Drainage Strategy

Title	Clacton Road, Weeley Heath
Client	LNT Construction
Location	Clacton Road, Weeley Heath, Essex
Project number	23-0452
BIM reference	CRWH-BSP-XX-XX-T-W-0001-P01_Drainage_Strategy
Date	07 SEP 2023

Authorisation Sheet & Revisions Record

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Document Reference:	CRWH-BSP-XX-XX-T-W-0001-P01_Drainage_Strategy
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Rev:	Issue Date:	Description:	Prepared:	Checked:	Authorised:
P01	07/09/2023	Initial issue	TH	TG	TG

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Contents

Executive Summary

Introduction	BSP Consulting has been commissioned by LNT Construction to undertake a Drainage Strategy for a proposed care home off Clacton Road, Weeley Heath, Essex. This report has been prepared in accordance with the Department for Communities and Local Government (DCLG) publication 'Technical Guidance to the National Planning Policy Framework, published in July 2018 and updated in July 2021.
Existing Site Conditions	The site itself comprises brownfield land bordered by trees, with some existing dwellings located towards the north of the site. Existing greenhouses are located to the southwest of the site, and a pond is located towards the centre. Site levels are shown to be generally flat, with a gradual fall from the north to the south of the site. Existing ground levels on-site are indicated to fall from approximately 27.03m AOD in the northern corner of the site to approximately 26.78m AOD in the southern corner.
Development Description and Planning Context	Development proposals are for the construction of an elderly care home, complete with car parking, access, supporting infrastructure and landscaping.
Climate Change	The implications of climate change of up to 40% have been considered in this assessment and mitigation measures have been determined accordingly.
Off-Site Impacts	The proposed developments surface water will discharge at reduced rates via the provision of attenuation. Therefore, the development will not increase flooding adjacent to or downstream of the site for the lifetime of the development.
Recommendations	• In accordance with best practice, external ground levels should comprise falls away from buildings and towards drainage features. The design of surface water drainage features should be such that any surface water flow paths within the site are maintained and/or accommodated while ensuring that buildings remain free from flooding without increasing risk elsewhere. • The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100-year plus climate change (40%) storm event on site without flooding any buildings. • For the purpose of this report it has been assumed that soakaways or similar or surface water discharge to an open watercourse will not be viable. • It is proposed to restrict surface water runoff to a pumped discharge rate of **1l/s** for all storms up to and including the 1 in 100-year plus 40% climate change return

	periods. In order to achieve this discharge rate an attenuation volume in the order of **234m³** will need to be provided. • The full required attenuation volume will be achieved by a subsurface attenuation tank located towards the southwest of the site, which will have a half drain down time of less than **12 hours**. Surface water will then need to be pumped towards an existing ditch drain located to the south of the site. • It is recommended that source control methods should be utilised where possible. These include the use of permeable paving for parking spaces and private pedestrian footways, the creation of bioretention gardens along the curtilage of the primary access road and the use of filter trenches.

1.0 Introduction

1.1 Terms of Reference

1.1.1 This Drainage Strategy has been prepared in accordance with the Department for Communities and Local Government (DCLG) publication 'Technical Guidance to the National Planning Policy Framework, published in July 2018 and updated in July 2021, and according to best practice guidance. For and on behalf of LNT Construction.

1.2 Site Details

1.2.1 The proposed development site is located off the A133 to the southeast of Weeley Heath and to the northwest of Clacton-on-sea, centred on OSNGR 615690E, 220289N. The site, shown by the red boundary in Figure 1.1 below, occupies an approximate area of 0.78 hectares.

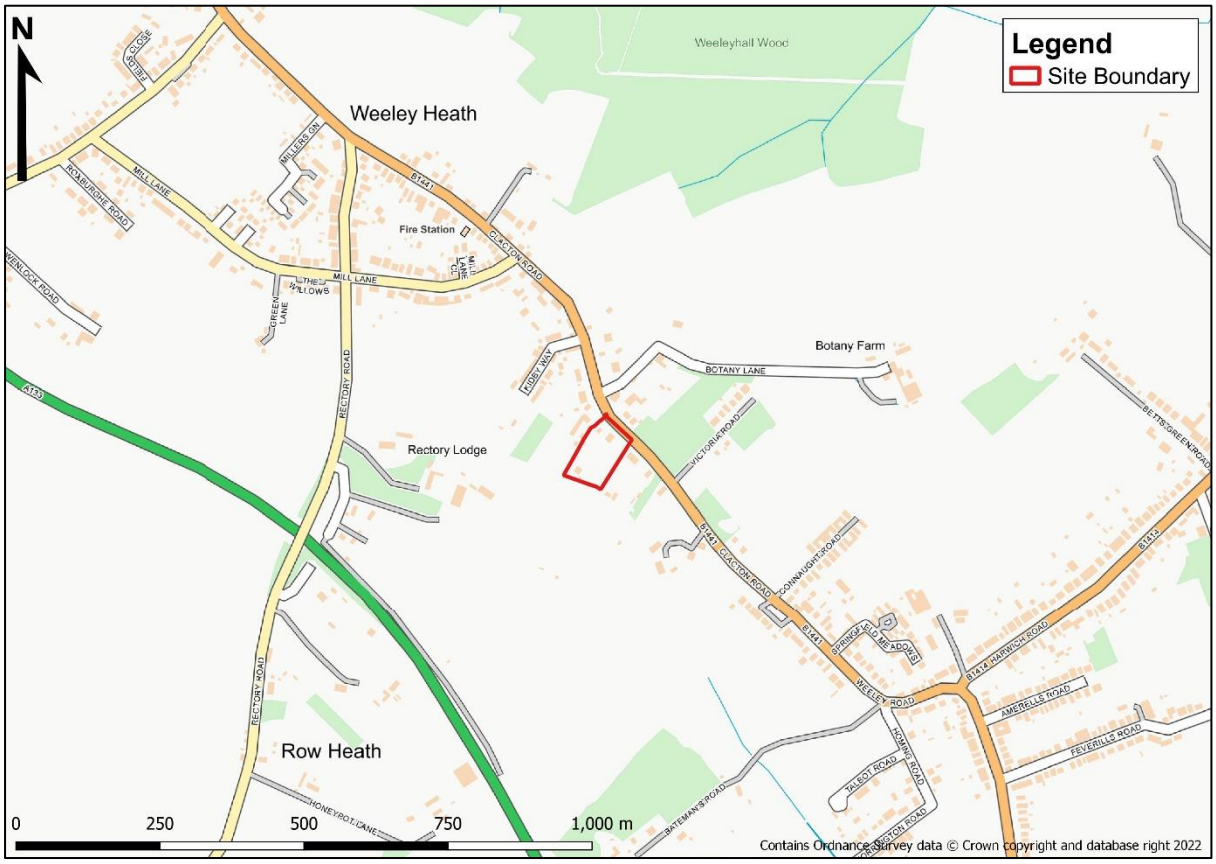


Figure 1.1 Clacton Road, Weeley Heath, Essex – Site Location

1.2.2 The site is bounded by Clacton Road to the northeast, which runs in a general northwest-southeast direction, existing dwellings to the southeast and west, and greenfield agricultural land to the south.

1.2.3 The majority of the site currently comprises gardens bordered by trees, with some existing dwellings located towards the north of the site. Existing greenhouses are located to the southwest of the site, and

an ornamental pond is located towards the centre. A topographical survey of the site has been included in **Appendix A**. Site levels are shown to be generally flat, with a gradual fall from the north to the south of the site. Existing ground levels on-site are indicated to fall from approximately 27.03m AOD in the northern corner of the site to approximately 26.78m AOD in the southern corner.

