraints as opposed to a predicted fluvial or tidal flood level.

7.2 The development is also at low risk from flooding from Groundwater and Infrastructure Failure (see Table 7.1):

Flood Mechanism	Source	Flood Risk to the Development	Mitigation Required?
Fluvial	N/A	Low	No
Tidal	N/A	Low	No
Groundwater	Underlying geology and groundwater levels	Low	No
Surface Water / Overland Flow	Runoff from surrounding elevated land and highway corridors	Low-High	Natural flow paths considered in development design.
Infrastructure Failure	Surface water systems and Water mains	Low	No

Table 7.1: Flood Risk Summary

7.3 The proposed development will use a combination of traditional piped drainage systems and sustainable drainage techniques (SuDS).

7.4 The surface water run-off from the proposed development will be discharged to the existing ditch to the north of the site using piped drainage systems and SuDS systems. The SuDS features will ensure flood water will be safely contained within the site boundary up to and including the 1 in 100 year event plus 40% climate change.

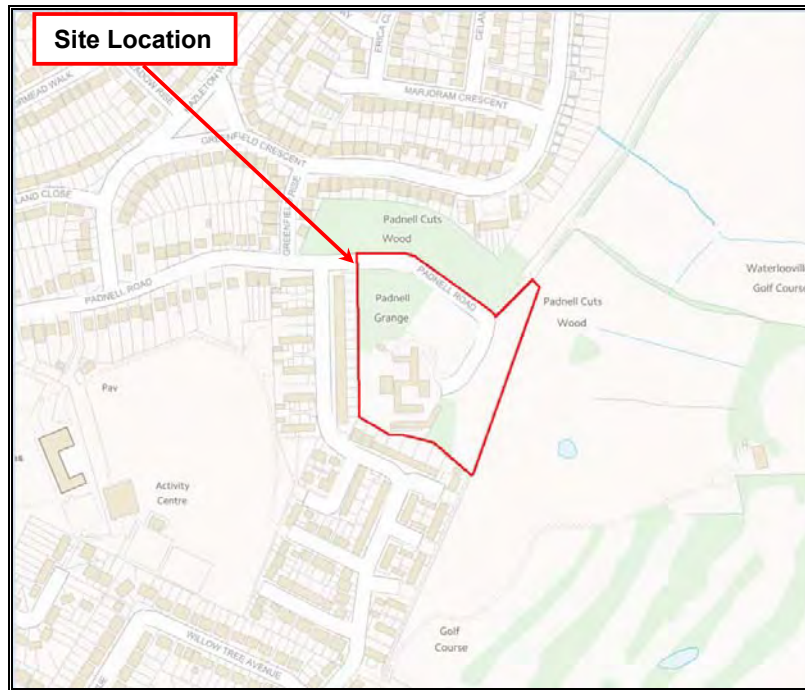
7.5 The proposed foul sewers serving the development will connect to the existing foul sewer in Cherry Tree Avenue.

7.6 In the event the capacity of the proposed surface water drainage network is exceeded, the excess water will follow the topography of the ground and flow overland towards the northern boundary and into the ditch at an unrestricted rate, leaving properties unaffected.

7.7 The conclusion of this flood risk assessment is that the development at Padnell Grange, Waterloooville can be safely carried out without increasing the risk of flooding to downstream / surrounding properties.

APPENDIX A: EA Indicative Flood Map

ENVIRONMENT AGENCY FLOOD MAP (December 2018) Padnell Grange, Waterlooville



Havant Borough Council, Post code: P08 8ED Co-ords: E469891, N111093

1. Floodplain

A floodplain is the area that would naturally be affected by flooding if a river rises above its banks, or high tides and stormy seas cause flooding in coastal areas.

There are two different kinds of area shown on the Flood Map. They can be described as follows:

- **Flood Zone 3** ■ shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:
 - from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year;
 - or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.
- **Flood Zone 2** ■ shows the additional extent of an extreme flood from rivers or the sea. These outlying areas are likely to be affected by a major flood, with up to a 0.1% (1 in 1000) chance of occurring each year.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements.

- Where there is no blue shading, this shows the area where flooding from rivers and the sea is very unlikely. There is less than a 0.1% (1 in 1000) chance of flooding occurring each year.

2. Flood Defences

- The purple line ■ shows all flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, or floods from the sea with a 0.5% (1 in 200) chance of happening each year, together with some, but not all, older defences and defences which protect against smaller floods. Flood defences that are not yet shown, and the areas that benefit from them, will be gradually added.
- Hatched areas ■ benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200) chance of happening each year. If the defences were not there, these areas would be flooded.

3. Main Rivers

The blue line ■ shows the main rivers, these are usually larger streams and rivers.

APPENDIX B: Surface Water Flood Map

ENVIRONMENT AGENCY SURFACE WATER FLOOD MAP
(December 2018)
Padnell Grange, Waterloooville



Havant Borough Council, Post code: P08 8ED Co-ords: E469891, N111093

Risk of Flooding from Surface Water

Surface water flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

The shading on the map shows the risk of flooding from surface water in this particular area.

There are four different kinds of area shown on the Flood Map. They can be described as follows:

-  High Risk Area – Each year this area has a greater than 1in30 (3.3%) chance of flooding from surface water:
-  Medium Risk Area – Each year this area has between a 1in100 and a 1in30 (1%-3.3%) chance of experiencing flooding from Surface Water:
-  Low Risk Area – Each year this area has a between a 1in1000 and 1in100 (0.1%-1%) chance of experiencing flooding from Surface Water.
-  Very Low Risk Area – Each year this area has a less than 1in1000 (0.1%) chance of experiencing flooding from Surface Water.

APPENDIX C: Topographic Survey

TREES	
A	Ash
AL	Alder
AP	Apple
B	Beech
C	Cedar
CB	Copper Beech
CH	Cherry
CY	Cypress
E	Elder
EL	Eucalyptus
EU	Field Maple
F	Fruit
FM	Hazel
FR	Horse Chestnut
HZ	Holm Oak
HC	Hawthorn
HO	Holly
HW	Japanese Maple
HY	Laburnum
JM	Lime
LB	Locust Tree
LM	Laurel
LO	Maple
LR	Magnolia
M	Oak
MG	Pine
OK	Palm
PA	Plane
PL	Plum
PM	Poplar
PO	Pissardii Plum
PP	Pear
PR	Redwood
R	Red Oak
RD	Rhododendron
RH	Rowan
RO	Silver Birch
SB	Sweet Chestnut
SC	Scots Pine
SP	Spruce
SU	Sycamore
SY	Undertified
U	Willow
W	Walnut
WN	Yew
Y	

Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15

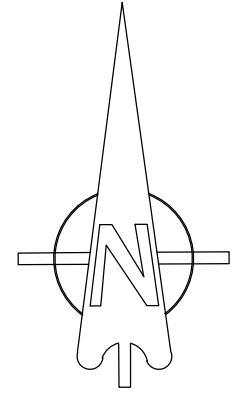
KEY	
BT	British Telecom
BOL	Bollard
CB	Control Box
CL	Cover Level
CTV	Cable Television
EL	Electric
EP	Electricity Pole
FH	Fire Hydrant
GVS	Gas Stop Valve
HT	Height
HVC	High Voltage Cable
IC	Inspection Cover
IL	Invert Level
LP	Lamp Post
MH	Man-Hole
MKR	Marker
MW	Monitoring Well
O/H	Overhead
G	Road Gully
PB	Post Box
PC	Pram Crossing
RNP	Road Name Plate
RS	Road Sign
S/A	Soakaway
ST	Stay / Strut
SV	Stop Valve (Unidentified)
TB	Telephone Box
TC	Telecom
TH	Trial Hole
TL	Traffic Light
TP	Telegraph Pole
UTL	Unable to Lift
VP	Vent pipe
VM	Water Meter
WSV	Water Stop Valve

FENCES	
BWF	Barbed Wire Fence
CBF	Closed Board Fence
CP	Concrete Post
CPE	Chestnut Paling Fence
CWF	Chicken Wire Fence
IRF	Iron Railing Fence
PKF	Picket Fence
PRF	Post & Rail Fence
PWF	Post & Wire Fence
SCF	Security Fence
SP	Steel Post
WMF	Wire Mesh Fence
WPF	Wood Panel Fence



STATION	EASTING	NORTHING	LEVEL	TYPE
1	46984.218	11132.328	61.94	Nat
2	46981.326	11143.439	62.04	Nat
3	46988.369	11177.351	62.09	Nat
4	46986.297	11178.302	62.53	Nat
5	46995.339	11127.552	59.47	Nat
6	46975.638	11085.748	60.88	Nat
7	46984.309	11172.609	61.71	Nat
8	46989.693	11155.279	61.25	Nat
9	46985.552	11206.323	61.91	Nat
10	46984.346	11074.013	61.77	Nat
11	46984.343	11058.156	60.82	Nat
12	46987.552	11364.556	60.88	Nat
13	46985.635	11228.129	62.52	Nat
14	46985.485	11228.407	64.27	Nat

SURVEY STATION INFORMATION			
STATION	EASTING	NORTHING	LEVEL
1	46984.218	11132.328	61.94
2	46981.326	11143.439	62.04
3	46988.369	11177.351	62.09
4	46986.297	11178.302	62.53
5	46995.339	11127.552	59.47
6	46975.638	11085.748	60.88
7	46984.309	11172.609	61.71
8	46989.693	11155.279	61.25
9	46985.552	11206.323	61.91
10	46984.346	11074.013	61.77
11	46984.343	11058.156	60.82
12	46987.552	11364.556	60.88
13	46985.635	11228.129	62.52
14	46985.485	11228.407	64.27



Revision A July 2017 - Ditch detail added to the north.
July 2017 - Survey updated

NOTES:

Survey grid is based on OS National Grid determined from the National GPS Network using OSTN02. A local geodetic transformation has been applied to provide a metric grid of scale factor 1 therefore some distortion due to scale factor will occur.

Levels based on OS datum determined from National GPS Network using OSGM02.

No assumptions should be made regarding the interconnection of manholes. Drainage details have been obtained from surface inspection and should be verified if of critical importance.

The position and height of adjacent buildings have been obtained using higher level reflectorless measurement and may not take account of single storey extensions or conservatories below the line of sight.

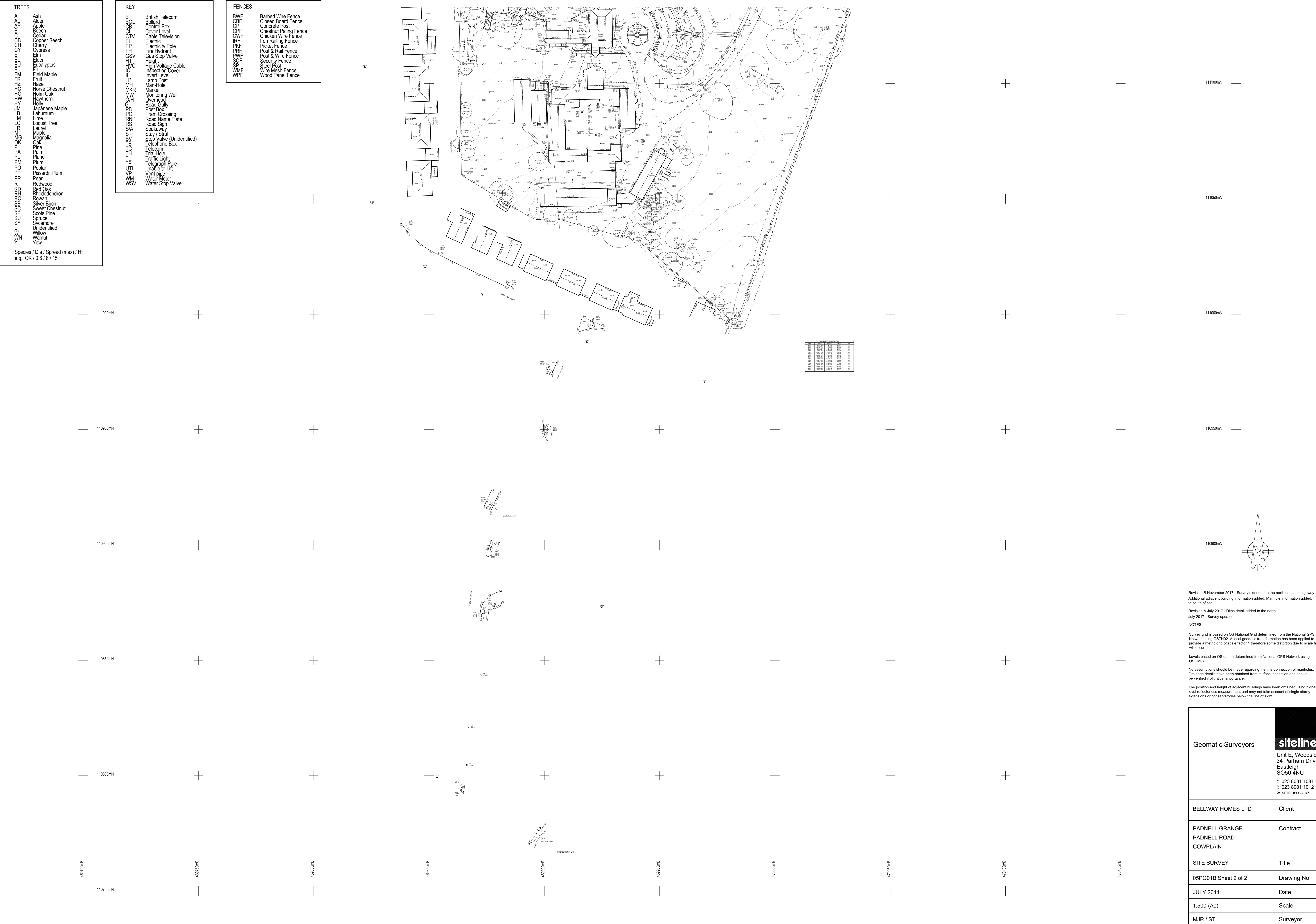
Geomatic Surveyors	siteline Unit E, Woodside 34 Parham Drive Eastleigh SO50 4NU t: 023 8081 1081 f: 023 8081 1012 w: siteline.co.uk
BELLWAY HOMES LTD	Client
PADNELL GRANGE PADNELL ROAD COWPLAIN	Contract
SITE SURVEY	Title
05PG01A	Drawing No.
JULY 2011	Date
1:500 (A0)	Scale
MJR / ST	Surveyor

TREES	
A	Ash
AL	Alder
AP	Apple
B	Beech
CB	Cedar
CH	Copper Beech
CY	Cherry
CTV	Cypress
EL	Elm
ELP	Elder
FM	Eucalyptus
FR	Fir
HZ	Hazel
HC	Horse Chestnut
HO	Holm Oak
HW	Hawthorn
HY	Holly
JM	Japanese Maple
LB	Laburnum
LM	Lime
LO	Locust Tree
L	Laurel
M	Maple
MG	Magnolia
OK	Oak
PA	Palm
PL	Plane
PM	Plum
PO	Poplar
PP	Pisardii Plum
PR	Pear
R	Redwood
RBD	Red Oak
RHO	Rhododendron
RSC	Rowan
SCB	Silver Birch
SCS	Sweet Chestnut
SP	Scots Pine
SU	Spruce
SY	Sycamore
CU	Undertified
W	Willow
WN	Walnut
Y	Yew

Species / Dia / Spread (max) / Ht
e.g. OK / 0.6 / 8 / 15

KEY	
BT	British Telecom
BOL	Bollard
CB	Control Box
CL	Cover Level
CTV	Cable Television
EL	Electric
ELP	Electricity Pole
EH	Fire Hydrant
FSV	Gas Stop Valve
HT	Height
HVC	High Voltage Cable
IC	Inspection Cover
IL	Invert Level
LP	Lamp Post
MH	Man-Hole
MKR	Marker
MW	Monitoring Well
O/H	Overhead
G	Road Gully
PB	Post Box
PC	Pit Crossing
RNP	Road Name Plate
RS	Road Sign
S/A	Soakaway
ST	Stop Valve (Unidentified)
SV	Stop Valve (Unidentified)
TB	Telephone Box
TC	Telecom
TH	Trial Hole
TL	Traffic Light
TP	Telegraph Pole
UTL	Unable to Lift
VP	Vent pipe
WM	Water Meter
WSV	Water Stop Valve

FENCES	
BWF	Barbed Wire Fence
CBF	Closed Board Fence
CP	Concrete Post
CPF	Chestnut Paling Fence
CWF	Chicken Wire Fence
IRF	Iron Railing Fence
PKF	Picket Fence
PRF	Post & Rail Fence
PWF	Post & Wire Fence
SCF	Security Fence
SP	Steel Post
WMF	Wire Mesh Fence
WPF	Wood Panel Fence



Revision B November 2017 - Survey extended to the north east and highway.
Additional adjacent building information added. Manhole information added.
to south of site.

Revision A July 2017 - Ditch detail added to the north.
July 2017 - Survey updated

NOTES:

Survey grid is based on OS National Grid determined from the National GPS
Network using OSTN02. A local geodetic transformation has been applied to
provide a metric grid of scale factor 1 therefore some distortion due to scale factor
will occur.

Levels based on OS datum determined from National GPS Network using
OSGM02.

No assumptions should be made regarding the interconnection of manholes.
Drainage details have been obtained from surface inspection and should
be verified if of critical importance.

The position and height of adjacent buildings have been obtained using higher
level reflectorless measurement and may not take account of single storey
extensions or conservatories below the line of sight.

Geomatic Surveyors		 Unit E, Woodside 34 Parham Drive Eastleigh SO50 4NU t: 023 8081 1081 f: 023 8081 1012 w: siteline.co.uk	
BELLWAY HOMES LTD			Client
PADNELL GRANGE			Contract
PADNELL ROAD			
COWPLAIN			
SITE SURVEY		Title	
05PG01B Sheet 2 of 2		Drawing No.	
JULY 2011		Date	
1:500 (A0)		Scale	
MJR / ST		Surveyor	

APPENDIX D: Soils Limited Ground Investigation Report Extracts

2.2 Ground Conditions

On 5th July 2017, five windowless sampler boreholes (WS1 – WS4, WSA) were drilled, using a Premier compact 110 windowless sampler and dynamic probe rig, to depths ranging between 3.60 and 6.00m below ground level (bgl).

Eight super heavy dynamic probes, (DP1 – DP4, DPA – DPD) were driven prior and adjacent to their corresponding windowless sampler borehole/ trial pit locations to depths ranging between 3.60 and 8.00m bgl.

Four standpipes were installed within window sampler borehole locations (WS1 – WS4) to allow for continued monitoring of both groundwater and soil gas, where present.

Five trial pits (SK1 – SK2, TPB – TPD) were machine excavated to depths ranging between 2.60 and 3.50m bgl. WSA was drilled in-place of TPA due to the area being inaccessible for the mechanical excavator. Following excavation of SK1 and SK2, infiltration testing was carried out, broadly in accordance with the principles of BRE DG 365:2016. Infiltration testing was only carried out once within the trial pits due to slow observed infiltration. The infiltration tests comprised piping clean water via a water tanker into the open trial hole, the fall in water level (head) over time was then recorded to calculate an indicative infiltration rate.

In-situ CBR testing using TRL DCP probe was undertaken in five locations associated with the development of new access roads.

All trial pits were excavated at locations selected by Soils Limited using a development plan provided and approved by the client.

The maximum depths of trial holes have been included in Table 2.1.

All trial holes were scanned with a Cable Avoidance Tool (C.A.T.) and GENNY prior to excavation to ensure the health and safety of the operatives.

Table 2.1 Final Depth of Trial Holes

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
WS1 ^w	6.00	DP3	3.80
WS2 ^w	3.60	DP4	4.00
WS3 ^w	4.00	DP-A	4.00
WS4 ^w	4.00	DP-B	4.00
WSA	3.70	DP-C	4.00
TP-B	3.50	DP-D	4.00
TP-C	3.30	DCP1	0.94
TP-D	2.60	DCP2	0.95
SK1	3.00	DCP3	0.95
SK2	3.00	DCP4	0.94
DPI	8.00	DCP5	0.95

Trial Hole	Depth (m bgl)	Trial Hole	Depth (m bgl)
DP2	3.60		
Note: w - well installation			

The approximate trial hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the trial hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots, or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

For more complete information about the soils encountered within the general area of the site reference should be made to the detailed records given within Appendix A, but for the purposes of discussion, the succession of conditions encountered in the trial holes in descending order can be summarised as:

Made Ground/Topsoil (MG/TS)
London Clay Formation (LCF) – Not Encountered
Lambeth Group (LMBE)

The ground conditions encountered in the trial holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Epoch	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
TS	Recent	G.L	0.10–0.40	0.30	Brown slightly gravelly sandy SILT with frequent rootlets.
MG	Recent	G.L.	0.25–1.20	>1.00	Dark brown gravelly sandy SILT. Gravel is fine to coarse sub-angular brick and flint.
LMBE	Palaeocene	0.10–1.30	1.30–8.00 ¹	Not proven ²	Cohesive: Soft to firm brownish red mottled light grey slightly sandy silty CLAY.
		0.25–2.90	1.30-4.00 ¹	Not proven ²	Granular: Light orangish brown clayey to very clayey fine to medium SAND.
Note: ¹ Final depth of trial hole. ² Base of strata not encountered.					

2.3 Ground Conditions Encountered in Trial Holes

The ground conditions encountered in trial holes have been described below in

descending order. The engineering logs are presented in Appendix A.1.

2.3.1 Made Ground and Topsoil

Soils described as Made Ground were encountered in five out of the ten trial holes from ground level to depths ranging between 0.25m and 1.30m bgl. The Made Ground typically comprised dark brown gravelly sandy SILT. The gravel comprised fine to coarse sub-angular brick, flint, chalk and metal fragments. The depths of Made Ground have been included in Table 2.3.