2.0 Definition of Flood Hazard & Probability

A number of sources of potential flood risk to the site have been assessed in order to provide context to the proposed drainage strategy for the development. Details of the levels of risk to the site from each source are provided below:

2.1 Fluvial Flood Risk

2.1.1 The EA Risk of Flooding from Rivers and Sea mapping indicates that the development site is located in Flood Zone 1, with a less than 1 in 1,000 annual probability (<0.1% AEP) of flooding from Rivers and the Sea. There are no notable watercourses within close proximity to the site.

2.2 Tidal Flood Risk

2.2.1 The site is not within close proximity of any tidal watercourses and is therefore not at risk of tidal flooding.

2.3 Surface Water Flood Risk

2.3.1 The site is located in a generally flat area with very gentle falls from north to south. Generally flat areas do not tend to generate any significant amount of sheet runoff and any surface flooding from pluvial sources tends to pond in localised depressions.

2.3.2 Figure 2.1 below shows the Risk of Flooding from Surface Water mapping and indicates that the entire site is at very low risk (<0.1% AEP) of surface water flooding.

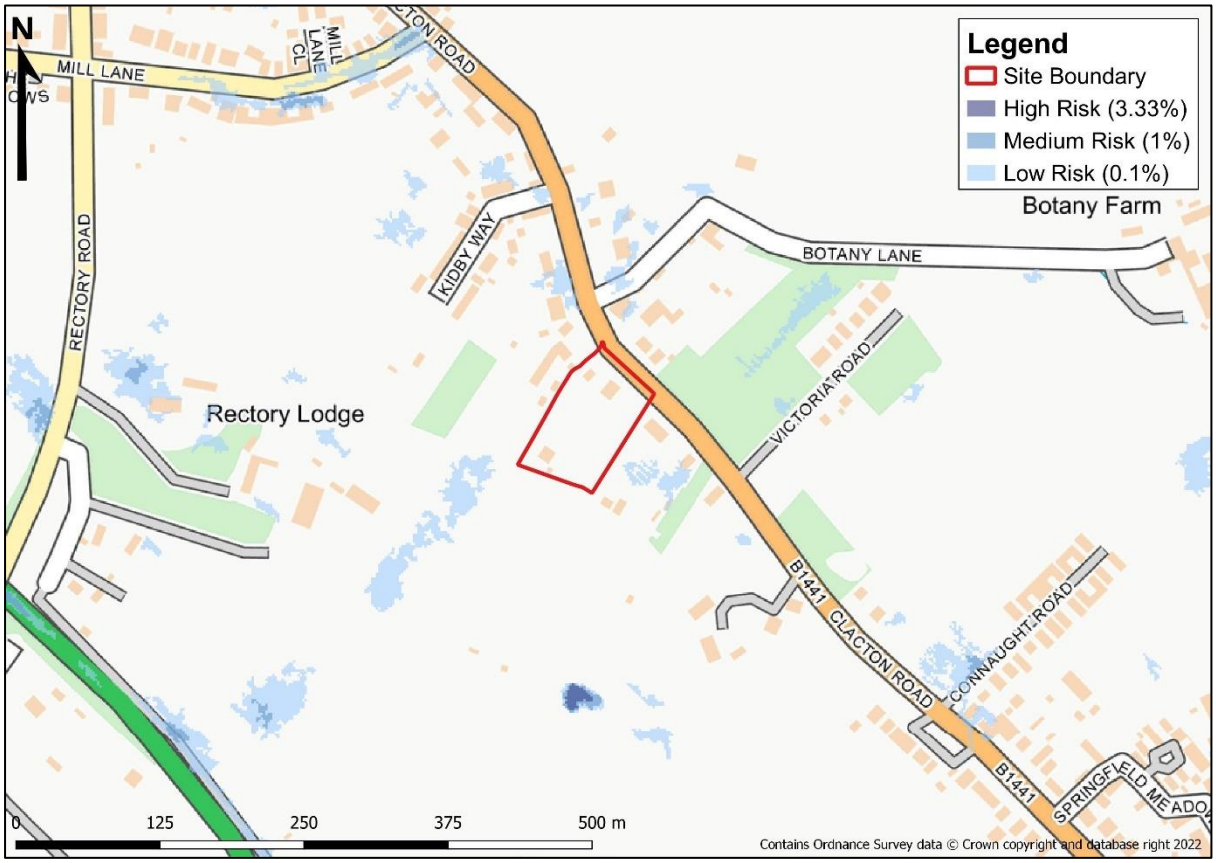


Figure 2.1 Clacton Road, Weeley Heath, Essex – Risk of Flooding from Surface Water (Source: EA)

2.3.3 The site is therefore not at significant risk of flooding from surface water runoff from adjacent land.

2.4 Ground Water Flood Risk

2.4.1 The British Geological Survey's Geology of Britain mapping indicates that the site is situated upon bedrock geology consisting of Thames Group – Clay, Silt and Sand, and superficial deposits consisting of Cover Sand – Clay, Silt and Sand. Thames Group is generally classed as rocks with essentially no groundwater.

2.4.2 The Environment Agency Aquifer Designation Map identifies the site as being situated on bedrock and superficial drift classed as Unproductive aquifer: these are geological strata with low permeability that have negligible significance for water supply or river base flow.

2.4.3 Based on the information from the above sources, the site is considered to be at low risk of flooding from groundwater sources. However, due to the nature of groundwater flooding, any risk associated with this source is likely to be heavily influenced by the local watercourses. Given that the site is not within the natural floodplain of any nearby fluvial watercourses, the risk of groundwater flooding is expected to be minimal on-site.

2.5 Flood Risk from Sewers & Infrastructure

2.5.1 The local sewers are operated and maintained by Anglian Water (AW). AW sewer records indicate the location of a 150mm diameter foul sewer to the northeast of the site, flowing in a northwestern direction under Clacton Road. A copy of the sewer record plan is included in **Appendix B**.

2.5.2 The EA Flood Risk from Reservoirs mapping confirms that the site does not lie in an area that is at risk of flooding from reservoirs.

2.5.3 The site is not within close proximity of any wet process industrial works.

2.5.4 The sewers and infrastructure flood risk source can therefore be discounted as a significant source of flood risk to the site.

2.6 Climate Change

2.6.1 Climate change is recognised as a factor for consideration in terms of its effects on flood risk. In line with the latest update to the planning practice guidance to the NPPF on Flood Risk and Coastal Change, to assess the effects of climate change, the 2070s epoch has been assessed for peak rainfall intensity.

2.6.2 The implications of climate change should be taken into account in relation to surface water drainage. Guidance from the EA advises that the upper end allowances for both the 1 in 30-year (3.3% AEP) and 1 in 100-year (1% AEP) events should be assessed, with the development designed to ensure that there is no increase in flood risk elsewhere and the development will be safe from surface water flooding during the 1 in 100-year event when the upper end allowance for climate change is applied. In this instance, peak rainfall intensity for care home developments within the Combined Essex Management Catchment are estimated to increase by 35% for the 3.3% AEP event and 40% for the 1% AEP event. Therefore, it is recommended that the upper end allowance of 40% is applied to design rainfall intensity to allow for the potential implications of climate change.

3.0 Sustainable Drainage Strategy

3.1 Detailed Development Proposals

3.1.1 The development proposals are for the construction of an elderly care home, complete with car parking, access, supporting infrastructure and landscaping. The proposed site plan is included in **Appendix C**.

Sustainable Drainage Systems

3.1.2 Part H of the Building Regulations 2010 recommends that surface water run-off shall discharge to one of the following, listed in order of priority:

a) an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable.

b) a watercourse, or, where that is not reasonably practicable.

c) a sewer.