Soils described as Topsoil were encountered in five out of the ten trial holes from ground level to depths ranging between 0.10m and 0.40m bgl. The Topsoil comprised brown slightly gravelly sandy SILT with frequent rootlets. Gravel was fine to medium sub-rounded clasts of flint. Sand was fine. The depth of Topsoil has been included in Table 2.3.

Table 2.3 Final Depth of Made Ground/Topsoil

Trial Hole	Strata	Depth (m bgl)
WS/DPI	MG	0.25
WS/DP 2	TS	0.40
WS/DP 3	TS	0.40
WS/DP 4	MG	0.90
WS/DP A	MG	0.35
SK 1	TS	0.30
SK 2	TS	0.30
TP/DP B	MG	1.20
TP/DP C	TS	0.10
TP/DP D	MG	1.30 ¹

Notes: ¹Infilled material

2.3.2 Lambeth Group

Soils described as Lambeth Group were encountered in all ten trial holes and were found in both cohesive and granular forms. The soils of the Lambeth group were encountered underlying the Made Ground/Topsoil and persisted to depth of 8.00m bgl, the full investigatory depth of DP1.

The soils of the Lambeth Group varied in composition across the site and layers of cohesive and granular material were found to be inconsistent in their order and thickness. Typically, where both cohesive and granular soils were encountered, the cohesive soils overlaid the granular soils. The exception is TP/DP D where the granular soils overlay the cohesive soils. Figure 4 identifies the different areas of different soil characteristics within the site.

The cohesive soils of the Lambeth Group were encountered in seven trial holes. The Cohesive soils of the Lambeth Group typically comprised soft to

firm brownish red mottled light grey slightly sandy CLAY. The sand was described as fine.

Granular soils of the Lambeth Group were encountered in nine trial holes underlying the Made Ground/Topsoil. The cohesive soils of the Lambeth Group persisted to a depth of 4.00m bgl (the final depth of WS/DP3, WS/DP4, TP/DPB and TP/DPC). The granular soils of Lambeth Group typically comprised light orangish brown clayey to very clayey fine to medium SAND.

The depth of Cohesive soils of the Lambeth Group has been included in Table 2.4 and the final depth of the granular soils of the Lambeth Group has been included in Table 2.5.

Table 2.4 Final Depth of Cohesive soils of the Lambeth Group

Trial Hole	Top Depth (m bgl)	Base Depth (m bgl)
WS/DP 1	0.25	6.00/8.00 ¹
WS/DP 2	0.40	1.90
WS/DP 3	0.40	1.80
WS/DP 4	0.90	1.30
WS/DP A	0.35	2.90
TP/DP B	Not present	
TP/DP C	0.10	2.20
TP/DP D ²	1.30	4.00 ¹
SK 1	Not present	
SK2	Not present	

Note: ¹ Final depth of trial hole. ² Cohesive soils overlaid by granular soils

Table 2.5 Final Depth of Granular soils of the Lambeth Group

Trial Hole	Top Depth (m bgl)	Base Depth (m bgl)
WS/DP 1	Not present	
WS/DP 2	1.90	3.60 ¹
WS/DP 3	1.80	4.00 ¹
WS/DP 4	1.30	4.00 ¹
WS/DP A	2.90	4.00 ¹
TP/DP B	1.20	4.00 ¹
TP/DP C	2.20	4.00 ¹
TP/DP D	Not present	
SK 1	0.30	3.00 ¹
SK2	0.30	3.00 ¹

Note: ¹ Final depth of trial hole.

2.4 Roots

Roots were encountered in all ten trial holes, present to depths ranging between 0.35 and 2.60m bgl.

The depths of root penetration have been included in Table 2.6.

Table 2.6 Depth of Root Penetration

Trial Hole	Depth (m bgl)
WS1	1.90
WS2	1.90
WS3	1.40
WS4	0.65
WSA	0.35
SK1	0.50
SK2	0.50
TPB	0.50
TPC	2.00
TPD	2.60

Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that may have been removed both within the site and its close environs.

It must be emphasised that the probability of determining the maximum depth of roots from a narrow diameter borehole is low.

Several mature trees were noted onsite, particularly in the north of the site where WS1 TPC and TPD were located.

2.5 Groundwater

Groundwater was encountered within two trial holes and was struck at a depth of 2.98m bgl (SK2) and 3.00m bgl (TPB). Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in July (2017), when groundwater levels should be falling towards their annual minimum (lowest) elevation, which typically occurs around September.

The results of the ongoing groundwater level monitoring have been presented in Table 2.7.

Table 2.7 Groundwater Monitoring

Trial Hole	Depth to Water (m bgl)	
	11/07/2017	28/07/2017
WS1	Dry	G.L. ¹
WS2	Dry	Dry
WS3	Dry	Dry
WS4	Dry	Dry

Note: ¹Water standing at ground level.

Made Ground/Topsoil and in to the cohesive soils of the Lambeth Group. The results from DCP testing indicated CBR values of between 4% and 20% for the soils encountered in the top 1.00m bgl

When removing the top ~400mm of either Made Ground or Topsoil, the worst case CBR value was 5%, which was considered suitable for design purposes for the proposed roadways. Any soft spots at formation level should be dug out and replaced with a suitable compacted granular fill. Prior to construction, the formation level should be proof rolled.

The cohesive soils of the Lambeth Group would be regarded as frost-susceptible as plasticity indexes were >20%. The non-cohesive soils of the Lambeth Group would be regarded as frost-susceptible as the soils consisted of >10% fines. In conclusion, all soils encountered will be frost susceptible.

4.7 Soakaways

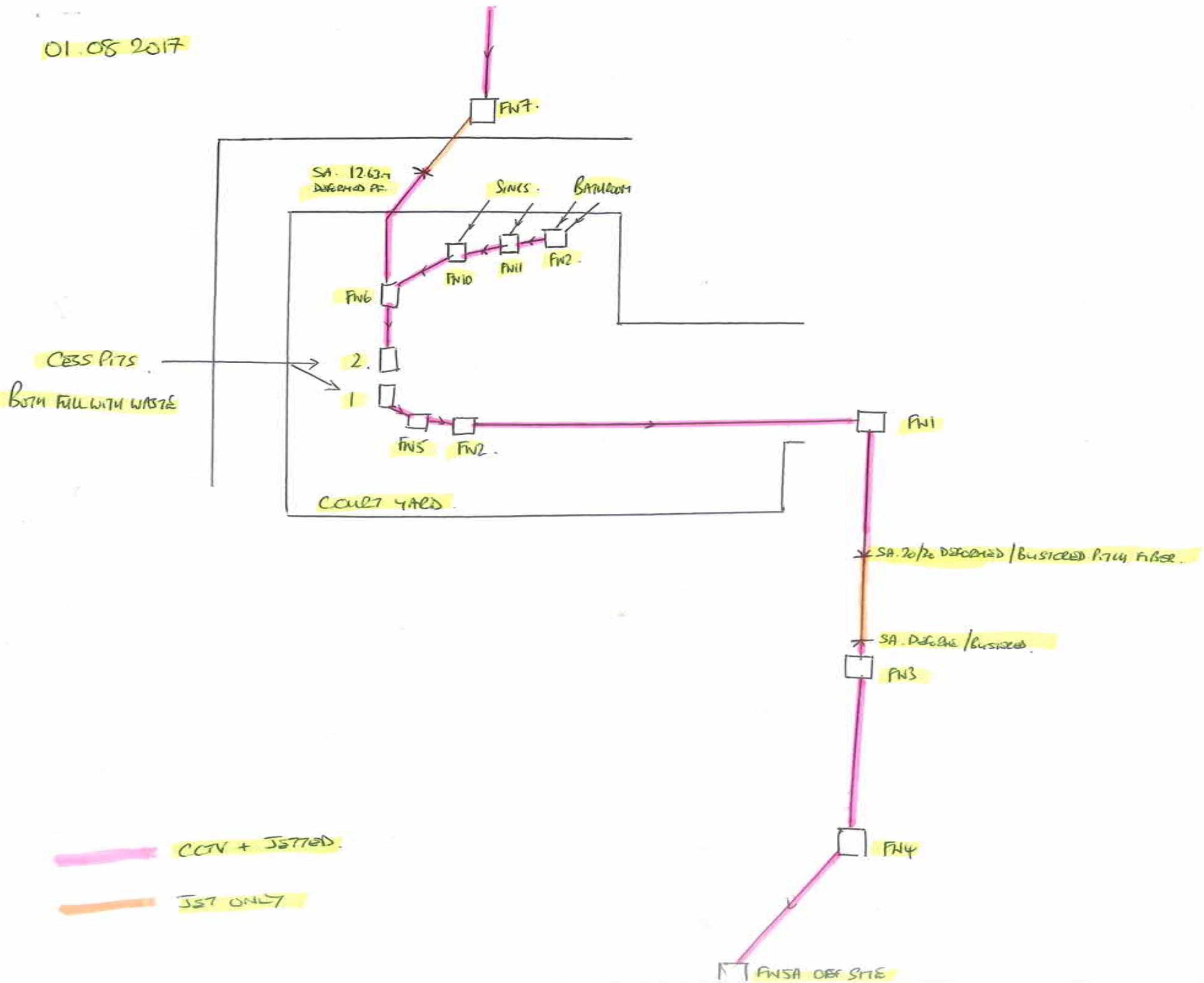
Infiltration testing in accordance with BRE DG 365 was attempted in SK1 and SK2 within the Lambeth Group. Due to low observed infiltration, the tests did not complete within the monitoring period.

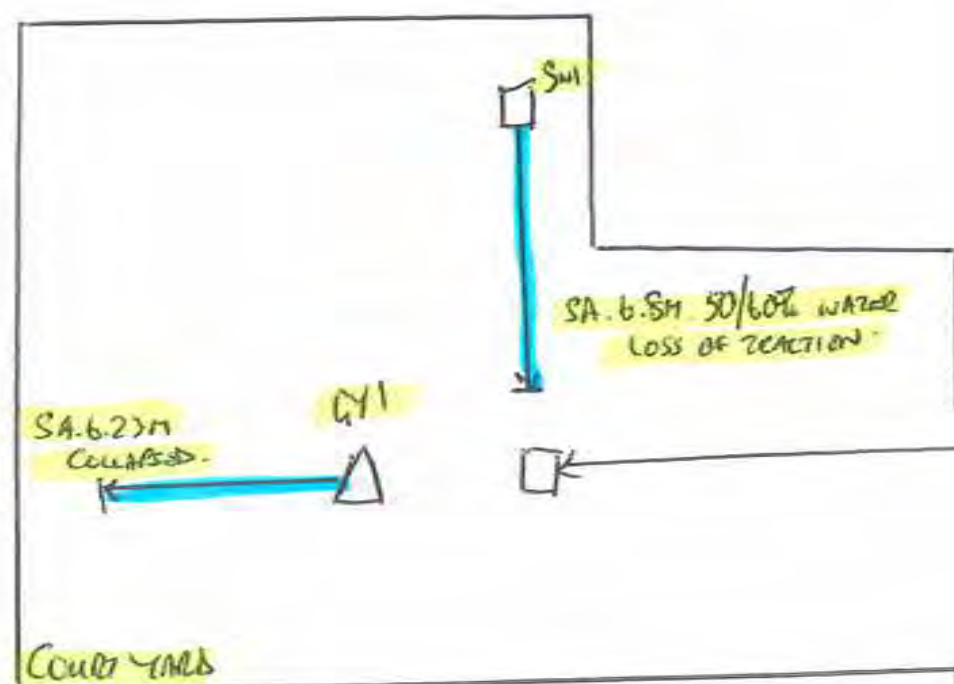
A single test was undertaken in SK1 and SK2. Infiltration rates within SK2 have been heavily extrapolated after 220minutes in order to calculate an infiltration rate. A rate of 1.47×10^{-6} was calculated. However, BRE Digest DG365 Soakaway design: 2016 states that 'Groundwater should not rise to the level of the base of the soakaway during annual variations in the water table'. Furthermore, the Environment Agency typically requires a minimum freeboard of 1.00m between the base of the soakaway and the phreatic zone (saturated ground).

Clarification to the maximum (highest) depth of groundwater must therefore be established prior to the commissioning of a soakaway installation. This will be achieved through the series of groundwater measurements associated with the gas monitoring. It is particularly important to gain information of the groundwater levels over the winter period. Alternatively, consideration could be given to a shallow soakaway system such as a herringbone system.

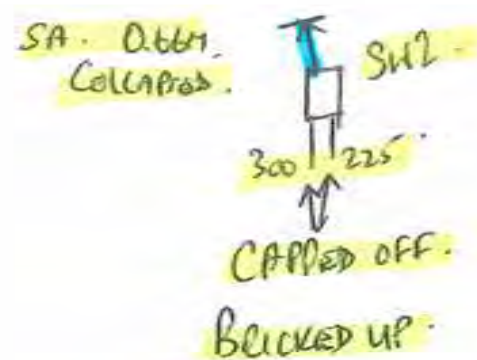
APPENDIX E: Drainage CCTV Survey

01.08.2017



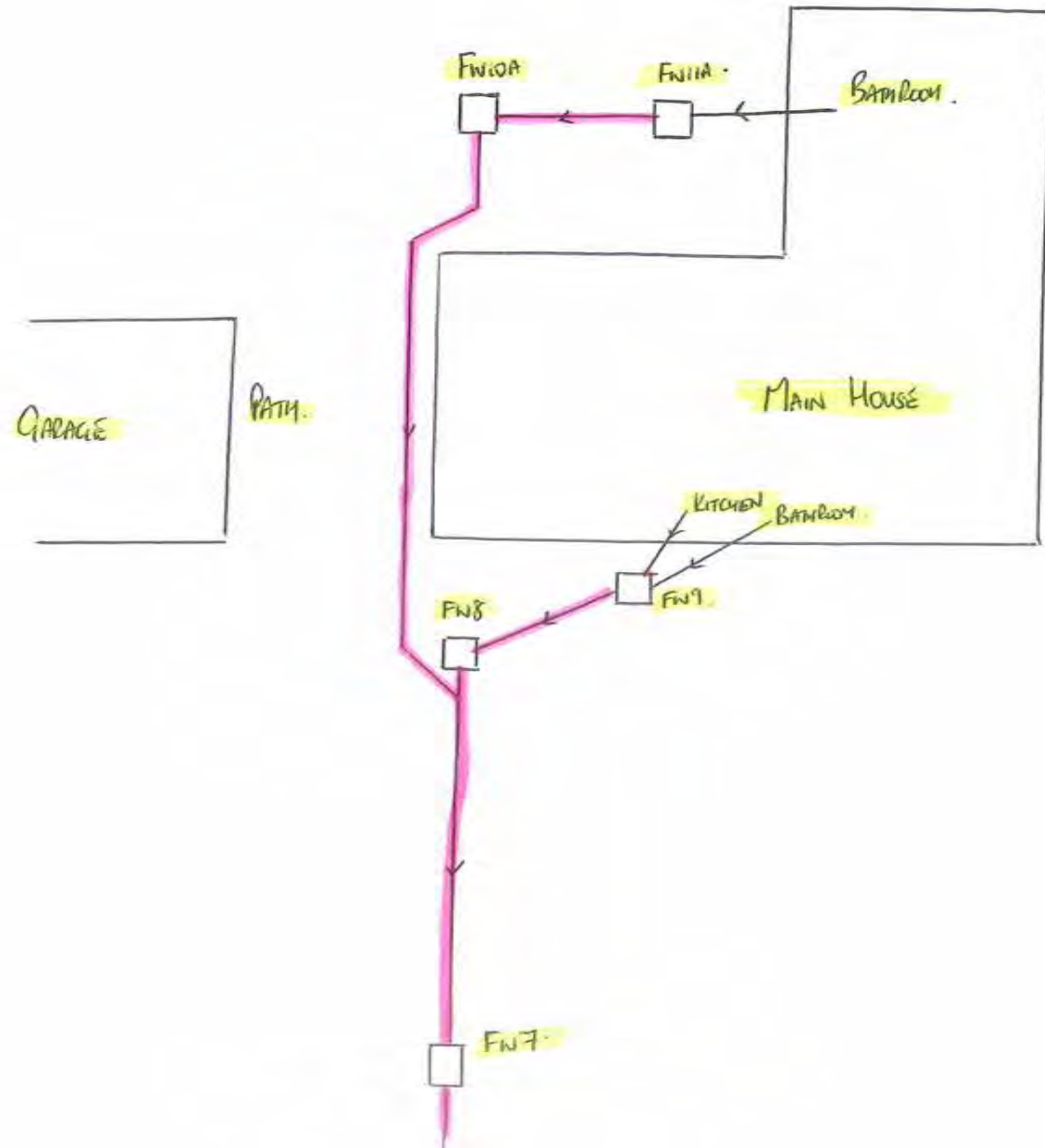


SUNK IN CONCRETE PATCH / POSSIBLE LID AT SOME POINT.
NOT POSSIBLE TO LIFT.



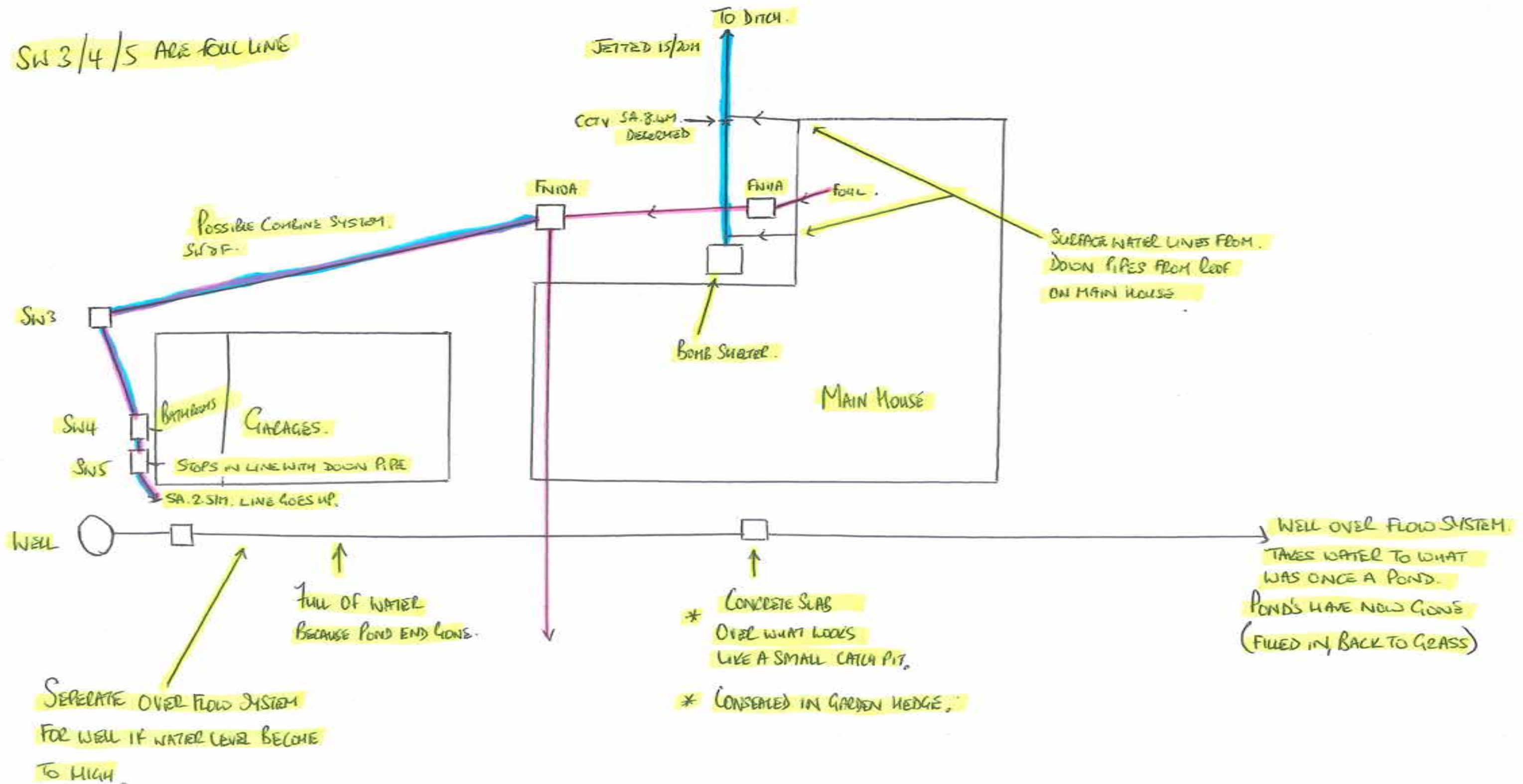
01 08 2017

02-08-2017



02.08.2017.

SW 3/4/5 ARE FOUL LINE



03.08.2017.

UNLOCATED BUT FALL.
ADVISED BY LEB (Notes maintained)
IT HAS TO STAY.

150
PVC.

SA 12.63M.
CAMERA
UNDER
WATER.



BOMB SITE

CORRY YARD

OFFICE

712.

SA 6.13M 95% WATER.

SA 1.5M TO MUCH DEEP IN LINE.
BOTTOM CORNER OF ROAD.
EXPOSED 22.5M LINE.
NO MURDER

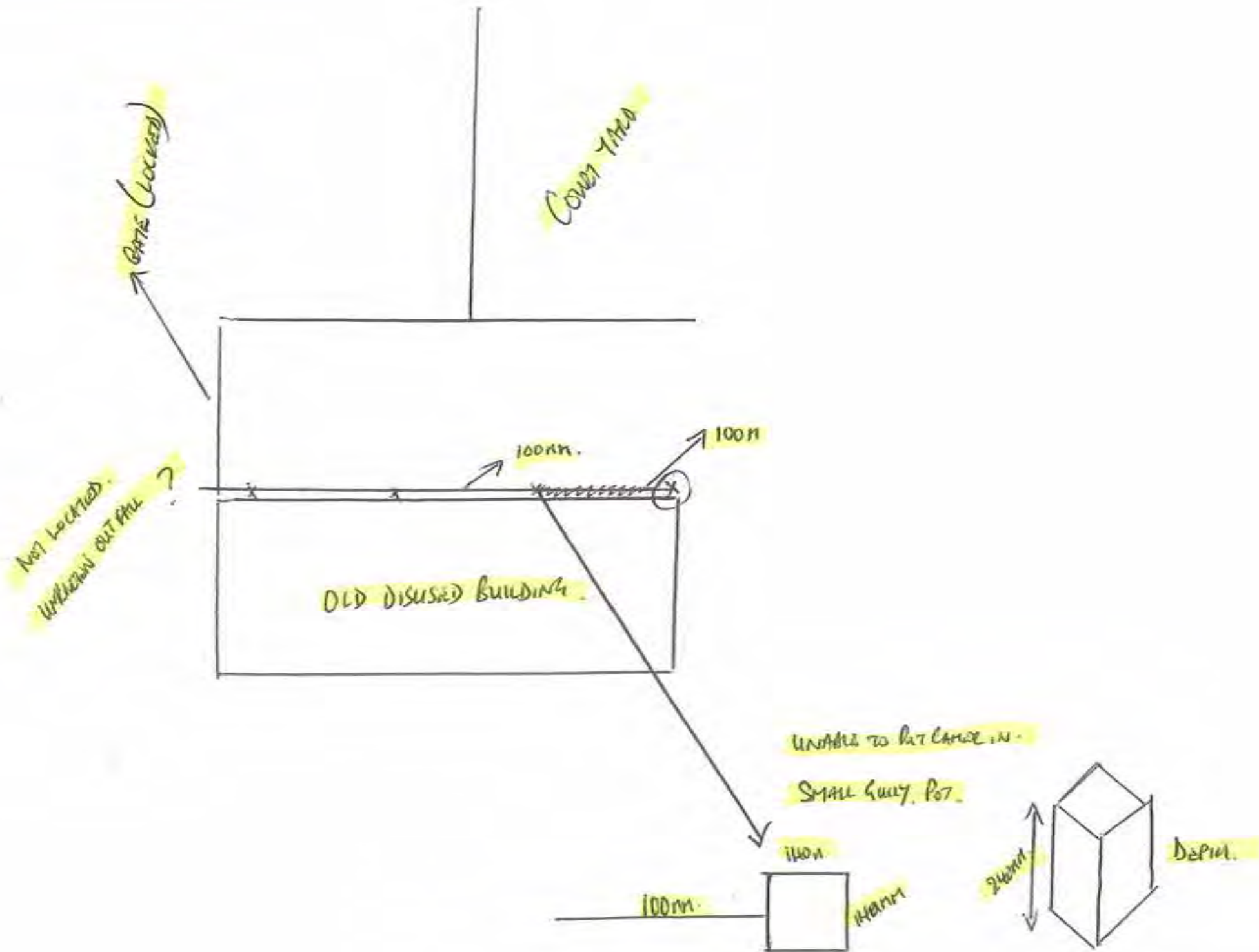
NO CHAMBER.

JETTING COULD DAMAGE PROPERTY.

OF 2

OF 1

03 08 2017





Project-information

Project name:
Mayerbrown

Contract number:
150807AN

Contact:
Victoria Berg-Holdo

Date:
01/08/2017

Client **Mayerbrown**
 Contact: **Victoria Berg-Holdo**
 Position: **Engineer**
 Road **Citygate, St James Boulevard**
 Town **Newcastle upon Tyne NE1 4JE**
 County
 Telephone:
 Fax:
 Mobile:
 E-Mail:

Site **Mayerbrown**
 Contact: **Victoria Berg-Holdo**
 Position: **Engineer**
 Road **Padnell Grange**
 Town **Cowplain**
 County **Hampshire**
 Telephone:
 Fax:
 Mobile:
 E-Mail:

Contractor **Euro Environmental Group**
 Contact: **Shaun Mclean**
 Position: **Contracts Manager**
 Road **Unit8 East Portway Portway Ind Est**
 Town **Andover**
 County **Hampshire**
 Telephone: **01264 339900**
 Fax:
 Mobile: **07917 392209**
 E-Mail: **shaun.mclean@eeg.uk.com**



Defect Grade Description

Project name:
Mayerbrown

Contract number:
150807AN

Contact:
Victoria Berg-Holdo

Date:
01/08/2017

1:

Brick: No Structural Defects
Pipe: No Structural Defects

Acceptable Structural Condition

2:

Brick: Minor cracking, Surface mortar loss, Spalling slight, wear slight
Pipe: Circumfrential crack, Moderate joint defects, Spalling slight, Wear slight

Minor collapse risk in short term but potential for further deterioration

3:

Brick: Total mortarloss without other defects, single brick displaced, Deformation up to 5%, Spalling medium, Wear medium
Pipe: Fractures with deformation up tp 5%, Longitudinal cracking or mulitlpe cracking, Minor loss of level, More severe joint defects, Spalling medium, Wear medium

! Collapse unlikely in near future but future deterioration likely !

4:

Brick: Total mortarloss with deformation greater than 10%, Deformation up to 10% and fractured, Displaced/hanging brickwork, Small number of missing bricks
Pipe: Broken, Deformation up to 10% and broken,, Fractured with deformation 5 - 10%, Multiple fractures, Serious loss of level, spalling large, wear large

!! Collapse likely in foreseeable future !!

5:

Brick: Already Collapsed, Missing invert, Deformation over 10% and fractured, Displaced/hanging brickwork and deformation over 10%, Extensive missing bricks
Pipe: Already collapsed, Deformation over 10% and broken, Extensive areas of fabric missing, Fractured with deformation over 10%

!!! Collapsed or collapse imminent !!!



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 1	PLR: FW2 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road: Access road	Div/Dist:	start MH: FW1
Place: Padnell Grange	Drain. Area:	end MH: FW2
Location: Property with buildings	Standard: BS EN 13508-2:2003	Total length: 7.6 m
Purpose: Routine inspection of condition	Shape/Size: Circular 100	
Type: Main Line	Material: Pitch fibre	Pipe length: 1m
Use: Foul	Lining:	
	Lining Type:	

Comment:

1:75	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW1		1_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	1.80	DEC	Settled deposits hard or compacted 5 % cross-sectional area loss		3_3a	1
	3.74	D	Deformed drain/sewer 10 %		1_4a	5
	3.74	DEE	Attached deposits encrustation from 05 to 07 o'clock 20 % cross-sectional area loss		10_5a	1
	3.90	DEE	Attached deposits encrustation at 06 o'clock 5 % cross-sectional area loss		1_6a	1
	7.60	D	Deformed drain/sewer 20 %		1_7a	5
	7.60	DEE	Attached deposits encrustation from 05 to 07 o'clock 20 % cross-sectional area loss		1_8a	1
	7.60	SA	Survey abandoned, Remark: to much scale in line		1_9a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 1	PLR: FW2 X
---------------------------------	-----------------------------	----------------------------	-----------------------------	----------------------



Photo: 1_1a
0m, Start node type, manhole, reference number: FW1



Photo: 3_3a
1.8m, Settled deposits hard or compacted 5 % cross-sectional area loss



Photo: 1_4a
3.74m, Deformed drain/sewer 10 %



Photo: 10_5a
3.74m, Attached deposits encrustation from 05 to 07 o'clock 20 % cross-sectional area loss



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 1	PLR: FW2 X
---------------------------------	-----------------------------	----------------------------	-----------------------------	----------------------



Photo: 1_6a
3.9m, Attached deposits encrustation at 06 o'clock 5 % cross-sectional area loss



Photo: 1_7a
7.6m, Deformed drain/sewer 20 %



Photo: 1_8a
7.6m, Attached deposits encrustation from 05 to 07 o'clock 20 % cross-sectional area loss



Photo: 1_9a
7.6m, Survey abandoned, Remark: to much scale in line



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 2	PLR: FW1 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned:	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW1
Place:	Padnell Grange	Drain. Area:		end MH:	FW3
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	11.49 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 100		
Type:	Main Line	Material:	Pitch fibre	Pipe length:	1m
Use:	Foul	Lining:			
		Lining Type:			
Comment:					

1:100	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW1		11_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	0.92	D	Deformed drain/sewer 5 % Remark: blistered pitch fiber		13_3a	5
	6.80	DEE	Attached deposits encrustation from 04 to 08 o'clock 5 % cross-sectional area loss		14_4a	1
	7.14	D	Deformed drain/sewer 5 % Remark: blistered pitch fiber		15_5a	5
	10.27	D	Deformed drain/sewer 10 % Remark: blistered pitch fiber		16_6a	5
	11.22	D	Deformed drain/sewer 30 %		17_7a	5
	11.49	SA	Survey abandoned, Remark: due to 20%disformed blister PF		18_8a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 2	PLR: FW1 X
---------------------------------	-----------------------------	----------------------------	-----------------------------	----------------------



Photo: 11_1a
0m, Start node type, manhole, reference number: FW1



Photo: 13_3a
0.92m, Deformed drain/sewer 5 % Remark: blistered pitch fiber



Photo: 14_4a
6.8m, Attached deposits encrustation from 04 to 08 o'clock 5 % cross-sectional area loss



Photo: 15_5a
7.14m, Deformed drain/sewer 5 % Remark: blistered pitch fiber



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 2	PLR: FW1 X
---------------------------------	-----------------------------	----------------------------	-----------------------------	----------------------



Photo: 16_6a
 10.27m, Deformed drain/sewer 10 % Remark: blistered pitch fiber



Photo: 17_7a
 11.22m, Deformed drain/sewer 30 %



Photo: 18_8a
 11.49m, Survey abandoned, Remark: due to 20%disformed blister PF

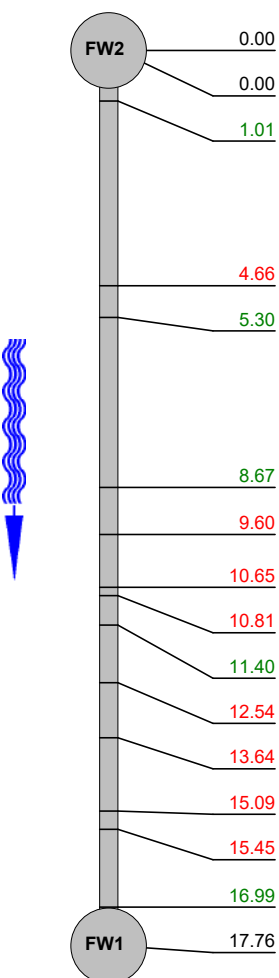


Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 3	PLR: FW2 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road: Access road	Div/Dist:	start MH: FW2
Place: Padnell Grange	Drain. Area:	end MH: FW1
Location: Property with buildings	Standard: BS EN 13508-2:2003	Total length: 17.76 m
Purpose: Routine inspection of condition	Shape/Size: Circular 100	
Type: Main Line	Material: Pitch fibre	Pipe length: 1m
Use: Foul	Lining:	
	Lining Type:	

Comment:

1:150	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW2		19_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	1.01	DEE	Attached deposits encrustation at 07 o'clock 5 % cross-sectional area loss		3_3a	1
	4.66	D	Deformed drain/sewer 10 % Remark: blistered pitch fiber		3_4a	5
	5.30	DEE	Attached deposits encrustation from 04 to 07 o'clock 30 % cross-sectional area loss		3_5a	1
	8.67	DEE	Attached deposits encrustation from 03 to 09 o'clock 10 % cross-sectional area loss		3_6a	1
	9.60	D	Deformed drain/sewer 10 % Remark: blistered pitch fiber		3_7a	5
	10.65	D	Deformed drain/sewer 10 %		3_8a	5
	10.81	D	Deformed drain/sewer 5 % Remark: blister pf		3_9a	5
	11.40	DEE	Attached deposits encrustation from 02 to 11 o'clock 5 % cross-sectional area loss		30_10a	1
	12.54	D	Deformed drain/sewer 5 % Remark: blister pf		31_11a	5
	13.64	D	Deformed drain/sewer 10 %		32_12a	5
	15.09	D	Deformed drain/sewer 5 % Remark: blistered pf		33_13a	5
	15.45	D	Deformed drain/sewer 5 % Remark: blistered pf		34_14a	5
	16.99	DER	Settled deposits coarse 5 % cross-sectional area loss		35_15a	1
	17.76	MHF	Finish node type, manhole, reference number: FW1		3_16a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 3	PLR: FW2 X
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Photo: 19_1a
 0m, Start node type, manhole, reference number: FW2



Photo: 3_3a
 1.01m, Attached deposits encrustation at 07 o'clock 5 % cross-sectional area loss



Photo: 3_4a
 4.66m, Deformed drain/sewer 10 % Remark: blistered pitch fiber



Photo: 3_5a
 5.3m, Attached deposits encrustation from 04 to 07 o'clock 30 % cross-sectional area loss



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 3	PLR: FW2 X
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Photo: 3_6a
 8.67m, Attached deposits encrustation from 03 to 09 o'clock
 10 % cross-sectional area loss



Photo: 3_7a
 9.6m, Deformed drain/sewer 10 % Remark: blistered pitch fiber



Photo: 3_8a
 10.65m, Deformed drain/sewer 10 %



Photo: 3_9a
 10.81m, Deformed drain/sewer 5 % Remark: blister pf



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 3	PLR: FW2 X
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Photo: 30_10a
 11.4m, Attached deposits encrustation from 02 to 11 o'clock 5 % cross-sectional area loss



Photo: 31_11a
 12.54m, Deformed drain/sewer 5 % Remark: blister pf



Photo: 32_12a
 13.64m, Deformed drain/sewer 10 %



Photo: 33_13a
 15.09m, Deformed drain/sewer 5 % Remark: blistered pf

Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 3	PLR: FW2 X
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Photo: 34_14a
15.45m, Deformed drain/sewer 5 % Remark: blistered pf



Photo: 35_15a
16.99m, Settled deposits coarse 5 % cross-sectional area loss



Photo: 3_16a
17.76m, Finish node type, manhole, reference number: FW1



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 4	PLR: FW2 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned:	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW2
Place:	Padnell Grange	Drain. Area:		end MH:	FW5
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	3.76 m
Purpose:	Routine inspection of condition			Shape/Size:	Circular 100
Type:	Main Line			Material:	Polyvinyl chloride
Use:	Foul			Lining:	Pipe length: 1m
Lining Type:					
Comment:					

1:50	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW2		4_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	3.42	LR	Line of drain/sewer deviates right		4_3a	
	3.76	MHF	Finish node type, manhole, reference number: FW5		4_4a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 4	PLR: FW2 X
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Photo: 4_1a
0m, Start node type, manhole, reference number: FW2



Photo: 4_3a
3.42m, Line of drain/sewer deviates right



Photo: 4_4a
3.76m, Finish node type, manhole, reference number: FW5



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 5	PLR: FW5 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW5
Place:	Padnell Grange	Drain. Area:		end MH:	Cess Pit 1
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	1.08 m
Purpose:	Routine inspection of condition			Shape/Size:	Circular 100
Type:	Main Line			Material:	Polyvinyl chloride
Use:	Foul			Lining:	Pipe length: 1m
Lining Type:					
Comment:					

1:25	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW5		41_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	0.30	LR	Line of drain/sewer deviates right		43_3a	
	1.08	OCF	Finish node type, other special chamber, reference number: Cess Pit		44_4a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 5	PLR: FW5 X
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Photo: 41_1a
 0m, Start node type, manhole, reference number: FW5

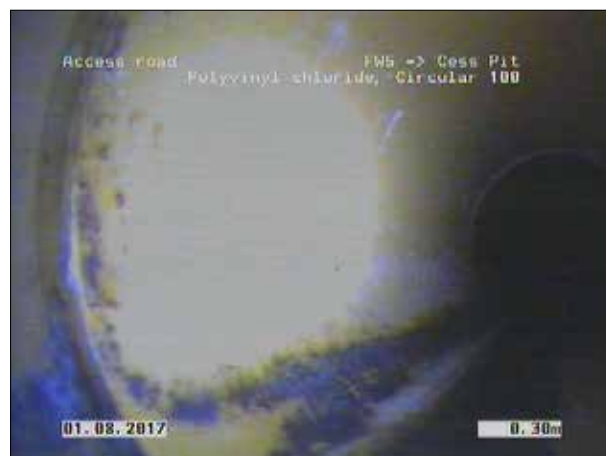


Photo: 43_3a
 0.3m, Line of drain/sewer deviates right



Photo: 44_4a
 1.08m, Finish node type, other special chamber, reference number: Cess Pit



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 6	PLR: FW6 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: No	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW6
Place:	Padnell Grange	Drain. Area:		end MH:	Cess Pit 2
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	0.78 m
Purpose:	Routine inspection of condition			Shape/Size:	Circular 100
Type:	Main Line			Material:	Polyvinyl chloride
Use:	Foul			Lining:	Pipe length: 1m
Lining Type:					
Comment:					

1:25	position	code	observation	counter	photo	grade
	0.00	WL	Water level 5 % height/diameter		46_1a	0
	0.00	MH	Start node type, manhole, reference number: FW6		6_2a	0
	0.78	SA	Survey abandoned, Remark: back drop to cess pit		47_3a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 6	PLR: FW6 X
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Photo: 46_1a
 0m, Water level 5 % height/diameter



Photo: 6_2a
 0m, Start node type, manhole, reference number: FW6



Photo: 47_3a
 0.78m, Survey abandoned, Remark: back drop to cess pit



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 7	PLR: FW6 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road: Access road	Div/Dist:	start MH: FW6
Place: Padnell Grange	Drain. Area:	end MH: FW7
Location: Property with buildings	Standard: BS EN 13508-2:2003	Total length: 12.63 m
Purpose: Routine inspection of condition	Shape/Size: Circular 100	
Type: Main Line	Material: Polyvinyl chloride	Pipe length: 1m
Use: Foul	Lining: Lining Type:	
Comment:		

1:100	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW6		7_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	6.21	LR	Line of drain/sewer deviates right		7_3a	
	6.21	MCPF	Material of drain/sewer changes to Pitch fibre		7_4a	
	11.61	D	Deformed drain/sewer 10 % Remark: blistered pf		7_5a	5
	12.63	D	Deformed drain/sewer 20 % Remark: unable to push past deformed line		7_6a	5
	12.63	SA	Survey abandoned, Remark: duer to deformed pipe	00:00:00		0



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 7	PLR: FW6 X
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Photo: 7_1a
0m, Start node type, manhole, reference number: FW6



Photo: 7_3a
6.21m, Line of drain/sewer deviates right



Photo: 7_4a
6.21m, Material of drain/sewer changes to Pitch fibre



Photo: 7_5a
11.61m, Deformed drain/sewer 10 % Remark: blistered pf



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 7	PLR: FW6 X
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Photo: 7_6a
12.63m, Deformed drain/sewer 20 % Remark: unable to push
past deformed line



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 8	PLR: FW10 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW6
Place:	Padnell Grange	Drain. Area:		end MH:	FW10
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	4.63 m
Purpose:	Routine inspection of condition			Shape/Size:	Circular 100
Type:	Main Line			Material:	Polyvinyl chloride
Use:	Foul			Pipe length:	1m
				Lining:	
				Lining Type:	
Comment:					

1:50	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW6		55_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	4.63	MHF	Finish node type, manhole, reference number: FW10		57_3a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 8	PLR: FW10 X
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Photo: 55_1a
 0m, Start node type, manhole, reference number: FW6



Photo: 57_3a
 4.63m, Finish node type, manhole, reference number: FW10



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 9	PLR: FW11 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW10
Place:	Padnell Grange	Drain. Area:		end MH:	FW11
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	4.1 m
Purpose:	Routine inspection of condition			Shape/Size:	Circular 100
Type:	Main Line			Material:	Polyvinyl chloride
Use:	Foul			Pipe length:	1m
				Lining:	
				Lining Type:	
Comment:					

1:50	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW10		58_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	4.10	MHF	Finish node type, manhole, reference number: FW11		60_3a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 9	PLR: FW11 X
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Photo: 58_1a
 0m, Start node type, manhole, reference number: FW10



Photo: 60_3a
 4.1m, Finish node type, manhole, reference number: FW11



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 10	PLR: FW12 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW11
Place:	Padnell Grange	Drain. Area:		end MH:	FW12
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	2.26 m
Purpose:	Routine inspection of condition		Shape/Size:	Circular 100	
Type:	Main Line		Material:	Polyvinyl chloride Pipe length: 1m	
Use:	Foul		Lining:		
			Lining Type:		
Comment:					

1:25	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW11		61_1a	0
	0.02	WL	Water level 5 % height/diameter			0
	2.26	MHF	Finish node type, manhole, reference number: FW12		63_3a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 10	PLR: FW12 X
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Photo: 61_1a
 0m, Start node type, manhole, reference number: FW11



Photo: 63_3a
 2.26m, Finish node type, manhole, reference number: FW12



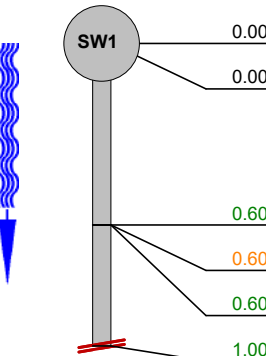
Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 11	PLR: SW1 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road: Access road	Div/Dist:	start MH: SW1
Place: Padnell Grange	Drain. Area:	end MH: Unknown
Location: Property with buildings	Standard: BS EN 13508-2:2003	Total length: 1 m
Purpose: Routine inspection of condition	Shape/Size: Circular 150	
Type: Main Line	Material: Vitrified clay (i.e. all clayware)	Pipe length: 1.5m
Use: Surface water	Lining:	
	Lining Type:	

Comment:

1:25 position code observation counter photo grade

	0.00	CP	Start node type, catchpit, reference number: SW1	64_1a	0	
	0.00	WL	Water level 5 % height/diameter		0	
	0.60	S1	DES	Settled deposits fine 5 % cross-sectional area loss, Start	66_3a	1
	0.60	FCJ		Circumferential Fracture at joint from 07 to 03 o'clock	67_4a, b	3
	0.60	DER		Settled deposits coarse 5 % cross-sectional area loss	68_5a	1
	1.00	SA		Survey abandoned, Remark: to much debris in line	69_6a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 11	PLR: SW1 X
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Photo: 64_1a
0m, Start node type, catchpit, reference number: SW1



Photo: 66_3a
0.6m, Settled deposits fine 5 % cross-sectional area loss, Start



Photo: 67_4a
0.6m, Circumferential Fracture at joint from 07 to 03 o'clock



Photo: 67_4b
0.6m, Circumferential Fracture at joint from 07 to 03 o'clock



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 11	PLR: SW1 X
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Photo: 68_5a
 0.6m, Settled deposits coarse 5 % cross-sectional area loss



Photo: 69_6a
 1m, Survey abandoned, Remark: to much debris in line



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 12	PLR: GY1 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	GY1
Place:	Padnell Grange	Drain. Area:		end MH:	Unknown
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	6.23 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 150		
Type:	Main Line	Material:	Pitch fibre	Pipe length:	1.5m
Use:	Surface water	Lining:			
		Lining Type:			
Comment:					

1:50	position	code	observation	counter	photo	grade
	0.00	GY	Start node type, gully, reference number: GY1		70_1a	
	0.00	WL	Water level 5 % height/diameter			0
	6.16	XP	Collapsed drain/sewer		72_3a	5
	6.23	SA	Survey abandoned, Remark: collapsed line		73_4a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 12	PLR: GY1 X
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Photo: 70_1a
 0m, Start node type, gully, reference number: GY1



Photo: 72_3a
 6.16m, Collapsed drain/sewer



Photo: 73_4a
 6.23m, Survey abandoned, Remark: collapsed line



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 13	PLR: SW1 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	SW1
Place:	Padnell Grange	Drain. Area:		end MH:	Unknown
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	6.8 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 150		
Type:	Main Line	Material:	Vitrified clay (i.e. all clayware)	Pipe length:	1.5m
Use:	Surface water	Lining:			
		Lining Type:			

Comment:

1:50	position	code	observation	counter	photo	grade
	0.00	CP	Start node type, catchpit, reference number: SW1		74_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	0.61	FCJ	Circumferential Fracture at joint from 07 to 03 o'clock		76_3a, b	3
	0.66	FLJ	Fracture longitudinal at joint at 12 o'clock		77_4a	3
	1.87	DEE	Attached deposits encrustation from 04 to 07 o'clock 5 % cross-sectional area loss		78_5a	1
	1.87	CCJ	Crack Circumferential at joint from 11 to 04 o'clock		79_6a	2
	2.26	FCJ	Circumferential Fracture at joint from 09 to 05 o'clock		80_7a	3
	2.70	CL	Crack Longitudinal at 12 o'clock		81_8a	2
	2.94	FCJ	Circumferential Fracture at joint from 09 to 03 o'clock		82_9a, b	3
	3.01	FLJ	Fracture longitudinal at joint at 12 o'clock		83_10a	3
	3.66	CCJ	Crack Circumferential at joint from 08 to 02 o'clock		84_11a	2
	3.84	WL	Water level 10 % height/diameter			0
	4.24	CL	Crack Longitudinal at 09 o'clock		86_13a	2
	4.24	CLJ	Crack Longitudinal at joint at 11 o'clock		87_14a	2
	4.24	CLJ	Crack Longitudinal at joint at 02 o'clock		88_15a	2
	4.24	CLJ	Crack Longitudinal at joint at 04 o'clock		89_16a	2
	4.50	CM	Multiple Cracks from 09 to 03 o'clock		90_17a	3
	5.70	WL	Water level 40 % height/diameter			1
	6.10	CCJ	Crack Circumferential at joint from 09 to 02 o'clock		92_19a	2
	6.62	WL	Water level 50 % height/diameter			2
	6.80	SA	Survey abandoned, Remark: water level to high and loss of traction		94_21a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 13	PLR: SW1 X
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Photo: 74_1a
 0m, Start node type, catchpit, reference number: SW1



Photo: 76_3a
 0.61m, Circumferential Fracture at joint from 07 to 03 o'clock



Photo: 76_3b
 0.61m, Circumferential Fracture at joint from 07 to 03 o'clock



Photo: 77_4a
 0.66m, Fracture longitudinal at joint at 12 o'clock

Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 13	PLR: SW1 X
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Photo: 78_5a
1.87m, Attached deposits encrustation from 04 to 07 o'clock 5 % cross-sectional area loss



Photo: 79_6a
1.87m, Crack Circumferential at joint from 11 to 04 o'clock



Photo: 80_7a
2.26m, Circumferential Fracture at joint from 09 to 05 o'clock



Photo: 81_8a
2.7m, Crack Longitudinal at 12 o'clock

Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 13	PLR: SW1 X
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Photo: 82_9a
2.94m, Circumferential Fracture at joint from 09 to 03 o'clock



Photo: 82_9b
2.94m, Circumferential Fracture at joint from 09 to 03 o'clock



Photo: 83_10a
3.01m, Fracture longitudinal at joint at 12 o'clock



Photo: 84_11a
3.66m, Crack Circumferential at joint from 08 to 02 o'clock

Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 13	PLR: SW1 X
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Photo: 86_13a
4.24m, Crack Longitudinal at 09 o'clock



Photo: 87_14a
4.24m, Crack Longitudinal at joint at 11 o'clock



Photo: 88_15a
4.24m, Crack Longitudinal at joint at 02 o'clock



Photo: 89_16a
4.24m, Crack Longitudinal at joint at 04 o'clock



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 13	PLR: SW1 X
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Photo: 90_17a
 4.5m, Multiple Cracks from 09 to 03 o'clock



Photo: 92_19a
 6.1m, Crack Circumferential at joint from 09 to 02 o'clock



Photo: 94_21a
 6.8m, Survey abandoned, Remark: water level to high and loss of traction



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 14	PLR: SW2 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	SW2
Place:	Padnell Grange	Drain. Area:		end MH:	Unknown
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	0.66 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 225	Pipe length: 1.5m	
Type:	Main Line	Material:	Vitrified clay (i.e. all clayware)		
Use:	Surface water	Lining:			
		Lining Type:			

Comment:

1:25	position	code	observation	counter	photo	grade
	0.00	CP	Start node type, catchpit, reference number: SW2		95_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	0.60	FLJ	Fracture longitudinal at joint at 11 o'clock		97_3a	3
	0.60	FCJ	Circumferential Fracture at joint from 11 to 02 o'clock		98_4a	3
	0.66	XP	Collapsed drain/sewer Remark: collapsed line		99_5a	5
	0.66	SA	Survey abandoned, Remark: collapsed line		100_6a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 14	PLR: SW2 X
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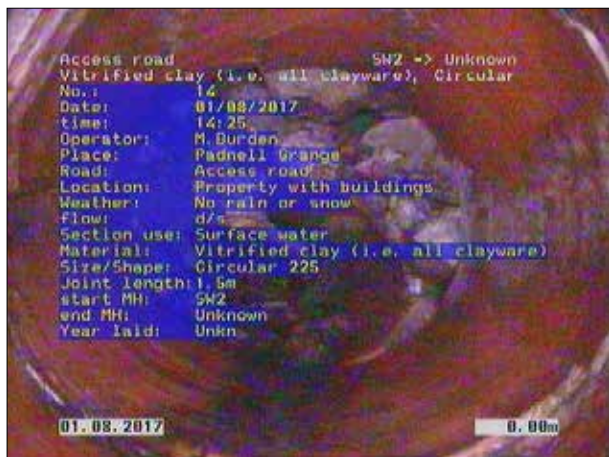


Photo: 95_1a
 0m, Start node type, catchpit, reference number: SW2



Photo: 97_3a
 0.6m, Fracture longitudinal at joint at 11 o'clock



Photo: 98_4a
 0.6m, Circumferential Fracture at joint from 11 to 02 o'clock



Photo: 99_5a
 0.66m, Collapsed drain/sewer Remark: collapsed line



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 14	PLR: SW2 X
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Photo: 100_6a
0.66m, Survey abandoned, Remark: collapsed line



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 15	PLR: FW2 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW3
Place:	Padnell Grange	Drain. Area:		end MH:	FW2
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	2.61 m
Purpose:	Routine inspection of condition			Shape/Size:	Circular 100
Type:	Main Line			Material:	Pitch fibre
Use:	Foul			Pipe length:	1m
				Lining:	
				Lining Type:	
Comment:					

1:25	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW3		101_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	1.90	D	Deformed drain/sewer 10 % Remark: blistered PF		103_3a	5
	2.40	D	Deformed drain/sewer 30 % Remark: blistered PF		104_4a	5
	2.61	SA	Survey abandoned, Remark: deformed PF line		105_5a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 15	PLR: FW2 X
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Photo: 101_1a
 0m, Start node type, manhole, reference number: FW3



Photo: 103_3a
 1.9m, Deformed drain/ sewer 10 % Remark: blistered PF



Photo: 104_4a
 2.4m, Deformed drain/ sewer 30 % Remark: blistered PF



Photo: 105_5a
 2.61m, Survey abandoned, Remark: deformed PF line

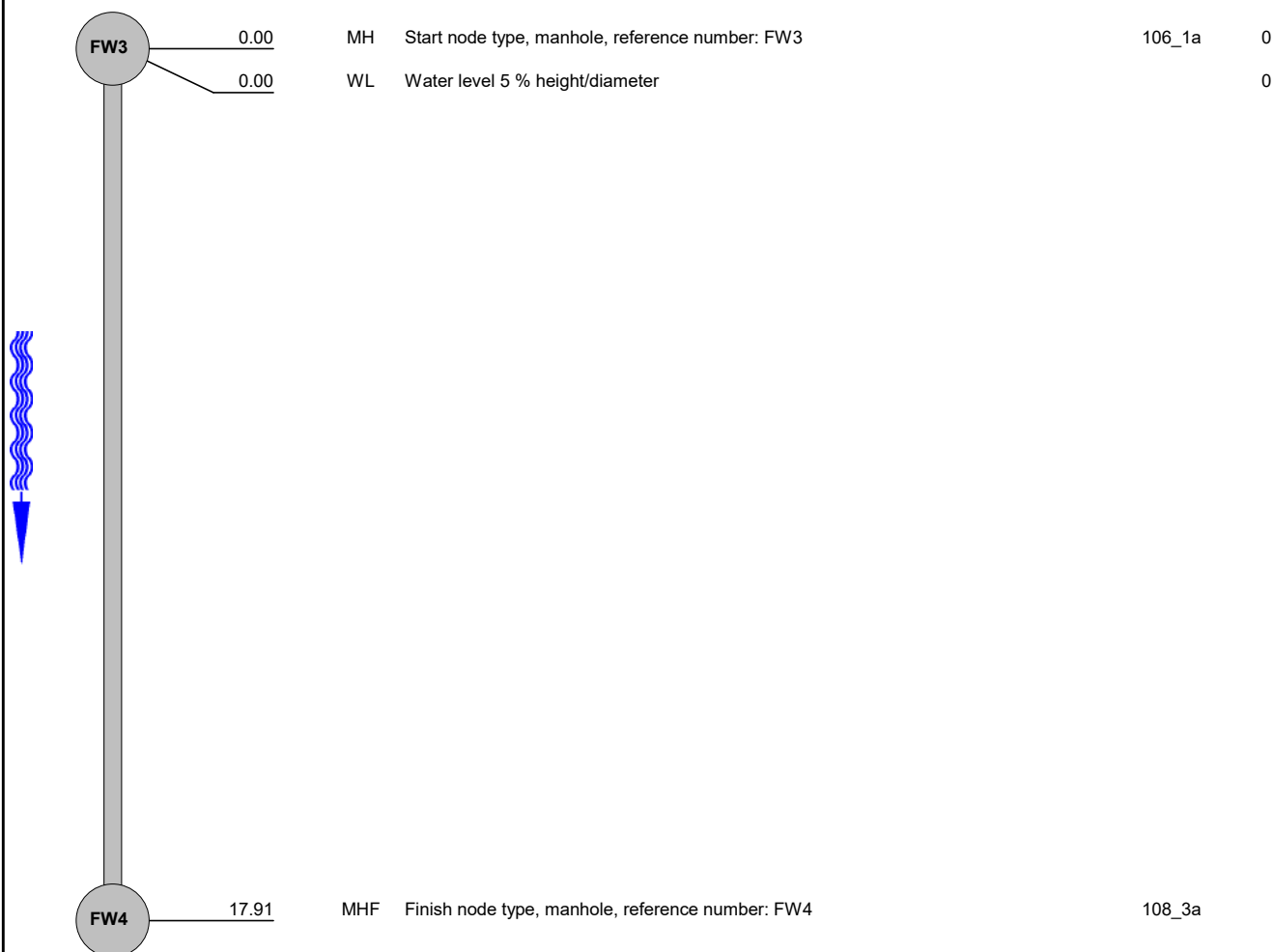


Strat. Drain:
not known

Lining Type:

Comment:

1:150	position	code	observation	counter	photo	grade
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Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 16	PLR: FW3 X
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Photo: 106_1a
 0m, Start node type, manhole, reference number: FW3



Photo: 108_3a
 17.91m, Finish node type, manhole, reference number: FW4



Inspection report

Date: 01/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 17	PLR: FW4 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW4
Place:	Padnell Grange	Drain. Area:		end MH:	FW5A
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	24.56 m
Purpose:	Routine inspection of condition			Shape/Size:	Circular 100
Type:	Main Line			Material:	Polyvinyl chloride
Use:	Foul			Lining:	Pipe length: 1.5m
Lining Type:					
Comment:					

1:200	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW4		109_1a	0
	0.00	WL	Water level 5 % height/diameter			0
	5.51	LR	Line of drain/sewer deviates right		111_3a	
	9.65	LR	Line of drain/sewer deviates right		17_4a	
	23.72	IR	Infiltration Running at 07 o'clock		17_5a	3
	24.00	LL	Line of drain/sewer deviates left		116_6a	
	24.56	MHF	Finish node type, manhole, reference number: FW5		17_7a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 17	PLR: FW4 X
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Photo: 109_1a
0m, Start node type, manhole, reference number: FW4



Photo: 111_3a
5.51m, Line of drain/sewer deviates right



Photo: 17_4a
9.65m, Line of drain/sewer deviates right



Photo: 17_5a
23.72m, Infiltration Running at 07 o'clock



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 01/08/2017	section number: 17	PLR: FW4 X
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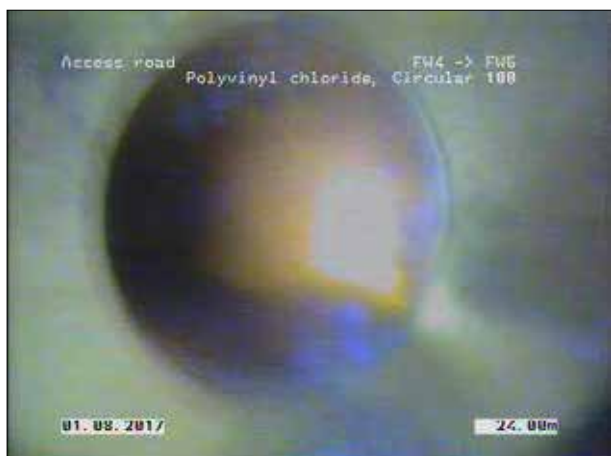


Photo: 116_6a
24m, Line of drain/sewer deviates left

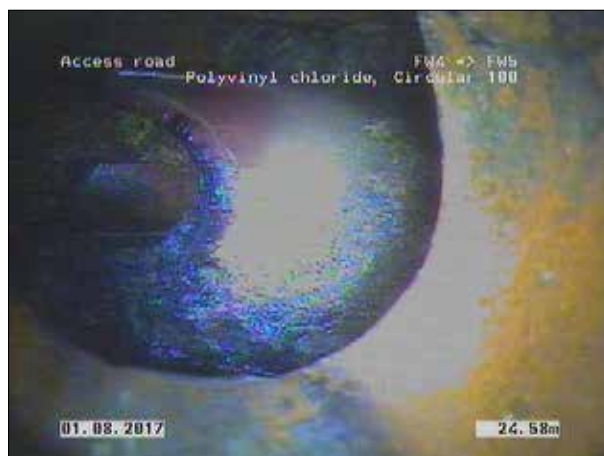


Photo: 17_7a
24.56m, Finish node type, manhole, reference number: FW5



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 18	PLR: OF1 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: No	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	OF1
Place:	Padnell Grange	Drain. Area:		end MH:	OF2
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	1.55 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 225		
Type:	Main Line	Material:	Concrete	Pipe length:	1.5m
Use:	Surface water	Lining:			
		Lining Type:			
Comment:					

1:25	position	code	observation	counter	photo	grade
	0.00	OC	Start node type, other special chamber, reference number: OF1	00:00:00	117_1a	
	0.60	DES	Settled deposits fine 10 % cross-sectional area loss	00:00:00	118_2a	1
	0.77	DER	Settled deposits coarse 10 % cross-sectional area loss	00:00:00	119_3a	1
	1.55	SA	Survey abandoned, Remark: to much debris in line	00:00:00	120_4a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 18	PLR: OF1 X
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Photo: 117_1a, 00:00:00
0m, Start node type, other special chamber, reference number: OF1



Photo: 118_2a, 00:00:00
0.6m, Settled deposits fine 10 % cross-sectional area loss



Photo: 119_3a, 00:00:00
0.77m, Settled deposits coarse 10 % cross-sectional area loss



Photo: 120_4a, 00:00:00
1.55m, Survey abandoned, Remark: to much debris in line



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 19	PLR: GY2 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	GY2
Place:	Padnell Grange	Drain. Area:		end MH:	Unknown
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	6.13 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 100		
Type:	Main Line	Material:	Pitch fibre	Pipe length:	1.5m
Use:	Surface water	Lining:			
Lining Type:					
Comment:					

1:50	position	code	observation	counter	photo	grade
	0.00	GY	Start node type, gully, reference number: GY2	00:00:00	121_1a	
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	0.30	DES	Settled deposits fine 10 % cross-sectional area loss	00:00:00	123_3a	1
	1.85	DER	Settled deposits coarse 10 % cross-sectional area loss	00:00:00	124_4a	1
	3.71	WL	Water level 50 % height/diameter	00:00:00		2
	4.01	CUW	Loss of vision, camera under water	00:00:00	126_6a	2
	4.01	WL	Water level 95 % height/diameter	00:00:00	127_7a	2
	6.13	SA	Survey abandoned, Remark: unable to push camera further	00:00:00	128_8a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 19	PLR: GY2 X
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Photo: 121_1a, 00:00:00
 0m, Start node type, gully, reference number: GY2



Photo: 123_3a, 00:00:00
 0.3m, Settled deposits fine 10 % cross-sectional area loss



Photo: 124_4a, 00:00:00
 1.85m, Settled deposits coarse 10 % cross-sectional area loss



Photo: 126_6a, 00:00:00
 4.01m, Loss of vision, camera under water



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 19	PLR: GY2 X
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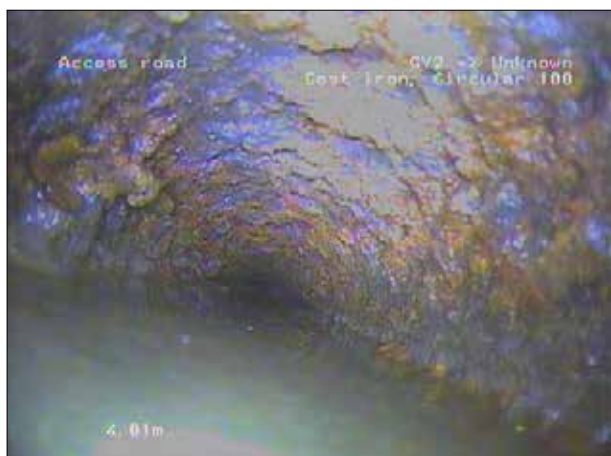


Photo: 127_7a, 00:00:00
4.01m, Water level 95 % height/diameter



Photo: 128_8a, 00:00:00
6.13m, Survey abandoned, Remark: unable to push camera further



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 20	PLR: FW8 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW8
Place:	Padnell Grange	Drain. Area:		end MH:	FW7
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	14.26 m
Purpose:	Routine inspection of condition		Shape/Size:	Circular 100	
Type:	Main Line		Material:	Polythylene Pipe length: 1.5m	
Use:	Surface water		Lining:		
			Lining Type:		
Comment:					

1:125	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW8	00:00:00	132_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	0.56	JN	Junction at 03 o'clock dia 100 mm	00:00:00	134_3a	0
	14.26	MHF	Finish node type, manhole, reference number: FW7	00:00:00	135_4a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 20	PLR: FW8 X
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Photo: 132_1a, 00:00:00
 0m, Start node type, manhole, reference number: FW8



Photo: 134_3a, 00:00:00
 0.56m, Junction at 03 o'clock dia 100 mm



Photo: 135_4a, 00:00:00
 14.26m, Finish node type, manhole, reference number: FW7



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 21	PLR: FW10A X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road: Access road	Div/Dist:	start MH: FW10A
Place: Padnell Grange	Drain. Area:	end MH: Main Line
Location: Property with buildings	Standard: BS EN 13508-2:2003	Total length: 17.46 m
Purpose: Routine inspection of condition	Shape/Size: Circular 100	
Type: Main Line	Material: Polythylene	Pipe length: 1.5m
Use: Surface water	Lining:	
	Lining Type:	

Comment:

1:150	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW10	00:00:00	147_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	0.58	LR	Line of drain/sewer deviates right	00:00:00	149_3a	
	5.00	LR	Line of drain/sewer deviates right	00:00:00	150_4a	
	5.51	LL	Line of drain/sewer deviates left	00:00:00	151_5a	
	8.43	JN	Junction at 09 o'clock dia 100 mm	00:00:00	152_6a	0
	8.43	CN	Connection at 12 o'clock, dia 100 mm	00:00:00	153_7a	0
	14.38	LL	Line of drain/sewer deviates left	00:00:00	154_8a	
	14.83	CN	Connection at 12 o'clock, dia 100 mm	00:00:00	155_9a	0
	15.18	LL	Line of drain/sewer deviates left	00:00:00	156_10a	
	17.30	LR	Line of drain/sewer deviates right	00:00:00	157_11a	
	17.42	BRF	Major connection without manhole	00:00:00	158_12a	0



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 21	PLR: FW10A X
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Photo: 147_1a, 00:00:00
 0m, Start node type, manhole, reference number: FW10



Photo: 149_3a, 00:00:00
 0.58m, Line of drain/sewer deviates right



Photo: 150_4a, 00:00:00
 5m, Line of drain/sewer deviates right



Photo: 151_5a, 00:00:00
 5.51m, Line of drain/sewer deviates left

Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 21	PLR: FW10A X
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Photo: 152_6a, 00:00:00
 8.43m, Junction at 09 o'clock dia 100 mm



Photo: 153_7a, 00:00:00
 8.43m, Connection at 12 o'clock, dia 100 mm



Photo: 154_8a, 00:00:00
 14.38m, Line of drain/sewer deviates left



Photo: 155_9a, 00:00:00
 14.83m, Connection at 12 o'clock, dia 100 mm



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 21	PLR: FW10A X
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Photo: 156_10a, 00:00:00
 15.18m, Line of drain/sewer deviates left



Photo: 157_11a, 00:00:00
 17.3m, Line of drain/sewer deviates right



Photo: 158_12a, 00:00:00
 17.42m, Major connection without manhole



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 22	PLR: FW11A X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW10A
Place:	Padnell Grange	Drain. Area:		end MH:	FW11A
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	4.71 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 100		
Type:	Main Line	Material:	Polythylene	Pipe length:	1.5m
Use:	Surface water	Lining:			
		Lining Type:			

Comment:

1:50	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW10	00:00:00	159_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	0.72	S1 DEE	Attached deposits encrustation from 04 to 07 o'clock 5 % cross-sectional area loss, Start	00:00:00	24_3a	1
	2.89	WL	Water level 10 % height/diameter	00:00:00	24_4a	0
	3.98	F1 DEE	Attached deposits encrustation from 04 to 07 o'clock 5 % cross-sectional area loss, Finish	00:00:00		1
	3.98	S2 DEE	Attached deposits encrustation from 04 to 07 o'clock 10 % cross-sectional area loss, Start	00:00:00	168_6a	1
	4.59	DEE	Attached deposits encrustation from 04 to 07 o'clock 10 % cross-sectional area loss Finish	00:00:00	169_7a	1
	4.71	MHF	Finish node type, manhole, reference number: FW11	00:00:00	24_8a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 22	PLR: FW11A X
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Photo: 159_1a, 00:00:00
 0m, Start node type, manhole, reference number: FW10



Photo: 24_3a, 00:00:00
 0.72m, Attached deposits encrustation from 04 to 07 o'clock 5 % cross-sectional area loss, Start



Photo: 24_4a, 00:00:00
 2.89m, Water level 10 % height/diameter



Photo: 168_6a, 00:00:00
 3.98m, Attached deposits encrustation from 04 to 07 o'clock 10 % cross-sectional area loss, Start



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 22	PLR: FW11A X
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Photo: 169_7a, 00:00:00
 4.59m, Attached deposits encrustation from 04 to 07 o'clock
 10 % cross-sectional area loss Finish



Photo: 24_8a, 00:00:00
 4.71m, Finish node type, manhole, reference number: FW11



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 23	PLR: SW3 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	FW10A
Place:	Padnell Grange	Drain. Area:		end MH:	SW3
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	12.54 m
Purpose:	Routine inspection of condition			Shape/Size:	Circular 100
Type:	Main Line			Material:	Vitrified clay (i.e. all clayware)
Use:	Surface water			Lining:	Pipe length: 1m
				Lining Type:	

1:100	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: FW10A	00:00:00	170_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	0.59	MCPF	Material of drain/sewer changes to Pitch fibre	00:00:00	172_3a	
	0.62	DES	Settled deposits fine 10 % cross-sectional area loss	00:00:00	173_4a	1
	1.95	D	Deformed drain/sewer 10 % Remark: blistered pitch fiber	00:00:00	174_5a	5
	12.54	OBZ	Other obstacles, other from, from 02 to 06 o'clock, 50 % cross-sectional area loss	00:00:00	175_6a	1
	12.54	SA	Survey abandoned, Remark: protruding metal in line	00:00:00	176_7a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 23	PLR: SW3 X
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Photo: 170_1a, 00:00:00
0m, Start node type, manhole, reference number: FW10A



Photo: 172_3a, 00:00:00
0.59m, Material of drain/sewer changes to Pitch fibre



Photo: 173_4a, 00:00:00
0.62m, Settled deposits fine 10 % cross-sectional area loss



Photo: 174_5a, 00:00:00
1.95m, Deformed drain/sewer 10 % Remark: blistered pitch fiber



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 23	PLR: SW3 X
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Photo: 175_6a, 00:00:00
 12.54m, Other obstacles, other from, from 02 to 06 o'clock, 50
 % cross-sectional area loss



Photo: 176_7a, 00:00:00
 12.54m, Survey abandoned, Remark: protruding metal in line



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 24	PLR: SW3 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	SW3
Place:	Padnell Grange	Drain. Area:		end MH:	FW10A
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	8.81 m
Purpose:	Routine inspection of condition		Shape/Size:	Circular 100	
Type:	Main Line		Material:	Vitrified clay (i.e. all clayware) Pipe length: 1m	
Use:	Surface water		Lining:		
			Lining Type:		
Comment:					

1:50	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: SW3	00:00:00	177_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	1.30	MCPF	Material of drain/sewer changes to Pitch fibre	00:00:00	179_3a	
	3.47	OBZ	Other obstacles, other from, from 12 to 06 o'clock, 50 % cross-sectional area loss	00:00:00	182_4a	1
	3.47	SA	Survey abandoned, Remark: overlap to protruding metal in line	00:00:00	183_5a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 24	PLR: SW3 X
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Photo: 177_1a, 00:00:00
 0m, Start node type, manhole, reference number: SW3



Photo: 179_3a, 00:00:00
 1.3m, Material of drain/sewer changes to Pitch fibre



Photo: 182_4a, 00:00:00
 3.47m, Other obstacles, other from, from 12 to 06 o'clock, 50 % cross-sectional area loss



Photo: 183_5a, 00:00:00
 3.47m, Survey abandoned, Remark: overlap to protruding metal in line



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 25	PLR: SW4 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	SW3
Place:	Padnell Grange	Drain. Area:		end MH:	SW4
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	3.65 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 100		
Type:	Main Line	Material:	Pitch fibre	Pipe length:	1m
Use:	Surface water	Lining:			
Lining Type:					
Comment:					

1:50	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: SW3	00:00:00	184_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	2.21	D	Deformed drain/sewer 20 %	00:00:00	186_3a	5
	3.65	SA	Survey abandoned, Remark: line to deformed to continue	00:00:00	187_4a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 25	PLR: SW4 X
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Photo: 184_1a, 00:00:00
 0m, Start node type, manhole, reference number: SW3



Photo: 186_3a, 00:00:00
 2.21m, Deformed drain/sewer 20 %



Photo: 187_4a, 00:00:00
 3.65m, Survey abandoned, Remark: line to deformed to continue



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 26	PLR: SW4 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	SW4
Place:	Padnell Grange	Drain. Area:		end MH:	SW3
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	1.91 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 100		
Type:	Main Line	Material:	Pitch fibre	Pipe length:	1m
Use:	Surface water	Lining:			
Lining Type:					
Comment:					

1:25	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: SW4	00:00:00	188_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	1.73	D	Deformed drain/sewer 30 %	00:00:00	190_3a	5
	1.91	SA	Survey abandoned, Remark: squashed Pitch fiber line	00:00:00	191_4a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 26	PLR: SW4 X
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Photo: 188_1a, 00:00:00
 0m, Start node type, manhole, reference number: SW4



Photo: 190_3a, 00:00:00
 1.73m, Deformed drain/sewer 30 %



Photo: 191_4a, 00:00:00
 1.91m, Survey abandoned, Remark: squashed Pitch fiber line



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 27	PLR: SW5 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	SW4
Place:	Padnell Grange	Drain. Area:		end MH:	SW5
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	0.57 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 100		
Type:	Main Line	Material:	Pitch fibre	Pipe length:	1m
Use:	Surface water	Lining:			
		Lining Type:			
Comment:					

1:25	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: SW4	00:00:00	192_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	0.57	MHF	Finish node type, manhole, reference number: SW5	00:00:00	194_3a	



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 27	PLR: SW5 X
---------------------------------	-----------------------------	----------------------------	------------------------------	----------------------



Photo: 192_1a, 00:00:00
 0m, Start node type, manhole, reference number: SW4



Photo: 194_3a, 00:00:00
 0.57m, Finish node type, manhole, reference number: SW5



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 28	PLR: SW5 X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	SW5
Place:	Padnell Grange	Drain. Area:		end MH:	Main Line
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	2.51 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 100		
Type:	Main Line	Material:	Pitch fibre	Pipe length:	1m
Use:	Surface water	Lining:			
		Lining Type:			
Comment:					

1:25	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: SW5	00:00:00	30_1a	0
	0.05	WL	Water level 5 % height/diameter	00:00:00		0
	1.15	MCPVC	Material of drain/sewer changes to Polyvinyl chloride	00:00:00	30_3a	
	2.24	LL	Line of drain/sewer deviates left	00:00:00	30_4a	
	2.24	CCJ	Crack Circumferential at joint from 04 to 02 o'clock	00:00:00	30_5a	2
	2.39	LU	Line of drain/sewer deviates up	00:00:00	30_6a	
	2.51	SA	Survey abandoned, Remark: line goes up looks like a non return system	00:00:00	30_7a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 28	PLR: SW5 X
---------------------------------	-----------------------------	----------------------------	------------------------------	----------------------



Photo: 30_1a, 00:00:00
 0m, Start node type, manhole, reference number: SW5

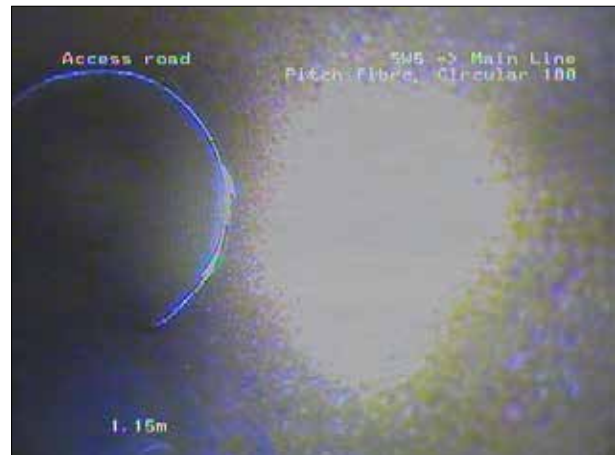


Photo: 30_3a, 00:00:00
 1.15m, Material of drain/sewer changes to Polyvinyl chloride



Photo: 30_4a, 00:00:00
 2.24m, Line of drain/sewer deviates left



Photo: 30_5a, 00:00:00
 2.24m, Crack Circumferential at joint from 04 to 02 o'clock



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 28	PLR: SW5 X
---------------------------------	-----------------------------	----------------------------	------------------------------	----------------------



Photo: 30_6a, 00:00:00
2.39m, Line of drain/sewer deviates up



Photo: 30_7a, 00:00:00
2.51m, Survey abandoned, Remark: line goes up looks like a non return system



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 29	PLR: Bomb SheltX
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: No	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	Bomb Shelt
Place:	Padnell Grange	Drain. Area:		end MH:	Ditch
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	8.69 m
Purpose:	Routine inspection of condition		Shape/Size:	Circular 100	
Type:	Main Line		Material:	Pitch fibre Pipe length: 1m	
Use:	Surface water		Lining:		
			Lining Type:		
Comment:					

1:75	position	code	observation	counter	photo	grade
	0.00	OC	Start node type, other special chamber, reference number: Bomb Shelt	00:00:00	203_1a	
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	0.00	LD	Line of drain/sewer deviates down	00:00:00	31_3a	
	1.59	JN	Junction at 12 o'clock dia 100 mm	00:00:00	31_4a	0
	5.15	S1 DES	Settled deposits fine 10 % cross-sectional area loss, Start	00:00:00	209_5a	1
	7.28	WL	Water level 15 % height/diameter	00:00:00	31_6a	0
	8.69	SA	Survey abandoned, Remark: to much debris in line	00:00:00	31_7a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 29	PLR: Bomb SheltX
---------------------------------	-----------------------------	----------------------------	------------------------------	----------------------------



Photo: 203_1a, 00:00:00
 0m, Start node type, other special chamber, reference number:
 Bomb Shelt



Photo: 31_3a, 00:00:00
 0m, Line of drain/sewer deviates down



Photo: 31_4a, 00:00:00
 1.59m, Junction at 12 o'clock dia 100 mm



Photo: 209_5a, 00:00:00
 5.15m, Settled deposits fine 10 % cross-sectional area loss,
 Start



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 29	PLR: Bomb SheltX
---------------------------------	-----------------------------	----------------------------	------------------------------	----------------------------



Photo: 31_6a, 00:00:00
 7.28m, Water level 15 % height/diameter



Photo: 31_7a, 00:00:00
 8.69m, Survey abandoned, Remark: to much debris in line



Inspection report

Date: 02/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 30	PLR: Bomb SheltX
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	Bomb Shelt
Place:	Padnell Grange	Drain. Area:		end MH:	Ditch
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	8.44 m
Purpose:	Routine inspection of condition	Shape/Size:	Circular 100		
Type:	Main Line	Material:	Pitch fibre	Pipe length:	1m
Use:	Surface water	Lining:			
		Lining Type:			
Comment:					

1:75	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: Bomb Shelt	00:00:00	210_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	1.85	JN	Junction at 12 o'clock dia 100 mm	00:00:00	212_3a	0
	7.22	WL	Water level 30 % height/diameter	00:00:00	213_4a	1
	8.40	D	Deformed drain/sewer 20 % Remark: blistered PF	00:00:00	214_5a	5
	8.40	JN	Junction at 03 o'clock dia 100 mm	00:00:00	215_6a	0
	8.44	SA	Survey abandoned, Remark: deformed PF	00:00:00	216_7a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 30	PLR: Bomb SheltX
---------------------------------	-----------------------------	----------------------------	------------------------------	----------------------------



Photo: 210_1a, 00:00:00
0m, Start node type, manhole, reference number: Bomb Shelt



Photo: 212_3a, 00:00:00
1.85m, Junction at 12 o'clock dia 100 mm



Photo: 213_4a, 00:00:00
7.22m, Water level 30 % height/diameter



Photo: 214_5a, 00:00:00
8.4m, Deformed drain/sewer 20 % Remark: blistered PF



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 02/08/2017	section number: 30	PLR: Bomb SheltX
---------------------------------	-----------------------------	----------------------------	------------------------------	----------------------------



Photo: 215_6a, 00:00:00
8.4m, Junction at 03 o'clock dia 100 mm



Photo: 216_7a, 00:00:00
8.44m, Survey abandoned, Remark: deformed PF



Inspection report

Date: 03/08/2017	Job N°:	Weather: No rain or snow	Operator: M.Burden	section number: 31	PLR: Ditch X
Video Volume No.:	Flow Ctrl: No flow control	Temperature: above freezing	Year laid: Unkn	Cleaned: Yes	Strat. Drain: not known

Road:	Access road	Div/Dist:		start MH:	Ditch
Place:	Padnell Grange	Drain. Area:		end MH:	Unknown
Location:	Property with buildings	Standard:	BS EN 13508-2:2003	Total length:	12.85 m
Purpose:	Routine inspection of condition		Shape/Size:	Circular 150	
Type:	Main Line		Material:	Polythylene Pipe length: 1m	
Use:	Surface water		Lining:		
			Lining Type:		
Comment:					

1:100	position	code	observation	counter	photo	grade
	0.00	MH	Start node type, manhole, reference number: Ditch	00:00:00	222_1a	0
	0.00	WL	Water level 5 % height/diameter	00:00:00		0
	5.65	LR	Line of drain/sewer deviates right	00:00:00	224_3a	
	8.28	D	Deformed drain/sewer 20 %	00:00:00	225_4a	5
	12.01	MCVC	Material of drain/sewer changes to Vitrified clay (i.e. all clayware)	00:00:00	226_5a	
	12.01	WL	Water level 30 % height/diameter	00:00:00		1
	12.85	CUW	Loss of vision, camera under water	00:00:00	228_7a	2
	12.85	SA	Survey abandoned	00:00:00	229_8a	1



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 03/08/2017	section number: 31	PLR: Ditch X
---------------------------------	-----------------------------	----------------------------	------------------------------	------------------------

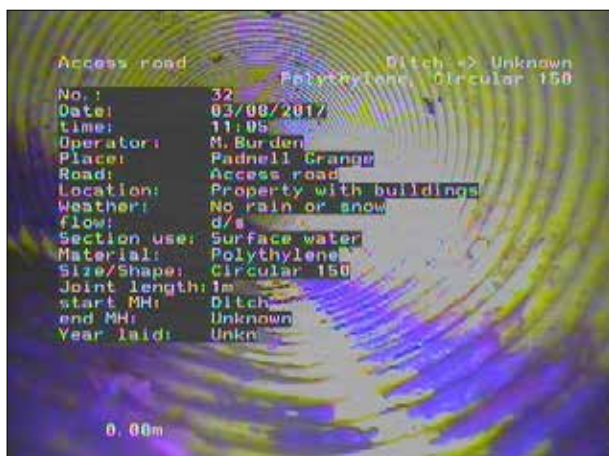


Photo: 222_1a, 00:00:00
 0m, Start node type, manhole, reference number: Ditch

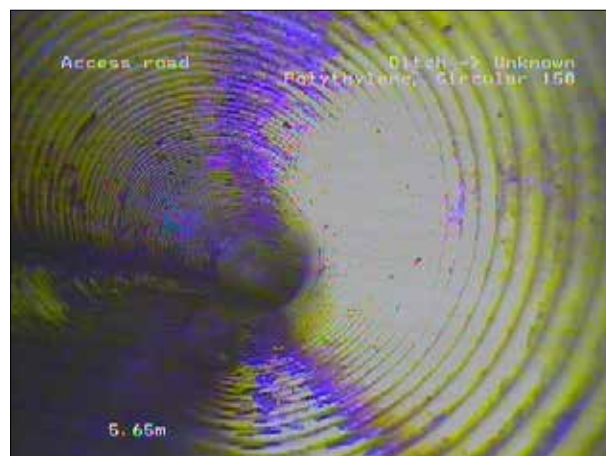


Photo: 224_3a, 00:00:00
 5.65m, Line of drain/sewer deviates right

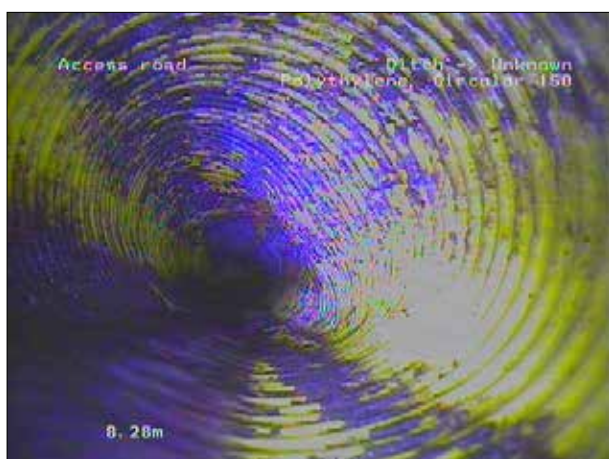


Photo: 225_4a, 00:00:00
 8.28m, Deformed drain/sewer 20 %



Photo: 226_5a, 00:00:00
 12.01m, Material of drain/sewer changes to Vitrified clay (i.e. all clayware)



Inspection photos

Place: Padnell Grange	Road: Access road	Date: 03/08/2017	section number: 31	PLR: Ditch X
---------------------------------	-----------------------------	----------------------------	------------------------------	------------------------