3.1.3 It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local run-off profile by using systems that can either attenuate run-off and reduce peak flow rates or positively impact on the existing flood profile.

3.2 Existing Constraints

Infiltration Based Systems

3.2.1 The British Geological Survey's Geology of Britain mapping indicates that the site is situated upon bedrock geology consisting of Thames Group – Clay, Silt and Sand, and superficial deposits consisting of Cover Sand – Clay, Silt and Sand.

3.2.2 The Cranfield Soil and Agrifood Institute's Soilscapes mapping indicates the majority of the site to be situated on soils categorised as Soilscape 8: slightly acid loamy and clayey soils with impeded drainage.

3.2.3 Based on the above information, it is unlikely that permeable ground conditions are present at the site. We understand that previous infiltration testing was proposed to be undertaken at the site, however it was unable to be completed due to high groundwater encountered, and the use of formal infiltration methods was therefore not deemed to be viable. As a result, the discharge of surface water runoff by infiltration-based systems has been ruled out.

Open Watercourses

3.2.4 An existing open ditch drain is suitably located to receive a direct surface water discharge from the site and as such, is the proposed surface water outfall from the site.

Sewers

3.2.5 As it is proposed to discharge surface water runoff to an existing drain ditch, it will not be necessary to discharge surface water to a sewer.

3.3 Sustainable Urban Drainage Systems

3.3.1 Sustainable Urban Drainage Systems (SuDS) are designed to reduce the risk of surface water runoff in urbanised areas in an effective manner while offering cost-benefits, reduced maintenance and increased amenity value. A summary of the different types of SuDS options available and their viability in the context of the proposed development are included in Table 3.1 below:

Table 3.1: Sustainable Urban Drainage Systems Options

SuDS Category	SuDS Technique	Viability	Explanation
Infiltration	Infiltration Trenches	✗	Due to the indicated geology on-site formal infiltration-based systems have been ruled out.
	Infiltration Basins	✗	
	Soakaways	✗	
	Bioretention/Filter Strips	✗	
Filtration	Bioretention/Rain Gardens	✗	Due to the potential to present a trip hazard to potentially susceptible elderly residents, formal features such as bioretention and/or raingardens are not being proposed. However, parts of the site remaining as gardens, and areas of soft landscaping will act in a similar fashion, capturing rainwater at source and enabling limited filtration.
	Filter Strips	✗	
Source Control	Green Roofs	✗	As the proposed development comprises pitched roofs, the use of green roofs will not be possible.
	Rainwater Harvesting	✗	Due to nature of the proposed development, the scope for rainwater harvesting is limited. As such, other SuDS options are more favourable than rainwater harvesting.
	Pervious Pavements	✓	Pervious paving may be utilised for the external ground level car parking spaces and pedestrian

			footways. This will serve to increase the rainfall-runoff response time and provide water quality benefits.
Conveyance	Swales	✗	All surface water runoff will flow through a filter trench before storage in a subsurface attenuation tank. This will serve to increase the rainfall-runoff response time and provide water quality benefits.
	Filter Drains	✓	
	Channels/Rills	✗	
Retention/ Detention	Detention Basin	✗	Due to spatial constraints, the proposed development surface water runoff will need to be attenuated by subsurface storage before a pumped discharge to an existing ditch drain to the south of the site. All surface water runoff should drain via a suitable SuDS device prior to the tank.
	Retention Pond	✗	
	Subsurface Storage	✓	
	Wetlands	✗	

Runoff Assessment

3.3.2 The ICP SUDS and IH124 (Flood Studies Report) methods have been used to calculate the surface water runoff from a small (<50ha) greenfield site ($QBAR_{RURAL}$), which are detailed below:

$QBAR_{RURAL} = 0.00108 \times (0.01 \times AREA)^{0.89} \times SAAR^{1.17} \times SPR^{2.17}$

Where
AREA = Area (ha)
SAAR = Standard Average Annual Rainfall (mm, 1941-1970)
SPR = Standard Percentage Runoff Coefficient

3.3.3 With a site area of 0.285ha and using Flood Studies Report values for SAAR (550mm) and SPR (0.15), this results in a **$QBAR_{RURAL}$** rate of **0.1l/s** and discharge rates for the following return periods:

Rainfall Event	Runoff Rate (l/s)
1 in 1-year	0.1
1 in 30-year	0.2
1 in 30-year + 35% Climate Change	0.3
1 in 100-year	0.3
1 in 100-year + 40% Climate Change	0.4

3.3.4 Greenfield runoff calculations are provided in **Appendix D**.

Return Period Design

3.3.5 The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100-year plus climate change (40%) storm event on site without flooding any buildings.

Discharge Rate

3.3.6 In accordance with DEFRA guidance, the peak surface water runoff rate for greenfield developments should be restricted to the pre-development discharge rate where reasonably practicable. The calculated $QBAR_{RURAL}$ rate results in an allowable discharge rate of 0.1l/s. Given that the proposed development surface water runoff will require pumping to an existing ditch drain to the south of the site, a rate of 0.1l/s will be too low. Therefore, it is proposed that a reasonably practicable minimum pumped flow rate of **1l/s** is applied.

Drainage Proposals – Main Strategy

3.3.7 The proposed development will comprise an impermeable footprint of approximately 0.285ha. In order to maintain the discharge rate of **1l/s** for all storms up to and including the 100-year return period with a 40% allowance for climate change, attenuation is required which provides in the order of **234m³** of surface water storage. These calculations have been undertaken in MicroDrainage with the use of 2022 FEH rainfall data. As MicroDrainage does not directly support 2022 FEH data, it is instead displayed as 2013 data in **Appendix D.**

3.3.8 The required surface water attenuation volume is proposed to be provisioned by a subsurface cellular attenuation tank before a pumped discharge into an existing ditch drain located south of the site. The proposed tank will have a half drain down time of less than **12 hours**.

3.3.9 It is recommended that parking spaces and private pedestrian footways are constructed from permeable paving where appropriate and bioretention features, such as raingardens, are utilised where possible. Both above-mentioned source control methods will act to increase the rainfall-runoff response time by intercepting rainfall at source while also providing improvements to water quality.

3.3.10 An initial surface water drainage strategy plan and supporting calculations are provided in **Appendix D**.

3.3.11 The surface water discharge rate will be subject to agreement with AW and the new public sewer connections will be subject to a Section 106 (Water Industry Act 1991) application to AW.

3.3.12 The proposed surface water drainage strategy will be subject to the approval of Essex County Council as Lead Local Flood Authority.

3.4 Water Quality

Simple Index Approach

3.4.1 In order to determine whether the proposed SuDS features for the development will be sufficient at removing pollutants from surface water runoff, the CIRIA SuDS Manual (2015) Simple Index Approach has been applied. This approach provides pollution hazard levels and indices to relevant pollutants based upon contributing hardstanding surfaces.

3.4.2 Table 4.2 below provides an extract of the land use types and pollutant indices from the CIRIA SuDS Manual which are relevant to the proposed development.

Table 4.2: Pollution hazard indices for different land use classifications (Source: CIRIA SuDS Manual 2015)

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very Low	0.2	0.2	0.05
Residential car parks, low traffic roads and non-residential car parking with infrequent change	Low	0.5	0.4	0.4

3.4.3 Based upon the above, the worst-case indices for the development are 0.5 (Total Suspended Solids), 0.4 (Metals) and 0.4 (Hydrocarbons). Table 4.3 below indicates the mitigation indices for different types of SuDS components, with only those relevant to the development included. Under the Simple Index Approach, in order to suitably mitigate surface water pollutants, the total combined indices for any SuDS components will need to be greater than the worst-case indices above. Where multiple SuDS components are proposed, the primary component is given its full indices, while subsequent component indices are applied with a factor of 50%.