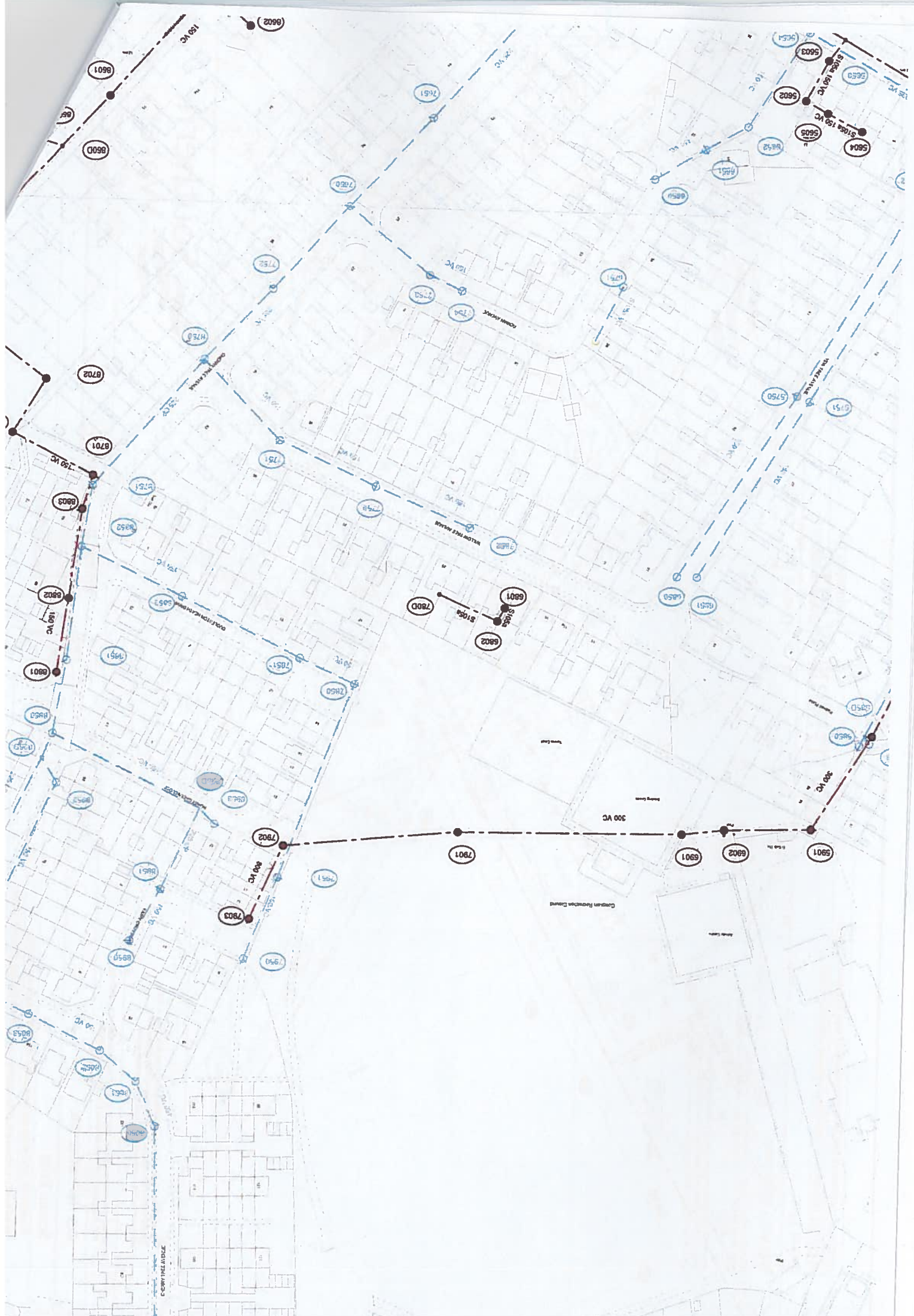


Photo: 228_7a, 00:00:00
12.85m, Loss of vision, camera under water

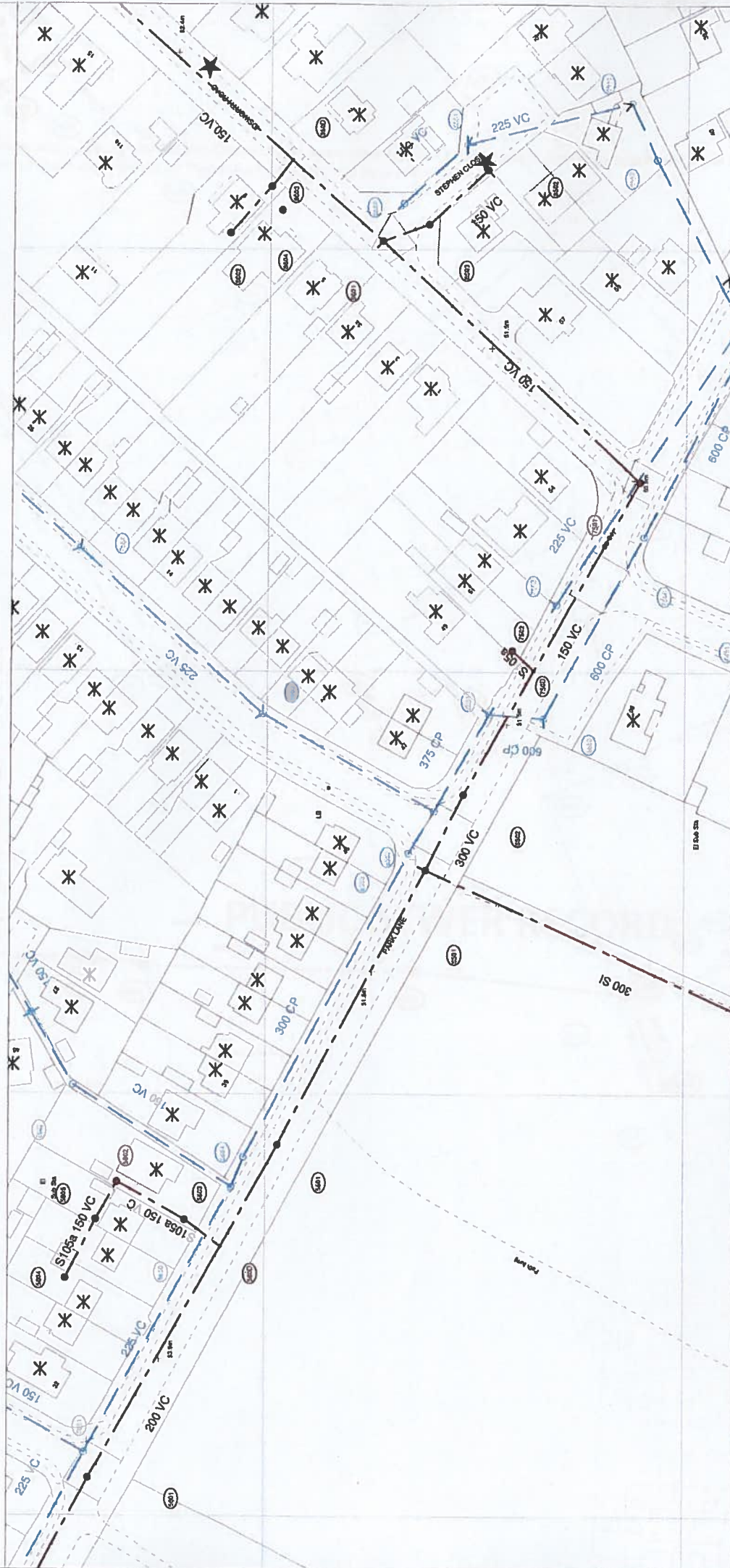


Photo: 229_8a, 00:00:00
12.85m, Survey abandoned

APPENDIX F: Southern Water Sewer Records



SOUTHERN WATER



The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.

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O.S. REF: SU6910NE

Scale: 1:1250

Printed By: Gouri
Improvements

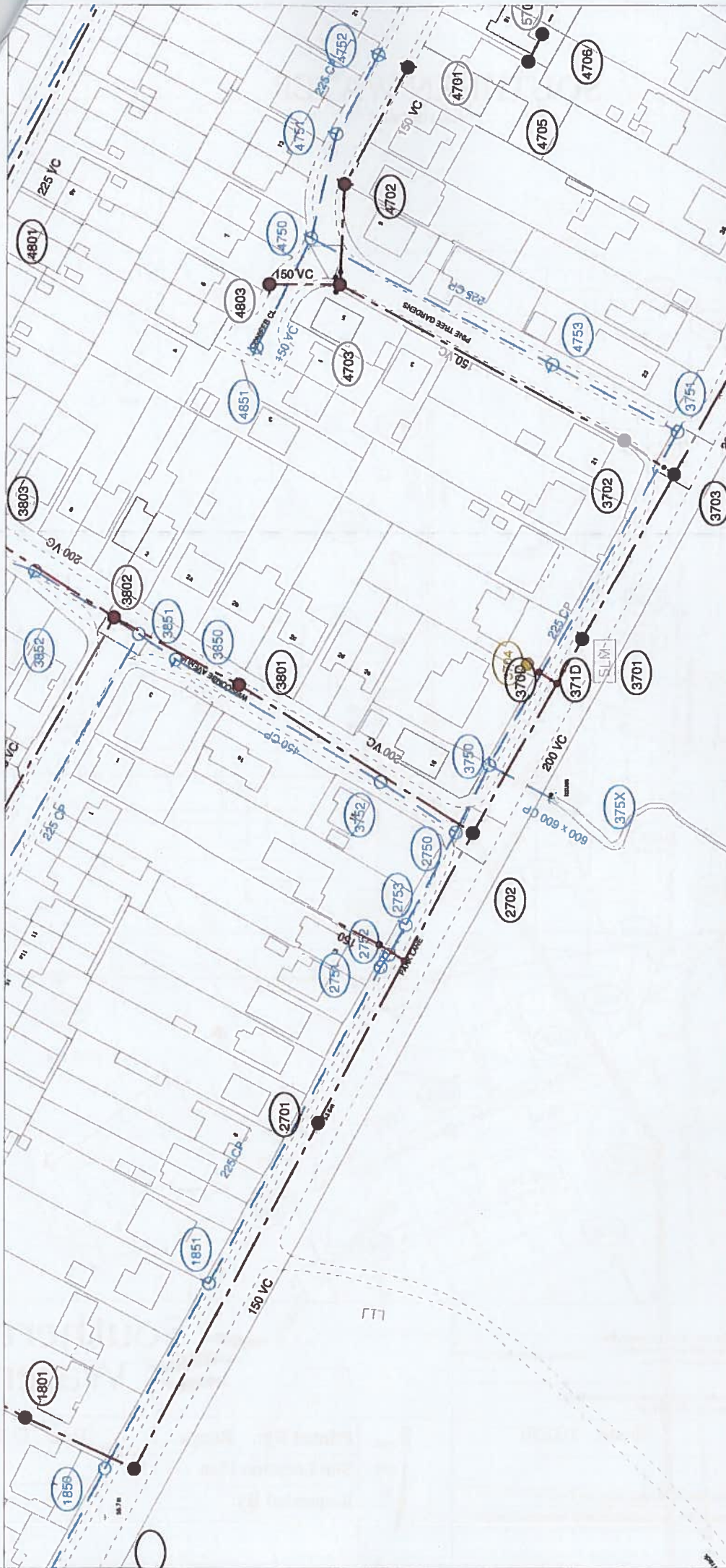
Date: 8-4-2014

Screen Print

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

Requested By:

SOUTHERN WATER



The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.

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Scale: 1:1250

O.S. REF: SU6910NW

Sewer Plot

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

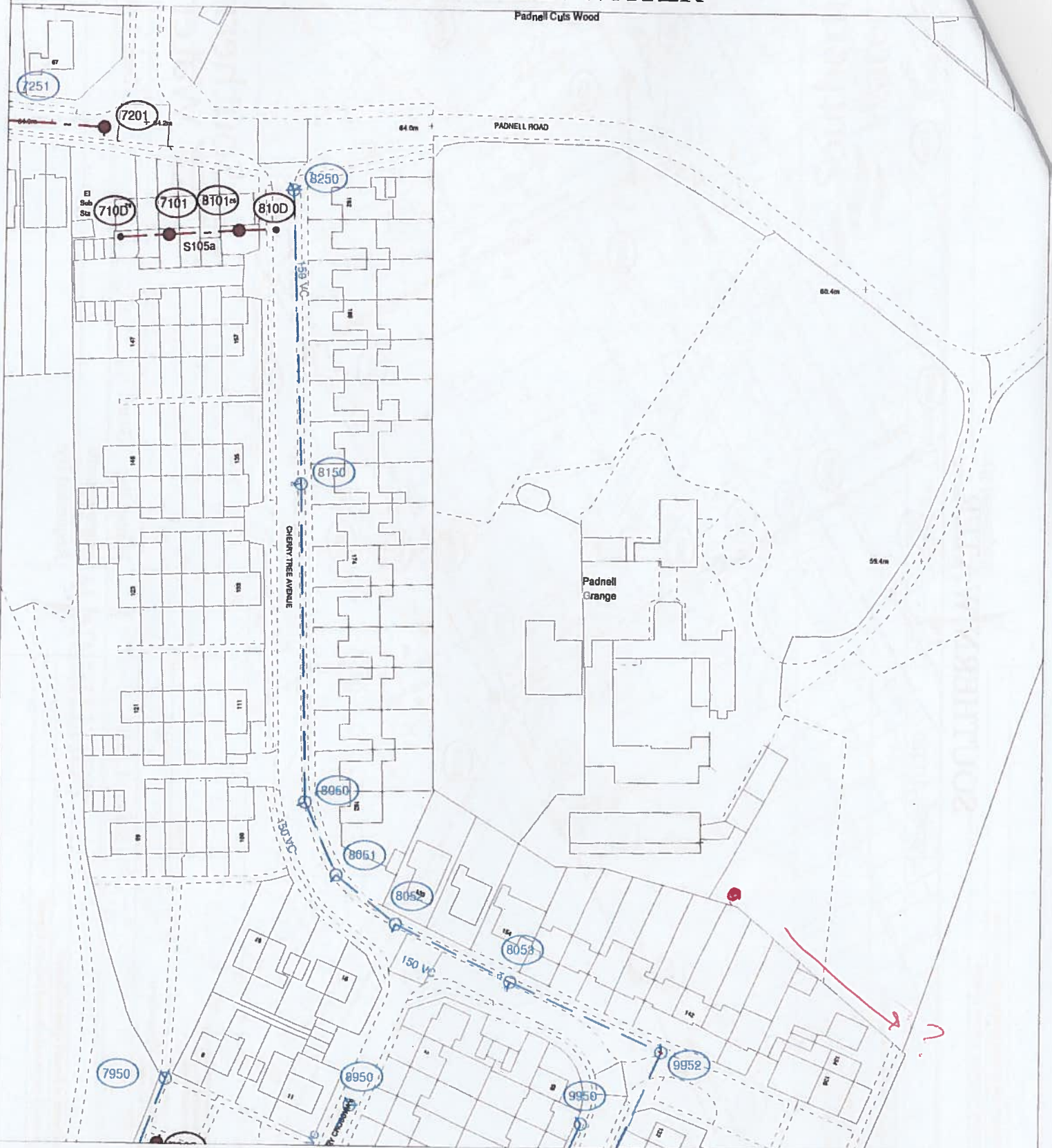


Printed By: Gouri
 Improvements
 Requested By:

Date: 8-4-2014

SOUTHERN WATER

Padnell Culs Wood



The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.

Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530

O.S. REF: SU6911SE

Scale: 1:1250

Sewer Plot

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

Southern Water

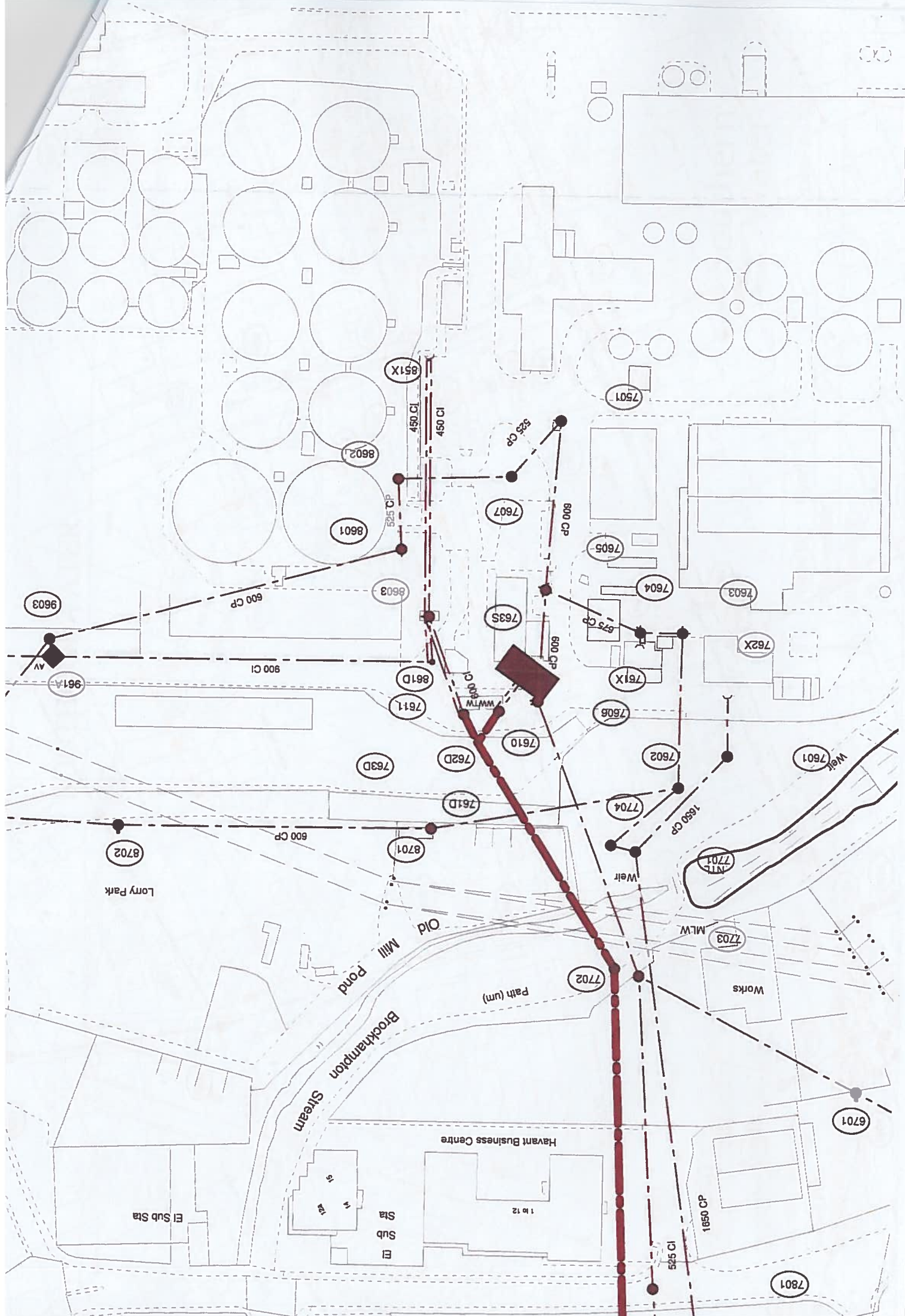
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Date: 13-3-2014

Site Location Plan

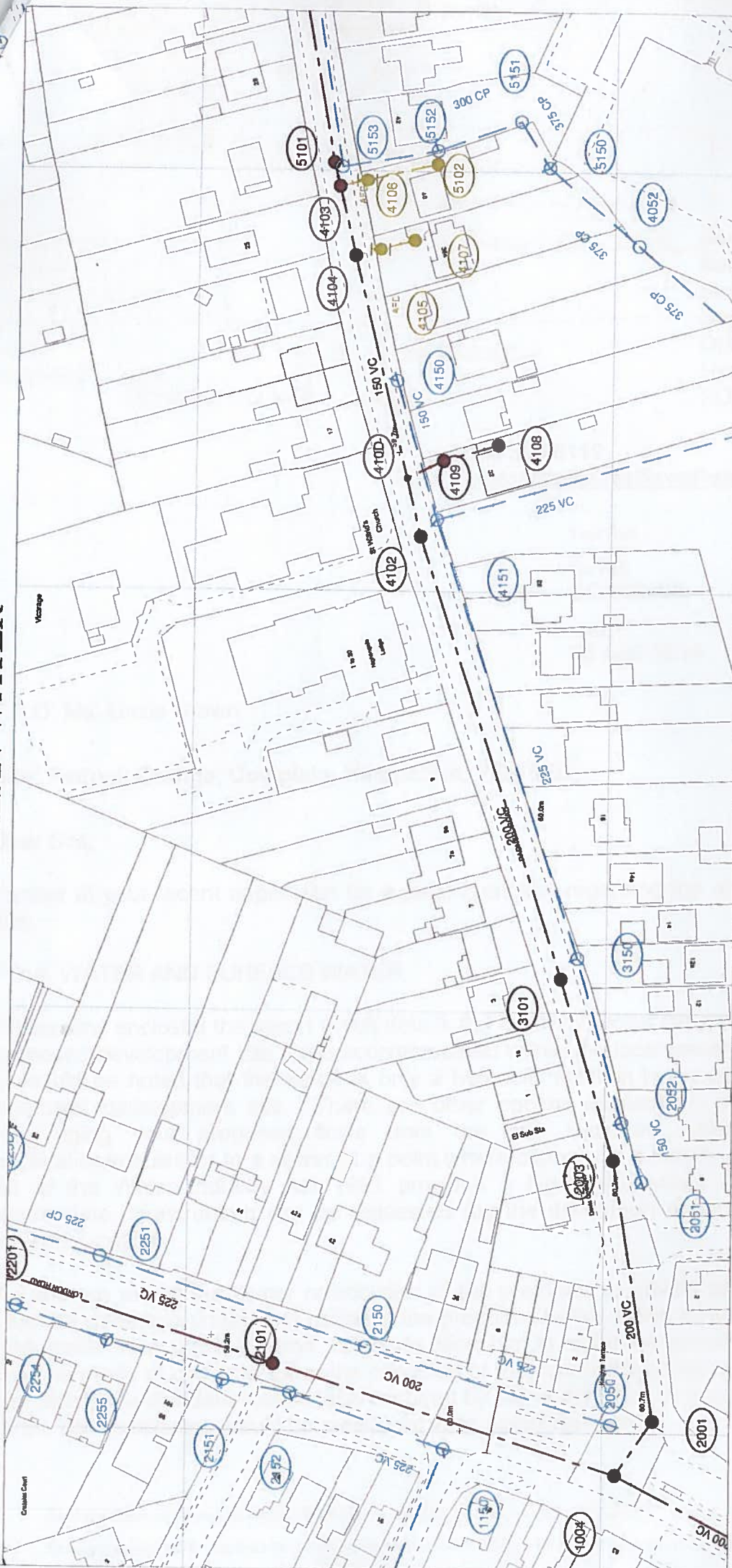
Requested By:







SOUTHERN WATER



Printed By: Gouri
Improvements
Requested By:



Scale: 1:1250

O.S. REF: SU6911SW

Screen Print

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site.