Table 4.3: Indicative SuDS mitigation indices for discharges to surface waters (Source: CIRIA SuDS Manual 2015)

Type of SuDS Component	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Filter Drain	0.4	0.4	0.5
Permeable Pavement	0.7	0.6	0.7
Bioretention System	0.8	0.8	0.8

3.4.5 Surface water runoff is proposed to flow through either permeable paving before a filter drain, or bioretention before a filter drain. Based upon the above, all surface water runoff will therefore flow through minimum mitigation indices of 0.9 (Total Suspended Solids), 0.8 (Metals) and 0.95 (Hydrocarbons), demonstrating that these components alone will be sufficient in mitigation surface water runoff pollution from the proposed development. Where further SuDS components are included in the development proposals these will offer even greater mitigation against surface water runoff pollution.

3.5 Maintenance

3.5.1 The proposed surface water drainage system will require routine maintenance to ensure it remains fully operational and effective. The proposed methods of drainage will be maintained by site management and should be inspected and maintained in accordance with the proposed maintenance schedule included in **Appendix D**.

3.6 Foul Water Drainage

3.6.1 A foul sewer connection will need to be sought for the proposed development, possibly utilising existing connection points. A 150mm diameter foul sewer is suitably located to receive foul flows from the development via gravity, located to the northeast of the site along Clacton Road.

3.6.2 New foul public sewer connections will be subject to agreement with AW via a Section 106 (Water Industry Act 1991) application.

3.7 Site Development Levels

3.7.1 The proposed development site levels should be set to ensure that finished floor levels are no lower than the existing ground levels on-site to reduce the risk of any potential internal surface water flooding.

4.0 Off-Site Impacts

4.1.1 The proposed development surface water will discharge at reduced rates via the provision of attenuation. Therefore, the development will bring about improvements to the surface water regime in the area, and hence will not increase flooding adjacent to or downstream of the site for the lifetime of the development.

5.0 Recommendations

5.1.1 The following recommendations are made to reduce flood risk and promote a sustainable and practicable drainage strategy at the proposed development:

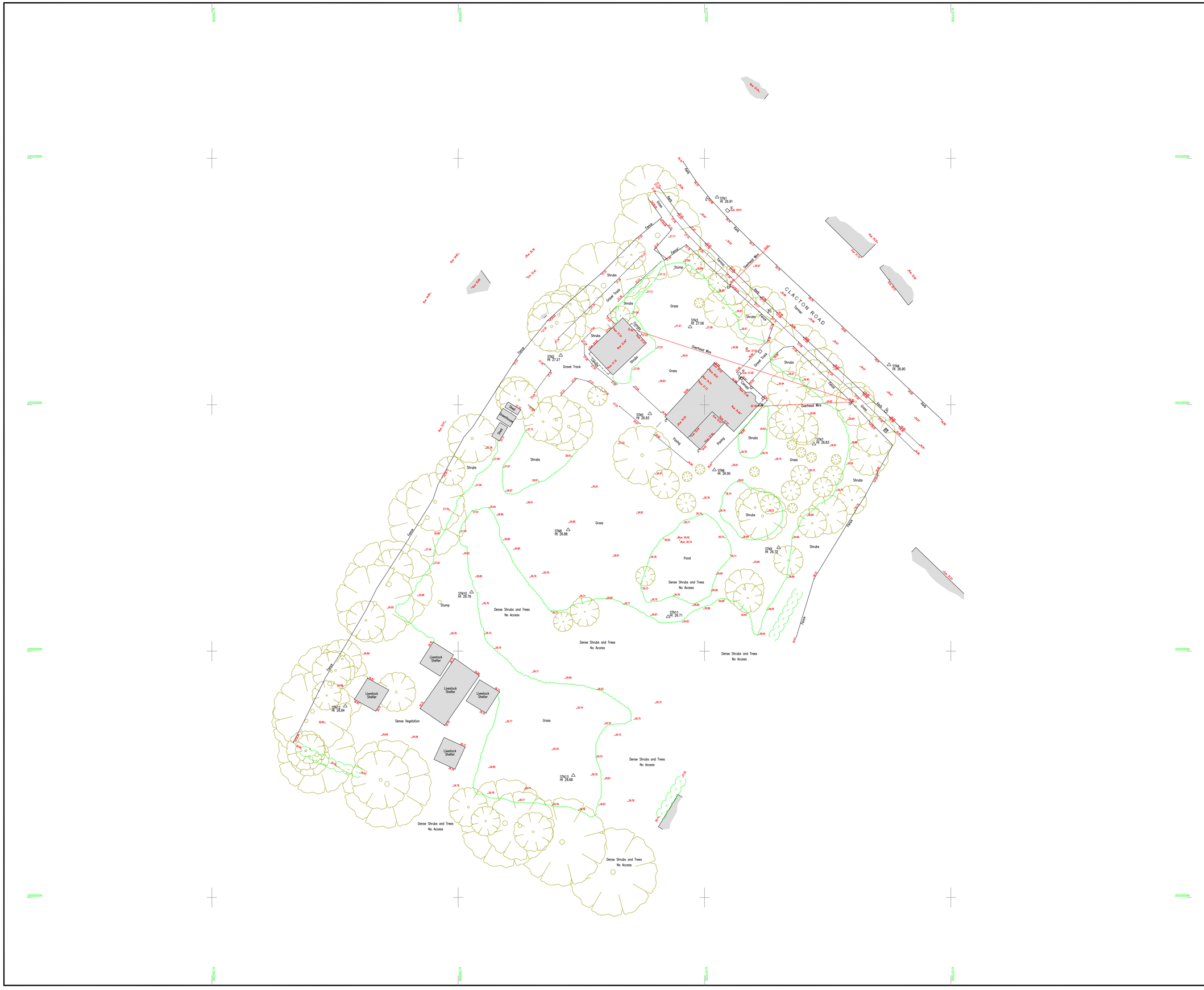
- In accordance with best practice, external ground levels should comprise falls away from buildings and towards drainage features. The design of surface water drainage features should be such that any surface water flow paths within the site are maintained and/or accommodated while ensuring that buildings remain free form flooding without increasing risk elsewhere.
- The proposed surface water drainage system should be designed to accommodate the 1 in 30-year rainfall event without any surface water flooding and should be capable of retaining the 1 in 100-year plus climate change (40%) storm event on site without flooding any buildings.
- For the purpose of this report it has been assumed that soakaways or similar or surface water discharge to an open watercourse will not be viable.
- It is proposed to restrict surface water runoff to a pumped discharge rate of **1l/s** for all storms up to and including the 1 in 100-year plus 40% climate change return periods. In order to achieve this discharge rate an attenuation volume in the order of **234m³** will need to be provided.
- The full required attenuation volume will be achieved by a subsurface attenuation tank located towards the southwest of the site, which will have a half drain down time of less than **12 hours**. Surface water will then need to be pumped towards an existing ditch drain located to the south of the site.
- It is recommended that source control methods should be utilised where possible. These include the use of permeable paving for parking spaces and private pedestrian footways, the creation of bioretention gardens along the curtilage of the primary access road and the use of filter trenches.

Disclaimer

We would note that all comments made in this report are based on the sources stated in Section 1.1. This report and its recommendations are intended for the use of LNT Construction for the above site only.

Appendix A

Topographical Survey



Quickdraw SURVEYS LTD.

Quickdraw Surveys Ltd, 58 Mavis Drive
Coppull, Lancashire, PR7 5AF

[redacted]

Notes:

The survey has been related to the Ordnance Survey National Grid and level datum using Leica GPS SmartNet data.

The extent of tree canopies and tree bole sizes are estimated.

Only features that are accessible/visible at the time of survey can be detailed.

There are no gaurantees offered on the drainage information supplied.

Before commencing works please check important dimensions on-site.

Should there be any discrepencies, inconsistencies,omissions or queries please contact Quickdraw Surveys Ltd as soon as possible for a resolution.

Abbreviations:

Topographical Surveys

BT	British Telecom Cover	FPR	Post & Rail	RS	Road Sign
Bin	Litter Bin	FPW	Post & Wire	RWP	Rain water pipe
BS	Bus Stop	FSF	Safety Barrier	SV	Stop Valve
BT	British Telecom Cover	FWM	Wire Mesh	Stay	Cable Stay
CPS	Conc Paving Slabs	FT	Floodlight	TB	Telephone Box
CTV	Cable Television Cover	FP	Flagpole	TL	Traffic Light
Elec	Electric Cover	G	Gully	TP	Telegraph Pole
EP	Electric Pole	GV	Gas Valve	VP	Vent Pipe
ER	Earthing Rod	Hyd	Hydrant	WM	Water Meter
Fence	Mixed Fencing	IC	Inspection Cover	WO	Water Outlet
FBW	Barbed Wire	JB	Junction box	UTL	Unable to Lift
FCB	Close Board	KO	Kerb Outlet		
FCI	Corrugated Iron	LB	Letter Box		
FCL	Chain Link	LP	Lamp Post		
FCP	Conc Panel	Mkr	Utility marker		
F(DIL)	Dilapidated Fence	PM	Parking Meter		
FIR	Iron Railings	P	Post		
FOB	Open Board	RE	Rodding Eye		
FPC	Post & Chain	RNP	Road Name Plate		

ALev	Arch Level	ILev	Invert Level	ThLev	Threshold Level
BLev	Bed Level	PLev	Parapet Level	ToF	Top of Fence Level
CLev	Cover Level	RLev	Ridge Level	ToW	Top of Wall Level
ELev	Eaves Level	SLev	Soffit Level	WLev	Water Level

Station Co-ordinates:

Station	Easting	Northing	Level
STN1	615732.357	220342.130	26.906
STN2	615670.817	220310.018	27.267
STN3	615697.067	220315.785	27.058
STN4	615737.449	220308.113	26.897
STN5	615688.903	220298.188	26.933
STN6	615705.510	220286.771	26.903
STN7	615722.210	220292.017	26.825
STN8	615672.300	220274.631	26.879
STN9	615715.032	220271.015	26.722
STN10	615652.736	220261.965	26.762
STN11	615690.613	220256.980	26.713
STN12	615627.067	220238.828	26.844
STN13	615673.378	220224.770	26.685

A0 Plot @ 1:250

Client: LNT Construction Ltd.

Date: May 2023

Project: Topographical Survey
Land at The Towers, Clacton Road,
Weeley Heath, Clacton, CO16 9EF.

Scale: 1:250

Drawing Number: QDS/ 350/1306/TOP | Revision: 0

Appendix B

Anglian Water Correspondence & Sewer Records

Pre-Planning Assessment Report

Weeley Heath

InFlow Reference: PPE-0186124

Assessment Type: Used Water

Report published: 11/08/2023

Thank you for submitting a pre-planning enquiry.

This has been produced for LNT CONSTRUCTION.

Your reference number is **PPE-0186124**.

This report can be submitted as a drainage strategy for the development should it seek planning permission.

If you have any questions upon receipt of this report, you can submit a further question via InFlow. Alternatively, please contact the Planning & Capacity team on [redacted]

Section 1 - Proposed development

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

List of planned developments	
Type of development	**No. Of units**
Non-residential	1

The anticipated residential build rate is:

Year	Y1
Build rate	1

Development type: Brownfield

Planning application status: Unknown

Site grid reference number: TM1567920276

The comments contained within this report relate to the public water mains and sewers indicated on our records.

Your attention is drawn to the disclaimer in the useful information section of this report.

Section 2 - Assets affected

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

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

Section 3 - Water recycling services

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

Water recycling centre

The foul drainage from the proposed development is in the catchment of Clacton-Holland Haven Water Recycling Centre, which currently does not have capacity to treat the flows from your development site.

Anglian Water are obligated to accept the foul flows from your development with the benefit of planning consent and would therefore take the necessary steps to ensure that there is sufficient treatment capacity should the planning authority grant planning permission.

Used water network

Our assessment has been based on development flows connecting to the nearest foul water sewer of the same size or greater pipe diameter to that required to drain the site. The infrastructure to convey foul water flows to the receiving sewerage network is assumed to be the responsibility of the developer. Conveyance to the connection point is considered as Onsite Work and includes all work carried out upstream from of the point of connection, including making the connection to our existing network. This connection point has been determined in reference to the calculated discharge flow and on this basis, a 150mm internal diameter pipe is required to drain the development site. The nearest practicable connection is to the 150mm diameter sewer at manhole 7301 in Clacton Road at National Grid Reference NGR TM 15723 20325. Anglian water has assessed the impact of gravity flows from the planned development to the public foul sewerage network. We can confirm that this is acceptable as the foul sewerage system, at present, has available capacity for your site. Please note that Anglian Water will request a suitably worded condition at planning application stage to ensure this strategy is implemented to mitigate the risk of flooding.

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

Surface water disposal

Anglian Water needs to ensure the surface water hierarchy has been followed and we will not agree, even in principle, to a surface water connection into the foul network until all other options have been proven unfeasible. We would require you to liaise with the Lead Local Flood Authority as they are the statutory consultee for surface water management. If they are satisfied that, based upon evidence, no other option is viable then please come back to us and we can discuss this further. Please also bear in mind that any mitigation works required as a consequence of a new surface water connection to an existing public foul (or surface water) sewer are not included within the infrastructure charge. The capital cost of these works will be fully chargeable to the applicant and will need to be paid prior to any design, enabling or construction works can commence. We will be happy to discuss this further, once it has been proven that there is no alternative viable option for disposal of the development's surface water.

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

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

If you wish to look at the adoption of any SuDs then an expression of interest form can be found on our website

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

Trade Effluent

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

Used Water Budget Costs

Your development site will be required to pay an Infrastructure charge for each new property connecting to the public water and sewerage network that benefits from Full planning permission. The infrastructure charge replaces the zonal charge as previously identified.

You will be required to pay an infrastructure charge upon connection for each new plot on your development site. The infrastructure charge are types of charges set out in Section 146(2) of the Water Industry Act 1991.

The charge should be paid by anyone who wishes to build or develop a property and is payable upon request of connection.

• The Infrastructure Charge is based on the cost of any reinforcement and upgrades to our existing network ("Network Reinforcements"), whether designed to address strategic or local capacity issues. For more information on our Infrastructure Charge, please see the 'Useful Information' section of this report.

Infrastructure charges are raised on a standard basis of one charge per new connection (one for water and one for sewerage).

The Water Recycling Infrastructure charge for your dwellings is:

Infrastructure charge	Number of units	Total
£ 400	1	To be confirmed at the S106 application to connect stage

Please note that you should also budget for infrastructure charges on non-household premises where applicable and these will be calculated according to the number and type of water fittings in the premises. This is called the "relevant multiplier" method of calculating the charge and the relevant multiplier will be applied to the figures set out in our 2023-24 Developer Charging Arrangements to arrive at the amount payable. Details of the relevant multiplier for each fitting can be found on our website.

Section 4 – Connection point map

Figure 1: Showing your used water point of connection.