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Date: 8-4-2014

APPENDIX G: Proposed Layout



NOTES

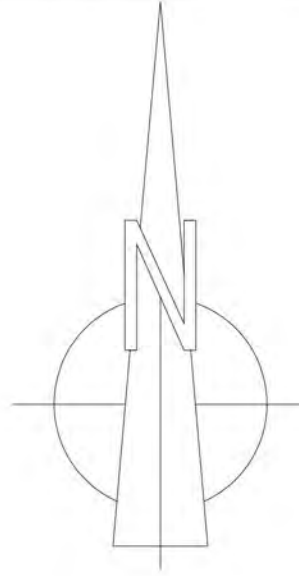
This drawing is the copyright of Thrive Ltd ©. All rights reserved.
Ordnance Survey Data © Crown Copyright. All rights reserved.
Licence No. 100007359. DO NOT scale from this drawing.
Contractors, Sub Contractors and Suppliers are to check all relevant dimensions and levels of the site and building before commencing any shop drawings or building work. Any discrepancies should be recorded to the Architect.
Where applicable this drawing is to be read in conjunction with the Consultants' drawings.

REV	DESCRIPTION	DATE	AUTHOR	CHK'D
P1	Preliminary Issue.	11.12.18	MK	
P2	minor revisions.	08.01.19	brd	
P3	revised to Client's comments	09.01.19	brd	
P4	Revised to Clients/Engineer's comments	14.01.19	MK	
P5	Revised to Clients/Engineer's comments	15.01.19	MK	
P6	Revised to Clients	16.01.19	MK	
P7	Paths added Preliminary Issue to client.	18.01.19 22.01.19	MK SJF	
P8	Parking Ref added to HT.CU	24.01.19	MK	

KEY:

- Application Red Line
- Close Board Fence - Ref Boundary Materials
Layout and details for detailed specification
- 1.8m Boundary Wall
- Garden Gate
- Root Protection Area
- Existing Trees to be Removed
- Existing Trees to be Retained
- BCP Bin Collection Point
- Bin Storage Area

NOTE: For Landscape/Boundary/Surface Materials Please Refer To Hard & Soft Landscape Drawings
NOTE: For specific location of retaining structures & steps please refer to engineers drawings.



scale 1:500
0 10m 20m 30m

PRELIMINARY



Romsey Office

Building 300, The Grange, Romsey Road, Michelmersh, SO51 0AE
t: 01794 367703 f: 01794 367276 www.thrivearchitects.co.uk

PROJECT

Padnell Grange,

Cowplain, Waterlooville

For: Bellway Homes Ltd (Wessex) & The Borrow Foundation Ltd

DRAWING

Coloured Site Layout

SCALE 1:500 @ A1 DATE 30/11/18 AUTHOR MK

JOB NO. BELL170217 DRAWING NO. CSL.01 REV P8

CLIENT REF.

PRIVATE	House Type	Storey Height	No of Bedrooms	SqFt	SqM	No	Total SqFt
PO	Potter	2	2	769	71.4	6	4614
TA	Tallor	2	3	802	74.5	16	12832
TH	Thatcher	2	3	921	85.6	3	2763
CH	Chandler	2	3	951	88.3	9	8559
CA	Carver	2	3	981	91.1	3	2943
LA	Larch	2	3	1087	101.0	7	7609
SC	Scrivener	2	4	1214	112.8	1	1214
CU	Cutler	2	4	1335	124.0	7	9345
BO	Bowyer	2	4	1356	126.0	9	12204
TOTALS						61	62083

Private housing plot areas (sqft)	62083
Net developable area (acres)	4.126
Coverage sqft/acre	15047

AFFORDABLE RENTED	House Type	Storey Height	No of Beds Bedrooms	SqFt	SqM	No	Total SqFt
1B FOG	1B2P	1	1	538	50.0	1	538
1B FLAT	1B2P	1	1	538	50.0	6	3228
2B FLAT	2B4P	1	2	754	70.0	6	4524
S01	2B4P	2	2	842	78.2	7	5894
S02	3B5P	2	3	985	91.5	2	1970
S03	4B6P	2	4	1138	105.7	1	1138
S05	1B2P	2	1	585	54.3	2	1170
TOTALS						25	18462

Affordable Housing plot areas (sqft)	18462
Net developable area (acres)	0.833
Coverage sqft/acre	22166

SITE TOTALS	86	80545
-------------	----	-------

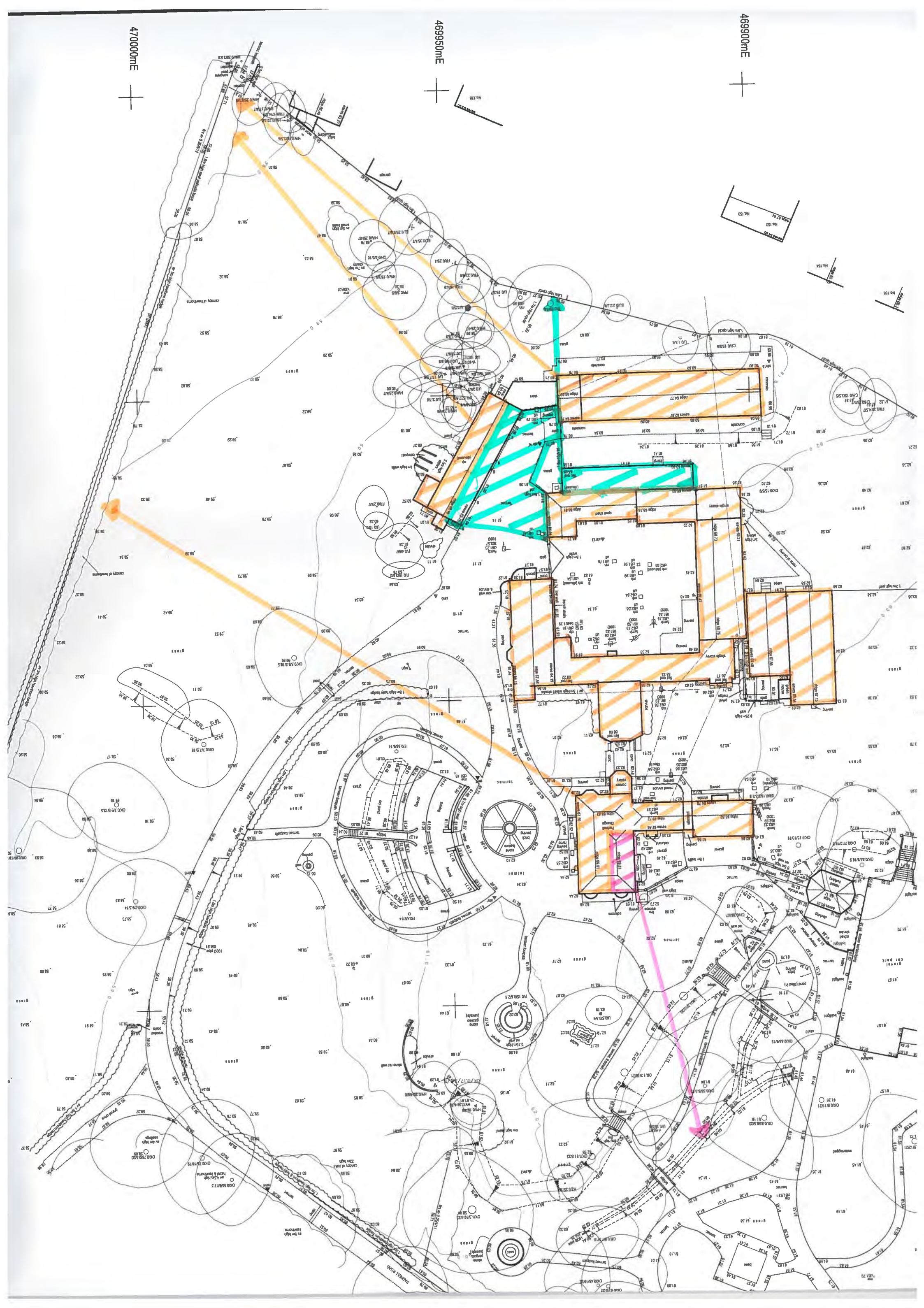
Total Housing plot areas (sqft)	80545
Total Net developable area (acres)	4.959
Total Coverage sqft/acre	16243

APPENDIX H: Indicative Existing Drainage Layout

469900ME

469950ME

470000ME



APPENDIX I: Proposed Drainage Strategy Drawing

APPENDIX J: Greenfield Run-off Rates

Mayer Brown-Carrwood Park		Page 1
Selby Road Leeds LS15 4LG	Padnell Grange Waterlooville Greenfield Run-off Rates	
Date 29/01/2019 File	Designed by CG Checked by SL	
XP Solutions	Source Control 2018.1	
ICP SUDS Mean Annual Flood Input Return Period (years) 100 Soil 0.450 Area (ha) 2.830 Urban 0.000 SAAR (mm) 813 Region Number Region 7 Results l/s QBAR Rural 14.8 QBAR Urban 14.8 Q100 years 47.2 Q1 year 12.6 Q30 years 33.6 Q100 years 47.2		
©1982-2018 Innovyze		

APPENDIX K: Proposed Network Calculations

Mayer Brown-Carrwood Park		Page 1
Selby Road Leeds LS15 4LG	Padnell Grange Waterlooville Proposed Network Calculations	
Date 12/03/2019 File 190312 - Proposed Netwo...	Designed by CG Checked by SL	
XP Solutions	Network 2018.1	

Existing Network Details for Storm

* - Indicates pipe has been modified outside of System 1

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
1.000	10.000	0.100	100.0	0.020	5.00	0.600	o	150	Pipe/Conduit
* 1.001	33.310	0.230	144.8	0.088	5.00	0.600	o	225	Pipe/Conduit
2.000	10.000	0.100	100.0	0.000	5.00	0.600	o	150	Pipe/Conduit
2.001	24.336	0.500	48.7	0.073	5.00	0.600	o	150	Pipe/Conduit
2.002	10.964	0.310	35.4	0.013	0.00	0.600	o	150	Pipe/Conduit
2.003	26.794	0.600	44.7	0.012	0.00	0.600	o	150	Pipe/Conduit
2.004	69.039	2.710	25.5	0.262	0.00	0.600	o	225	Pipe/Conduit
2.005	7.679	0.690	11.1	0.009	0.00	0.600	o	225	Pipe/Conduit
1.002	42.706	0.290	147.3	0.169	0.00	0.600	o	450	Pipe/Conduit
1.003	11.077	0.080	138.5	0.026	0.00	0.600	o	450	Pipe/Conduit
3.000	10.000	0.100	100.0	0.000	5.00	0.600	o	150	Pipe/Conduit
3.001	22.609	0.280	80.7	0.060	5.00	0.600	o	150	Pipe/Conduit
* 3.002	3.600	0.460	7.8	0.000	0.00	0.600	o	150	Pipe/Conduit
* 3.003	17.007	0.320	53.1	0.000	0.00	0.600	o	150	Pipe/Conduit
* 3.004	10.000	0.250	40.0	0.005	0.00	0.600	o	150	Pipe/Conduit
* 3.005	7.847	0.050	156.9	0.008	0.00	0.600	o	225	Pipe/Conduit
* 3.006	23.355	0.160	146.0	0.036	0.00	0.600	o	225	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
1.000	DN -Urban Creep 1	59.340	57.940	1.250	59.340	57.840	1.350		1200
* 1.001	SW1	59.340	57.840	1.275	59.760	57.610	1.925		1200
2.000	DN - Urban Creep 2	63.920	62.520	1.250	63.920	62.420	1.350		1200
2.001	SW2	63.920	62.420	1.350	63.420	61.920	1.350		1200
2.002	SW3	63.420	61.920	1.350	63.110	61.610	1.350		1200
2.003	SW4	63.110	61.610	1.350	62.510	61.010	1.350		1200
2.004	SW5	62.510	61.010	1.275	59.800	58.300	1.275		1200
2.005	SW6	59.800	58.300	1.275	59.760	57.610	1.925		1200
1.002	SW7	59.760	57.610	1.700	60.170	57.320	2.400		1200
1.003	SW8	60.170	57.320	2.400	60.440	57.240	2.750		1200
3.000	DN - Urban Creep 3	62.760	61.460	1.150	62.760	61.360	1.250		1200
3.001	SW9	62.760	61.360	1.250	62.480	61.080	1.250		1200
* 3.002	SW10	62.480	61.080	1.250	62.200	60.620	1.430		1200
* 3.003	SW11	62.200	60.620	1.430	61.700	60.300	1.250		1200
* 3.004	SW12	61.700	60.300	1.250	61.450	60.050	1.250		1200
* 3.005	SW13	61.450	60.050	1.175	61.440	60.000	1.215		1200
* 3.006	SW14	61.440	60.000	1.215	61.600	59.840	1.535		1200

Mayer Brown-Carrwood Park		Page 2
Selby Road Leeds LS15 4LG	Padnell Grange Waterlooville Proposed Network Calculations	
Date 12/03/2019 File 190312 - Proposed Netwo...	Designed by CG Checked by SL	
XP Solutions	Network 2018.1	

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
* 3.007	29.956	0.200	149.8	0.000	0.00	0.600	o	225	Pipe/Conduit
* 3.008	8.606	0.060	143.4	0.087	0.00	0.600	o	225	Pipe/Conduit
* 3.009	32.238	0.220	146.5	0.002	0.00	0.600	o	225	Pipe/Conduit
* 4.000	18.322	0.130	140.9	0.067	5.00	0.600	o	225	Pipe/Conduit
* 4.001	19.627	0.570	34.4	0.000	0.00	0.600	o	225	Pipe/Conduit
* 4.002	6.411	0.640	10.0	0.000	0.00	0.600	o	225	Pipe/Conduit
* 3.010	18.034	0.130	138.7	0.015	0.00	0.600	o	225	Pipe/Conduit
* 3.011	41.140	1.990	20.7	0.079	0.00	0.600	o	225	Pipe/Conduit
1.004	46.575	0.320	145.5	0.142	0.00	0.600	o	450	Pipe/Conduit
1.005	6.951	0.050	139.0	0.019	0.00	0.600	o	450	Pipe/Conduit
1.006	15.251	0.110	138.6	0.000	0.00	0.600	o	450	Pipe/Conduit
* 5.000	19.879	0.480	41.4	0.008	5.00	0.600	o	150	Pipe/Conduit
* 5.001	17.150	1.900	9.0	0.008	0.00	0.600	o	150	Pipe/Conduit
1.007	5.788	0.040	144.7	0.000	0.00	0.600	o	450	Pipe/Conduit
1.008	14.128	2.220	6.4	0.000	0.00	0.600	o	450	Pipe/Conduit
1.009	10.880	0.000	0.0	0.000	0.00	0.600	o	450	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
* 3.007	SW15	61.600	59.840	1.535	62.200	59.640	2.335		1200
* 3.008	SW16	62.200	59.640	2.335	62.200	59.580	2.395		1200
* 3.009	SW17	62.200	59.580	2.395	62.540	59.360	2.955		1200
* 4.000	SW18	62.100	60.700	1.175	62.300	60.570	1.505		1200
* 4.001	SW19	62.300	60.570	1.505	62.500	60.000	2.275		1200
* 4.002	SW20	62.500	60.000	2.275	62.540	59.360	2.955		1200
* 3.010	SW21	62.540	59.360	2.955	62.000	59.230	2.545		1200
* 3.011	SW22	62.000	59.230	2.545	60.440	57.240	2.975		1200
1.004	SW23	60.440	57.240	2.750	60.020	56.920	2.650		1200
1.005	SW24	60.020	56.920	2.650	60.020	56.870	2.700		1200
1.006	SW25	60.020	56.870	2.700	60.020	56.760	2.810		1200
* 5.000	SW26	60.540	59.140	1.250	60.060	58.660	1.250		1200
* 5.001	SW27	60.060	58.660	1.250	60.020	56.760	3.110		1200
1.007	SW28	60.020	56.760	2.810	58.900	56.720	1.730		1200
1.008	SW29	58.900	56.720	1.730	57.000	54.500	2.050		1200
1.009	Tank	57.000	54.500	2.050	57.000	54.500	2.050		1200

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)	Section Type
* 1.010	8.366	0.060	139.4	0.000	0.00	0.600	o	375	Pipe/Conduit
* 1.011	74.770	0.880	85.0	0.000	0.00	0.600	o	150	Pipe/Conduit
* 1.012	6.844	0.050	136.9	0.000	0.00	0.600	o	150	Pipe/Conduit

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
* 1.010	Hydrobrake	57.000	54.500	2.125	58.000	54.440	3.185	Hydro-Brake®	1200
* 1.011	SW30	58.000	54.440	3.410	54.000	53.560	0.290		1200
* 1.012	SW31	54.000	53.560	0.290	53.900	53.510	0.240		1200

Free Flowing Outfall Details for Storm

Outfall Pipe	Outfall Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
	1.012		53.900	53.510	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.328		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: Hydrobrake, DS/PN: 1.010, Volume (m³): 4.4

Unit Reference	MD-SHE-0167-1500-1500-1500
Design Head (m)	1.500
Design Flow (l/s)	15.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	167
Invert Level (m)	54.500
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	15.0
Flush-Flo™	0.442	14.9
Kick-Flo®	0.951	12.1
Mean Flow over Head Range	-	13.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.0	1.200	13.5	3.000	20.9	7.000	31.3
0.200	13.5	1.400	14.5	3.500	22.5	7.500	32.4
0.300	14.5	1.600	15.5	4.000	23.9	8.000	33.4
0.400	14.9	1.800	16.3	4.500	25.3	8.500	34.4
0.500	14.9	2.000	17.2	5.000	26.6	9.000	35.4
0.600	14.7	2.200	18.0	5.500	27.9	9.500	36.3
0.800	13.8	2.400	18.7	6.000	29.1		
1.000	12.4	2.600	19.5	6.500	30.2		

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Storage Structures for Storm

Cellular Storage Manhole: Tank, DS/PN: 1.009

Invert Level (m) 54.500 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	460.0	0.0	1.300	460.0	0.0
0.100	460.0	0.0	1.400	460.0	0.0
0.200	460.0	0.0	1.500	460.0	0.0
0.300	460.0	0.0	1.600	460.0	0.0
0.400	460.0	0.0	1.601	0.0	0.0
0.500	460.0	0.0	1.800	0.0	0.0
0.600	460.0	0.0	1.900	0.0	0.0
0.700	460.0	0.0	2.000	0.0	0.0
0.800	460.0	0.0	2.100	0.0	0.0
0.900	460.0	0.0	2.200	0.0	0.0
1.000	460.0	0.0	2.300	0.0	0.0
1.100	460.0	0.0	2.400	0.0	0.0
1.200	460.0	0.0	2.500	0.0	0.0

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.328
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.700 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	DN -Urban Creep 1	60 Summer	1	+0%				
1.001	SW1	60 Summer	1	+0%				
2.000	DN - Urban Creep 2	240 Winter	1	+0%				
2.001	SW2	60 Summer	1	+0%				
2.002	SW3	60 Summer	1	+0%				
2.003	SW4	60 Summer	1	+0%				
2.004	SW5	60 Summer	1	+0%				
2.005	SW6	60 Summer	1	+0%				
1.002	SW7	60 Summer	1	+0%				
1.003	SW8	60 Summer	1	+0%				
3.000	DN - Urban Creep 3	240 Winter	1	+0%				
3.001	SW9	60 Summer	1	+0%				
3.002	SW10	60 Summer	1	+0%				
3.003	SW11	60 Summer	1	+0%				
3.004	SW12	60 Summer	1	+0%				
3.005	SW13	60 Summer	1	+0%				
3.006	SW14	60 Summer	1	+0%				
3.007	SW15	60 Summer	1	+0%				
3.008	SW16	60 Summer	1	+0%				
3.009	SW17	60 Summer	1	+0%				

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

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	DN -Urban Creep 1	57.973	-0.117	0.000	0.11		1.8	OK	
1.001	SW1	57.914	-0.151	0.000	0.24		9.5	OK	
2.000	DN - Urban Creep 2	62.520	-0.150	0.000	0.00		0.0	OK	
2.001	SW2	62.473	-0.097	0.000	0.27		6.5	OK	
2.002	SW3	61.974	-0.096	0.000	0.28		7.6	OK	
2.003	SW4	61.670	-0.090	0.000	0.33		8.5	OK	
2.004	SW5	61.094	-0.141	0.000	0.30		30.0	OK	
2.005	SW6	58.378	-0.147	0.000	0.26		30.7	OK	
1.002	SW7	57.755	-0.305	0.000	0.23		53.8	OK	
1.003	SW8	57.498	-0.272	0.000	0.33		55.7	OK	
3.000	DN - Urban Creep 3	61.460	-0.150	0.000	0.00		0.0	OK	
3.001	SW9	61.414	-0.096	0.000	0.28		5.3	OK	
3.002	SW10	61.115	-0.115	0.000	0.13		5.3	OK	
3.003	SW11	60.669	-0.101	0.000	0.23		5.3	OK	
3.004	SW12	60.348	-0.102	0.000	0.23		5.7	OK	
3.005	SW13	60.119	-0.156	0.000	0.20		6.4	OK	
3.006	SW14	60.074	-0.151	0.000	0.24		9.3	OK	
3.007	SW15	59.914	-0.151	0.000	0.23		9.2	OK	
3.008	SW16	59.748	-0.117	0.000	0.46		16.0	OK	
3.009	SW17	59.679	-0.126	0.000	0.40		16.1	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
4.000	SW18	60 Summer	1	+0%				
4.001	SW19	60 Summer	1	+0%				
4.002	SW20	60 Summer	1	+0%				
3.010	SW21	60 Summer	1	+0%				
3.011	SW22	60 Summer	1	+0%				
1.004	SW23	60 Summer	1	+0%				
1.005	SW24	60 Summer	1	+0%				
1.006	SW25	60 Summer	1	+0%				
5.000	SW26	60 Summer	1	+0%				
5.001	SW27	60 Summer	1	+0%				
1.007	SW28	60 Summer	1	+0%				
1.008	SW29	60 Summer	1	+0%				
1.009	Tank	240 Winter	1	+0%				
1.010	Hydrobrake	240 Winter	1	+0%				
1.011	SW30	240 Winter	1	+0%				
1.012	SW31	360 Winter	1	+0%	1/120 Winter			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.000	SW18	60.758	-0.167	0.000	0.15		6.0	OK	
4.001	SW19	60.610	-0.185	0.000	0.07		5.9	OK	
4.002	SW20	60.033	-0.192	0.000	0.05		5.9	OK	
3.010	SW21	59.483	-0.102	0.000	0.58		22.9	OK	
3.011	SW22	59.309	-0.146	0.000	0.26		28.9	OK	
1.004	SW23	57.437	-0.253	0.000	0.39		95.4	OK	
1.005	SW24	57.164	-0.206	0.000	0.57		96.6	OK	
1.006	SW25	57.100	-0.220	0.000	0.52		96.8	OK	
5.000	SW26	59.156	-0.134	0.000	0.03		0.7	OK	
5.001	SW27	58.676	-0.134	0.000	0.02		1.4	OK	
1.007	SW28	57.015	-0.195	0.000	0.61		97.8	OK	
1.008	SW29	56.822	-0.348	0.000	0.12		97.5	OK	
1.009	Tank	54.777	-0.173	0.000	0.22		15.7	OK	
1.010	Hydrobrake	54.775	-0.100	0.000	0.13		13.9	OK	
1.011	SW30	54.536	-0.054	0.000	0.73		13.9	OK	
1.012	SW31	53.710	0.000	0.000	1.07		13.8	FLOOD RISK	