Section 5- Useful information

Water Industry Act – Key used water sections

Section 98:

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

Section 102:

This provides you with the right to have an existing sewerage asset vested by us. It is your responsibility to bring the infrastructure to an adoptable condition ahead of the asset being vested.

Section 104:

This provides you with the right to have a design technically vetted and an agreement reached that will see us adopt your assets following their satisfactory construction and connection to the public sewer.

Section 106:

This provides you with the right to have your constructed sewer connected to the public sewer.

Section 185

This provides you with the right to have a public sewerage asset diverted.

Details on how to make a formal application for a new sewer, new connection or diversion are available on our website or via our Development Services team on **0345 60 66 087**.

Sustainable drainage systems

Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not resilient to climate change in the long term. .

Our preferred method of surface water disposal is through the use of Sustainable Drainage Systems or SuDS.

SuDS are a range of techniques that aim to mimic the way surface water drains in natural systems within urban areas. For more information on SuDS, please visit our website

We recommend that you contact the Local Authority and Lead Local Flood Authority (LLFA) for your site to discuss your application.

Private sewer transfers

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

Surface water sewers and lateral drains that do not discharge to the public sewer, e.g. those that discharged to a watercourse.

Foul sewers and lateral drains that discharged to a privately owned sewage treatment/collection facility.

Pumping stations and rising mains will transfer between 1 October 2011 and 1 October 2016.

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

It is anticipated that all new sewer applications will need to have an approved Section104 application ahead of a Section 106 connection

Encroachment

Anglian Water operates a risk based approach to development encroaching close to our used water infrastructure. We assess the issue of encroachment if you are planning to build within 400 metres of a water recycling centre or, within 15 metres to 100 metres of a pumping station. We have more information available on our website

Locating our assets

Maps detailing the location of our water and used water infrastructure including both underground assets and above ground assets such as pumping stations and recycling centres are available from digdat

All requests from members of the public or non-statutory bodies for maps showing the location of our assets will be subject to an appropriate administrative charge.

We have more information on our website

Charging arrangements

Our charging arrangements and summary for this year's water and used water connection and infrastructure charges can be found on our website

Section 6 - Disclaimer

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

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

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

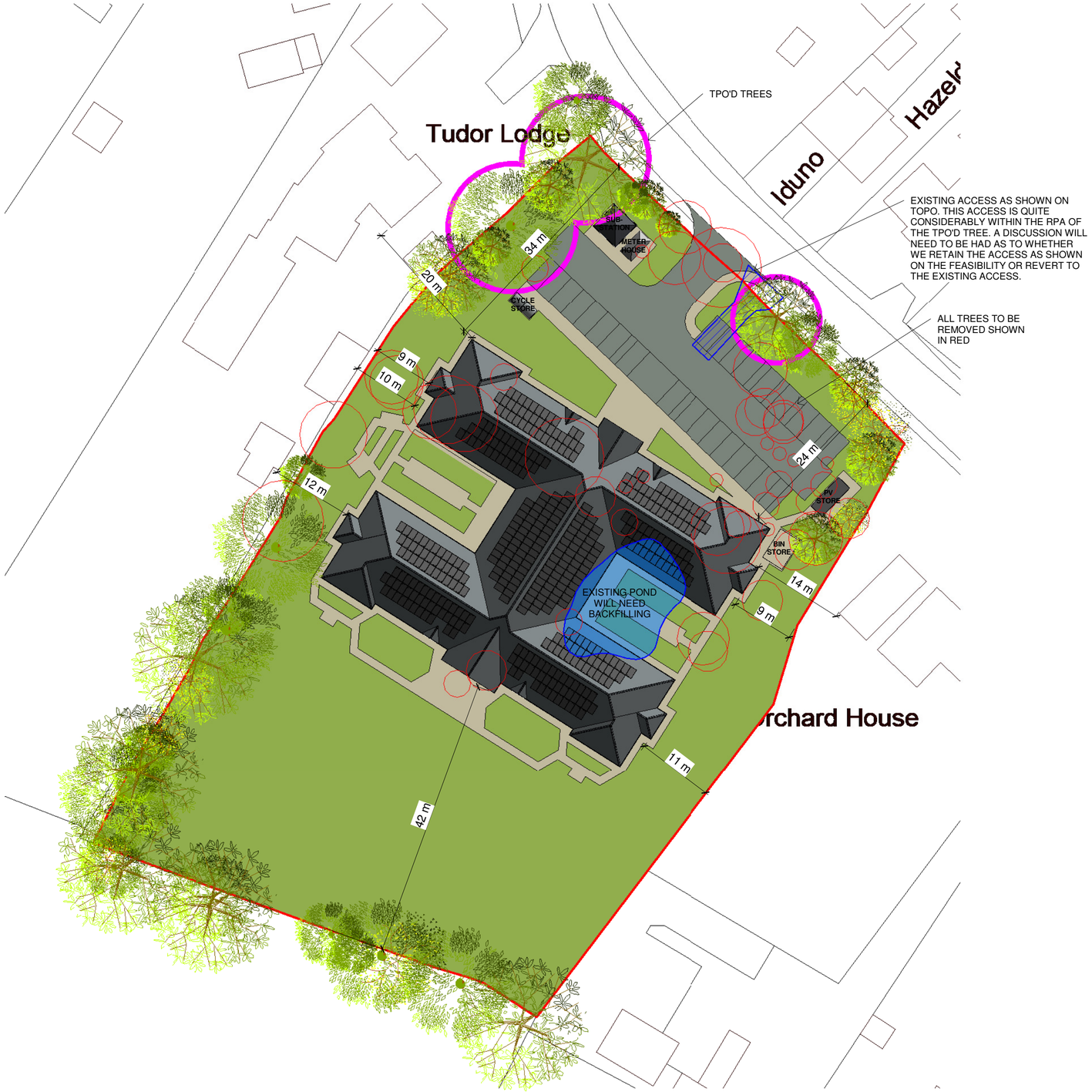
No liability whatsoever, including liability for negligence is accepted by Anglian Water or its partners, employees or agents, for any error or omission, or for the results obtained from the use of this report and/or its content.

Furthermore, in no event will any of those parties be liable to the applicant or any third party for any decision made or action taken as a result of reliance on this report.

This report is valid from the date issued and the enquirer is advised to resubmit their request for an up to date report should there be a delay in submitting any subsequent application for water supply/sewer connection(s). Our pre-planning reports are valid for 12 months, however please note Anglian Water cannot reserve capacity and available capacity in our network can be reduced at any time due to increased requirements from existing businesses and houses as well as from new housing and new commercial developments.

Appendix C

Proposed Site Plan



FEAS 02

1 : 500

REV	DATE	DETAILS OF AMENDMENTS	DRAWN
A	26/07/2023	ACCESS POSITION UPDATED, CYCLE STORE & MOTORCYCLE PARKING SPACE ADDED.	L-JL

REVISIONS

LNT CONSTRUCTION LTD
UNIT 2, HELIOS 47
ISABELLA ROAD
GARFORTH
LS25 2DY
[redacted]

CLIENT
LNT CARE DEVELOPMENTS

SITE
CLACTON ROAD
WEELEY HEATH
CO16 9EP

TITLE
FEASIBILITY 02

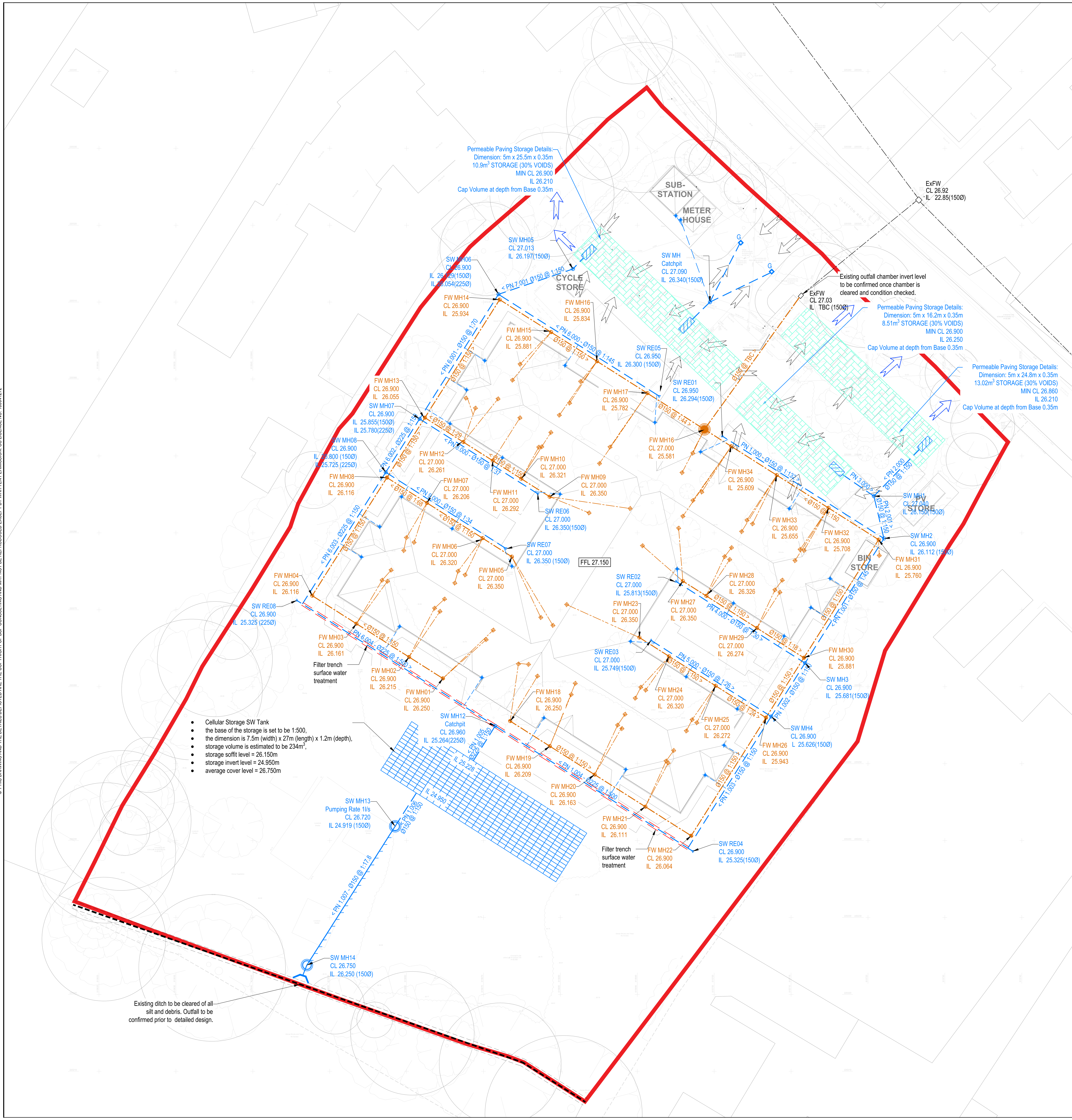
SCALE @A2	1 : 500	DATE	26/07/2023 12:29:00
DRAWN	L-JL	DWG NO.	CO16 9EP F-02-A

DRAWING STATUS
FEASIBILITY

CHECKED BY		DATE	
APPROVED BY		DATE	

Appendix D

Proposed Drainage Strategy Plan, Supporting Calculations & Maintenance Schedules



Key

Proposed finished floor level	FFL 105.660
Proposed Private Surface Water Drain (Rodding eye, PPIC with 150Ø main runs& PCCIC)	RE PPIC150 PCCIC
Proposed Private Foul Water Drain (PPIC with 150Ø main runs, reduced access chamber PPIC, PCCIC)	PPIC150s PCCIC
Proposed private surface water drain (pipe size @ gradient)	150Ø @ 1:100
Proposed private foul water drain (pipe size @ gradient)	150Ø @ 1:100
Proposed private permeable block paving	
Proposed private foul drain point	
Proposed private surface water drain point	
Proposed private surface water gully	G
Proposed private attenuation tank	
Existing public sewer	
Proposed overland flood flow route	
Proposed overland flood flow route in the unlikely event of the drainage network failing	
Proposed diffuser block	
Proposed Rising Main	
Proposed Filter Trench with Perforated Pipe	
Site Boundary	
Existing Ditch	
Proposed private headwall	

Drainage Strategy Notes:

1. This drainage strategy follows the design guide of "The Sustainable Drainage System Design Guide for Essex".
2. Proposed nett impermeable area is 0.285Ha.
3. Infiltration drainage is unsuitable for this site.
4. Surface water of the development to be discharged through a 150mm dia.pipe via a pumping system to an existing ditch to the south of the site.
5. The greenfield runoff rate, Qbar is calculated to be 0.1 l/s for a 1 in 1 year storm event. As the Essex drainage guidance requires the discharge rate to be limited to the 1 in 1 year greenfield rate or 1 l/s, whichever is highest. Therefore the pumping discharge rate for the site is limited to 1 l/s.
6. Climate Change Allowance of the development (building design life is expected to be 100 years) are 35% and 40% for 1 in 30-year and 1 in 100-year rainfall events, respectively.
7. In accordance with the "The Sustainable Drainage System Design Guide for Essex", rainfall is designed with FSR. Time of entry is 5 minutes. CV value is equal to 1. Areal Reduction Factor is equal to 1. MADD Factor is set to 0.
8. The design of the attenuation tank is in accordance with the "The Sustainable Drainage System Design Guide for Essex". The attenuation tank with have 50% capacity available after 24 hours of a 1 in 30-year storm event + climate change and it is capable to store up to 1 in 100-year storm event + climate change
9. Foul water of the development to be discharged through a 150mm dia.pipe to the existing foul chamber on site. Exisiting discharge level is yet unknown to the designer. When chamber is cleared and condition checked, the design will be modified to suit. All foul water pipes are 150mm dia. unless specify otherwise.
10. SuDS feature to improve water quality via permeable paving parking, filter trenches and catchpits to be implemented. Permavoid or similar devices to be installed at the low point of the parking spacing.

KEY PLAN

Construction Risks	Maintenance/cleaning Risks	Demolition/adaptation Risks

In addition to the hazard/risks normally associated with the type of works detailed on this drawing take note of the above.
It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

NOTES

1. DO NOT SCALE.
2. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Engineer should be informed PRIOR to construction on site.
3. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his own risk.
4. All dimensions are in metres unless otherwise stated.
5. The BSP Hazard Identification and Risk Assessment information for this project must be reviewed and understood by the contractor PRIOR to the commencement of any works on site.