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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall C. Level Name (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.012	53.900	53.510	0.000	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.328		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: Hydrobrake, DS/PN: 1.010, Volume (m³): 4.4

Unit Reference	MD-SHE-0167-1500-1500-1500
Design Head (m)	1.500
Design Flow (l/s)	15.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	167
Invert Level (m)	54.500
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	15.0
Flush-Flo™	0.442	14.9
Kick-Flo®	0.951	12.1
Mean Flow over Head Range	-	13.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.0	1.200	13.5	3.000	20.9	7.000	31.3
0.200	13.5	1.400	14.5	3.500	22.5	7.500	32.4
0.300	14.5	1.600	15.5	4.000	23.9	8.000	33.4
0.400	14.9	1.800	16.3	4.500	25.3	8.500	34.4
0.500	14.9	2.000	17.2	5.000	26.6	9.000	35.4
0.600	14.7	2.200	18.0	5.500	27.9	9.500	36.3
0.800	13.8	2.400	18.7	6.000	29.1		
1.000	12.4	2.600	19.5	6.500	30.2		

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Storage Structures for Storm

Cellular Storage Manhole: Tank, DS/PN: 1.009

Invert Level (m) 54.500 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	460.0	0.0	1.300	460.0	0.0
0.100	460.0	0.0	1.400	460.0	0.0
0.200	460.0	0.0	1.500	460.0	0.0
0.300	460.0	0.0	1.600	460.0	0.0
0.400	460.0	0.0	1.601	0.0	0.0
0.500	460.0	0.0	1.800	0.0	0.0
0.600	460.0	0.0	1.900	0.0	0.0
0.700	460.0	0.0	2.000	0.0	0.0
0.800	460.0	0.0	2.100	0.0	0.0
0.900	460.0	0.0	2.200	0.0	0.0
1.000	460.0	0.0	2.300	0.0	0.0
1.100	460.0	0.0	2.400	0.0	0.0
1.200	460.0	0.0	2.500	0.0	0.0

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.328
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.700 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow
1.000	DN -Urban Creep 1	60 Summer	30	+0%			
1.001	SW1	60 Summer	30	+0%			
2.000	DN - Urban Creep 2	240 Winter	30	+0%			
2.001	SW2	60 Summer	30	+0%			
2.002	SW3	60 Summer	30	+0%			
2.003	SW4	60 Summer	30	+0%			
2.004	SW5	60 Summer	30	+0%			
2.005	SW6	60 Summer	30	+0%			
1.002	SW7	60 Summer	30	+0%			
1.003	SW8	60 Summer	30	+0%	30/60 Summer		
3.000	DN - Urban Creep 3	240 Winter	30	+0%			
3.001	SW9	60 Summer	30	+0%			
3.002	SW10	60 Summer	30	+0%			
3.003	SW11	60 Summer	30	+0%			
3.004	SW12	60 Summer	30	+0%			
3.005	SW13	60 Summer	30	+0%			
3.006	SW14	60 Summer	30	+0%			
3.007	SW15	60 Summer	30	+0%			
3.008	SW16	60 Summer	30	+0%	30/60 Summer		
3.009	SW17	60 Summer	30	+0%	30/60 Summer		

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1.000	DN -Urban Creep 1		58.068	-0.022	0.000	0.27		4.3
1.001	SW1		58.055	-0.010	0.000	0.57		23.0
2.000	DN - Urban Creep 2		62.520	-0.150	0.000	0.00		0.0
2.001	SW2		62.508	-0.062	0.000	0.65		15.7
2.002	SW3		62.012	-0.058	0.000	0.69		18.5
2.003	SW4		61.715	-0.045	0.000	0.83		21.0
2.004	SW5		61.161	-0.074	0.000	0.78		78.1
2.005	SW6		58.437	-0.088	0.000	0.68		80.1
1.002	SW7		58.008	-0.052	0.000	0.57		136.8
1.003	SW8		57.912	0.142	0.000	0.70		118.5
3.000	DN - Urban Creep 3		61.460	-0.150	0.000	0.00		0.0
3.001	SW9		61.452	-0.058	0.000	0.69		12.9
3.002	SW10		61.136	-0.094	0.000	0.30		12.8
3.003	SW11		60.701	-0.069	0.000	0.56		12.8
3.004	SW12		60.380	-0.070	0.000	0.55		13.8
3.005	SW13		60.162	-0.113	0.000	0.49		15.5
3.006	SW14		60.125	-0.100	0.000	0.58		22.9
3.007	SW15		59.996	-0.069	0.000	0.55		21.7
3.008	SW16		59.938	0.073	0.000	1.05		36.3
3.009	SW17		59.856	0.051	0.000	0.90		36.3

PN	US/MH Name	Status	Level Exceeded
1.000	DN -Urban Creep 1	OK	
1.001	SW1	OK	
2.000	DN - Urban Creep 2	OK	
2.001	SW2	OK	
2.002	SW3	OK	
2.003	SW4	OK	
2.004	SW5	OK	
2.005	SW6	OK	
1.002	SW7	OK	
1.003	SW8	SURCHARGED	
3.000	DN - Urban Creep 3	OK	
3.001	SW9	OK	
3.002	SW10	OK	
3.003	SW11	OK	
3.004	SW12	OK	
3.005	SW13	OK	
3.006	SW14	OK	
3.007	SW15	OK	
3.008	SW16	SURCHARGED	
3.009	SW17	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
4.000	SW18	60 Summer	30	+0%				
4.001	SW19	60 Summer	30	+0%				
4.002	SW20	60 Summer	30	+0%				
3.010	SW21	60 Summer	30	+0%	30/60 Summer			
3.011	SW22	60 Summer	30	+0%				
1.004	SW23	60 Summer	30	+0%	30/60 Summer			
1.005	SW24	60 Summer	30	+0%	30/60 Summer			
1.006	SW25	60 Summer	30	+0%	30/60 Summer			
5.000	SW26	60 Summer	30	+0%				
5.001	SW27	60 Summer	30	+0%				
1.007	SW28	60 Summer	30	+0%	30/60 Summer			
1.008	SW29	60 Summer	30	+0%				
1.009	Tank	240 Winter	30	+0%	30/60 Summer			
1.010	Hydrobrake	360 Winter	30	+0%	30/60 Summer			
1.011	SW30	120 Winter	30	+0%				
1.012	SW31	480 Winter	30	+0%	30/60 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.000	SW18	60.794	-0.131	0.000	0.37		14.4		OK
4.001	SW19	60.634	-0.161	0.000	0.18		14.4		OK
4.002	SW20	60.053	-0.172	0.000	0.13		14.3		OK
3.010	SW21	59.675	0.090	0.000	1.33		52.6	SURCHARGED	
3.011	SW22	59.358	-0.097	0.000	0.61		66.8		OK
1.004	SW23	57.812	0.122	0.000	0.86		208.8	SURCHARGED	
1.005	SW24	57.575	0.205	0.000	1.25		210.6	SURCHARGED	
1.006	SW25	57.434	0.114	0.000	1.13		211.0	SURCHARGED	
5.000	SW26	59.165	-0.125	0.000	0.07		1.7		OK
5.001	SW27	58.684	-0.126	0.000	0.06		3.5		OK
1.007	SW28	57.293	0.083	0.000	1.34		214.0	SURCHARGED	
1.008	SW29	56.874	-0.296	0.000	0.25		214.1		OK
1.009	Tank	55.232	0.282	0.000	0.28		20.3	SURCHARGED	
1.010	Hydrobrake	55.266	0.391	0.000	0.14		14.9	SURCHARGED	
1.011	SW30	54.540	-0.050	0.000	0.78		14.9		OK
1.012	SW31	53.719	0.009	0.000	1.15		14.9	FLOOD RISK	

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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall C. Level Name (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.012	53.900	53.510	0.000	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Storm Duration (mins)	30
Ratio R	0.328		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: Hydrobrake, DS/PN: 1.010, Volume (m³): 4.4

Unit Reference	MD-SHE-0167-1500-1500-1500
Design Head (m)	1.500
Design Flow (l/s)	15.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	167
Invert Level (m)	54.500
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.500	15.0
Flush-Flo™	0.442	14.9
Kick-Flo®	0.951	12.1
Mean Flow over Head Range	-	13.0

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.0	1.200	13.5	3.000	20.9	7.000	31.3
0.200	13.5	1.400	14.5	3.500	22.5	7.500	32.4
0.300	14.5	1.600	15.5	4.000	23.9	8.000	33.4
0.400	14.9	1.800	16.3	4.500	25.3	8.500	34.4
0.500	14.9	2.000	17.2	5.000	26.6	9.000	35.4
0.600	14.7	2.200	18.0	5.500	27.9	9.500	36.3
0.800	13.8	2.400	18.7	6.000	29.1		
1.000	12.4	2.600	19.5	6.500	30.2		

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Storage Structures for Storm

Cellular Storage Manhole: Tank, DS/PN: 1.009

Invert Level (m) 54.500 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	460.0	0.0	1.300	460.0	0.0
0.100	460.0	0.0	1.400	460.0	0.0
0.200	460.0	0.0	1.500	460.0	0.0
0.300	460.0	0.0	1.600	460.0	0.0
0.400	460.0	0.0	1.601	0.0	0.0
0.500	460.0	0.0	1.800	0.0	0.0
0.600	460.0	0.0	1.900	0.0	0.0
0.700	460.0	0.0	2.000	0.0	0.0
0.800	460.0	0.0	2.100	0.0	0.0
0.900	460.0	0.0	2.200	0.0	0.0
1.000	460.0	0.0	2.300	0.0	0.0
1.100	460.0	0.0	2.400	0.0	0.0
1.200	460.0	0.0	2.500	0.0	0.0

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.328
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.700 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 100
 Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	DN -Urban Creep 1	60 Summer	100	+40%	100/60	Summer	
1.001	SW1	60 Summer	100	+40%	100/60	Summer	
2.000	DN - Urban Creep 2	60 Summer	100	+40%	100/60	Summer	
2.001	SW2	60 Summer	100	+40%	100/60	Summer	
2.002	SW3	60 Summer	100	+40%	100/60	Summer	
2.003	SW4	60 Summer	100	+40%	100/60	Summer	
2.004	SW5	60 Summer	100	+40%	100/60	Summer	
2.005	SW6	60 Summer	100	+40%	100/60	Summer	
1.002	SW7	60 Summer	100	+40%	100/60	Summer	
1.003	SW8	60 Summer	100	+40%	100/60	Summer	
3.000	DN - Urban Creep 3	60 Summer	100	+40%	100/60	Summer	
3.001	SW9	60 Summer	100	+40%	100/60	Summer	
3.002	SW10	60 Summer	100	+40%	100/60	Summer	
3.003	SW11	60 Summer	100	+40%	100/60	Summer	
3.004	SW12	60 Summer	100	+40%	100/60	Summer	
3.005	SW13	60 Summer	100	+40%	100/60	Summer	
3.006	SW14	60 Summer	100	+40%	100/60	Summer	
3.007	SW15	60 Summer	100	+40%	100/60	Summer	
3.008	SW16	60 Summer	100	+40%	100/60	Summer	
3.009	SW17	60 Summer	100	+40%	100/60	Summer	

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

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1.000	DN -Urban Creep 1		59.329	1.239	0.000	0.48		7.7
1.001	SW1		59.308	1.243	0.000	0.87		35.2
2.000	DN - Urban Creep 2		63.294	0.624	0.000	0.23		3.6
2.001	SW2		63.302	0.732	0.000	0.92		22.4
2.002	SW3		63.023	0.953	0.000	1.00		26.9
2.003	SW4		62.833	1.073	0.000	1.25		31.9
2.004	SW5		62.390	1.155	0.000	1.00		100.7
2.005	SW6		59.668	1.143	0.000	0.90		104.9
1.002	SW7		59.133	1.073	0.000	0.79		188.1
1.003	SW8		58.948	1.178	0.000	1.16		196.0
3.000	DN - Urban Creep 3		61.664	0.054	0.000	0.07		1.2
3.001	SW9		61.669	0.159	0.000	1.15		21.6
3.002	SW10		61.483	0.253	0.000	0.49		20.6
3.003	SW11		61.426	0.656	0.000	0.82		18.7
3.004	SW12		61.286	0.836	0.000	0.87		21.9
3.005	SW13		61.182	0.907	0.000	0.82		25.9
3.006	SW14		61.162	0.937	0.000	0.86		33.8
3.007	SW15		61.078	1.013	0.000	0.92		36.6
3.008	SW16		60.997	1.132	0.000	1.45		50.1
3.009	SW17		60.891	1.086	0.000	1.33		53.4

PN	US/MH Name	Status	Level Exceeded
1.000	DN -Urban Creep 1	FLOOD RISK	
1.001	SW1	FLOOD RISK	
2.000	DN - Urban Creep 2	SURCHARGED	
2.001	SW2	SURCHARGED	
2.002	SW3	SURCHARGED	
2.003	SW4	FLOOD RISK	
2.004	SW5	FLOOD RISK	
2.005	SW6	FLOOD RISK	
1.002	SW7	SURCHARGED	
1.003	SW8	SURCHARGED	
3.000	DN - Urban Creep 3	SURCHARGED	
3.001	SW9	SURCHARGED	
3.002	SW10	SURCHARGED	
3.003	SW11	SURCHARGED	
3.004	SW12	SURCHARGED	
3.005	SW13	FLOOD RISK	
3.006	SW14	FLOOD RISK	
3.007	SW15	SURCHARGED	
3.008	SW16	SURCHARGED	
3.009	SW17	SURCHARGED	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
4.000	SW18	60 Summer	100	+40%				
4.001	SW19	60 Summer	100	+40%				
4.002	SW20	60 Summer	100	+40%	100/60 Summer			
3.010	SW21	60 Summer	100	+40%	100/60 Summer			
3.011	SW22	60 Summer	100	+40%	100/60 Summer			
1.004	SW23	60 Summer	100	+40%	100/60 Summer			
1.005	SW24	60 Summer	100	+40%	100/60 Summer			
1.006	SW25	60 Summer	100	+40%	100/60 Summer			
5.000	SW26	60 Summer	100	+40%				
5.001	SW27	60 Summer	100	+40%				
1.007	SW28	60 Summer	100	+40%	100/60 Summer			
1.008	SW29	60 Summer	100	+40%				
1.009	Tank	360 Winter	100	+40%	100/60 Summer			
1.010	Hydrobrake	360 Winter	100	+40%	100/60 Summer			
1.011	SW30	360 Winter	100	+40%				
1.012	SW31	360 Winter	100	+40%	100/60 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
4.000	SW18	60.836	-0.089	0.000	0.67		26.5		OK
4.001	SW19	60.676	-0.119	0.000	0.33		26.4		OK
4.002	SW20	60.633	0.408	0.000	0.20		23.0	SURCHARGED	
3.010	SW21	60.615	1.030	0.000	1.87		73.8	SURCHARGED	
3.011	SW22	60.227	0.772	0.000	0.84		91.7	SURCHARGED	
1.004	SW23	58.826	1.136	0.000	1.37		330.1	SURCHARGED	
1.005	SW24	58.226	0.856	0.000	1.98		335.5	SURCHARGED	
1.006	SW25	57.870	0.550	0.000	1.79		335.5	SURCHARGED	
5.000	SW26	59.175	-0.115	0.000	0.12		3.2		OK
5.001	SW27	58.694	-0.116	0.000	0.11		6.4		OK
1.007	SW28	57.514	0.304	0.000	2.14		340.6	SURCHARGED	
1.008	SW29	56.919	-0.251	0.000	0.41		340.8		OK
1.009	Tank	56.086	1.136	0.000	0.39		28.2	SURCHARGED	
1.010	Hydrobrake	56.110	1.235	0.000	0.14		15.2	SURCHARGED	
1.011	SW30	54.542	-0.048	0.000	0.80		15.2		OK
1.012	SW31	53.722	0.012	0.000	1.18		15.2	FLOOD RISK	

APPENDIX L: Overland Flow Routes Drawing

APPENDIX M: Hampshire County Council LLFA Developer Check List

Hampshire County Council's Flood and Water Management Team have created this template to assist developers when seeking planning permission for new sites.

In order for the team to be able to act as a statutory consultee for surface water drainage for major planning applications ALL of the following information is required.

This check list is designed to help developers provide the correct information and reduce time spent by HCC searching for details we require.

FOR ALL APPLICATIONS WE ARE ASKED TO COMMENT ON WE WILL NEED THE FOLLOWING INFORMATION - PLEASE FILL IN THIS FORM AND SUBMIT WITH ANY SURFACE WATER CONSULTATIONS

	Information required:	Included	Document chapter/page number where information can be viewed
1	Background information on the proposed design. Including proposal; site; plans of surface water drainage and any SuDS featured in the scheme	✓	Chapter 5 and Appendix I of the FRA.
2	Evidence that the applicant understands the sensitivity of discharge points relating to the receiving water body. Where this is main river or discharging through contaminated land the LPA may have to consult the Environment Agency (EA)	✓	Chapter 5 of the FRA.
3	Evidence of and information on the existing surface water flow paths of undeveloped (greenfield) sites	✓	Chapter 5, Figure 5.2 and Appendix H of the FRA.
4	Evidence of and information on the existing drainage network for previously developed (brownfield) sites	✓	Chapter 5, Figure 5.2 and Appendix E of the FRA.
5	Identification of and information on areas that may have been affected by failures in the existing drainage regime	✓	Chapter 5 of the FRA.
6	Evidence that the proposed drainage will follow the same pattern as the existing . This avoids directing flow to other locations.	✓	Chapter 5 of the FRA.
7	Information evidencing that the correct level of water treatment exists in the system in accordance with the Ciria SuDS Manual C753	✓	Chapter 5 of the FRA.
8	Where infiltration is used for drainage , evidence that a suitable number of infiltration tests have been completed. These need to be across the whole site; within different geologies and to a similar depth to the proposed infiltration devices. Tests must be completed according to the BRE 365 method or another recognised method including British Standard BS 5930: 2015	N/A	Infiltration Testing is contained in Appendix D of the FRA, although the rates are too low to utilise.
9	If not using infiltration for drainage - Existing and proposed run-off rate calculations completed according to a suitable method such as IH124 or FEH. Information is available from UK Sustainable Drainage: Guidance and Tools. Calculations must show that the proposed run off rates do not exceed the existing run-off rates. This must be shown for a one in one year event plus climate change and a one in one hundred year event plus climate change.	✓	Chapter 5 and Appendix J of the FRA.
10	If not using infiltration for drainage - Existing and proposed run-off volume calculations completed according to a suitable method such as IH124 or FEH. Calculations must show that, where reasonably practical, runoff volume should not exceed the greenfield runoff volume for the same event. This must be shown for a 1 in 100 year, 6 hour rainfall event	✓	Chapter 5 and Appendix J of the FRA.
11	Evidence that enough storage/attenuation has been provided without increasing the runoff rate or volume. This must be shown for a 1 in 100 year plus climate change event	✓	Chapter 5 and Appendix K of the FRA.
12	Evidence that runoff exceeding design criteria has been considered . Calculations and exceedance flow diagram/plans must show where above ground flooding might occur and where this would pool and flow.	✓	Chapter 5 and Appendix L of the FRA.
13	Maintenance regimes of entire surface water drainage system including individual SuDS features, including a plan illustrating the organisation responsible for each element. Evidence that those responsible/adopting bodies are in discussion with the developer. For larger/phased sites, we need to see evidence of measures taken to protect and ensure continued operation of drainage features during construction.	✓	SuDS Management and Maintenance Plan. Chapter 5 and 6 of the FRA.
14	Evidence that Urban Creep has been considered in the application and that a 10% increase in impermeable area has been used in calculations to account for this.	✓	Chapter 5 and Appendix K of the FRA.
15	Did you take advantage of Hampshire County Council's Pre-Application advice service (details below)? If so, please insert your pre-application reference number here.	✓/N	Pre application number -

[SuDS Manual](#)

[Guidance for Climate Change percentages](#)

[British Standard for Infiltration tests BS 5930: 2015](#)

[HCC's Pre-application Service](#)

[UK Sustainable Drainage: Guidance and Tools](#)



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