REV	COMMENT						
P01	First Issue						
	FE	30/08/23	TG	30/08/23	TG	30/08/23	
REV	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE	

SCALE @ A1	ISSUING OFFICE	PROJECT NUMBER
1:250	NOTTINGHAM	23-0452

CLIENT APPROVAL
A - APPROVED
B - APPROVED WITH COMMENTS
C - DO NOT USE

STATUS	PURPOSE OF ISSUE
S1	PRELIMINARY

• CIVIL • STRUCTURAL • TRANSPORTATION • GEOTECHNICAL • ENVIRONMENTAL

bsp CONSULTING
12 Oxford Street
[redacted]

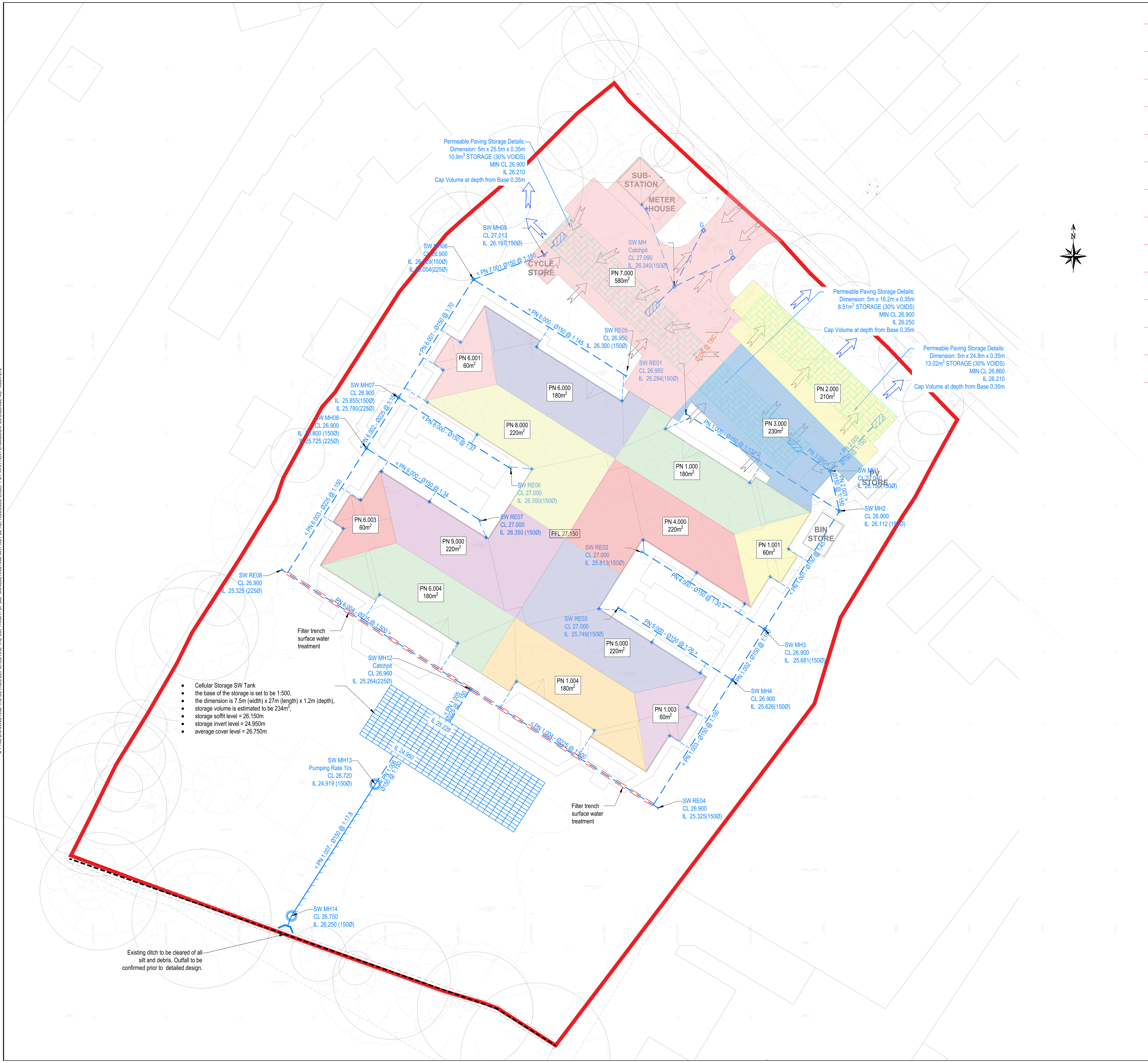
BIM Design and Construction KITEMARK™

PROJECT
Clacton Road, Weeley Heath

TITLE
Drainage Strategy

CLIENT
LNT Construction Ltd.

	REV
CRWH-BSP-ZZ-XX-DR-C-SK240	P01



Key

Item	Symbol
Proposed finished floor level	FFL 105.660
Proposed Private Surface Water Drain (Rodding eye, PPIC with 150Ø main runs& PCCIC)	RE PPIC150 PCCIC
Proposed Private Foul Water Drain (PPIC with 150Ø main runs, reduced access chamber PPIC, PCCIC)	PPIC150 PCCIC
Proposed private surface water drain (pipe size @ gradient)	150Ø @ 1:100
Proposed private foul water drain (pipe size @ gradient)	150Ø @ 1:100
Proposed private permeable block paving	
Proposed private foul drain point	
Proposed private surface water drain point	
Proposed private surface water gully	G
Proposed private attenuation tank	
Existing public sewer	
Proposed overland flood flow route	
Proposed overland flood flow route in the unlikely event of the drainage network failing	
Proposed diffuser block	
Proposed Rising Main	
Proposed Filter Trench with Perforated Pipe	
Site Boundary	
Existing Ditch	
Proposed private headwall	

KEY PLAN

Construction Risks	Maintenance/cleaning Risks	Demolition/adaptation Risks

In addition to the hazard/risks normally associated with the type of works detailed on this drawing take note of the above.
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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

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4. All dimensions are in metres unless otherwise stated.
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REV	COMMENT					
P01	First Issue					
	FE	05/09/23	TG	05/09/23	TG	05/09/23
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

SCALE @ A1	ISSUING OFFICE	PROJECT NUMBER
1:250	NOTTINGHAM	23-0452

CLIENT APPROVAL
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B - APPROVED WITH COMMENTS
C - DO NOT USE

STATUS	PURPOSE OF ISSUE
S1	PRELIMINARY

• CIVIL • STRUCTURAL • TRANSPORTATION • GEOTECHNICAL • ENVIRONMENTAL

bsp CONSULTING
12 Oxford Street
[redacted]

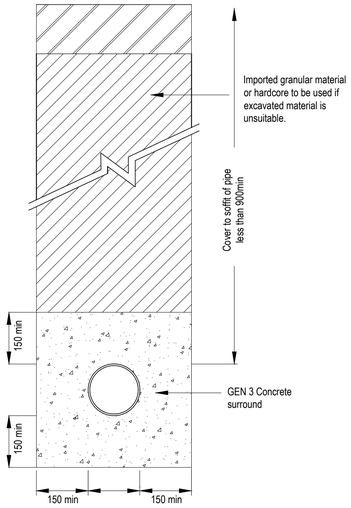
bsi BIM Design and Construction KITEMARK™

PROJECT
Clacton Road, Weeley Heath

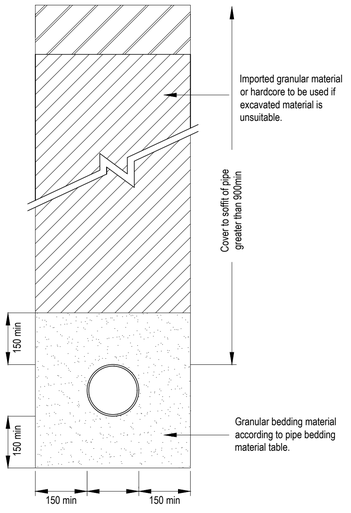
TITLE
Drainage Strategy

CLIENT
LNT Construction Ltd.

	REV
CRWH-BSP-ZZ-XX-DR-C-SK241	P01



CLASS Z - Bedding Factor 2.6
For pipes under Private Roads with less than 1200mm cover
NOT TO SCALE

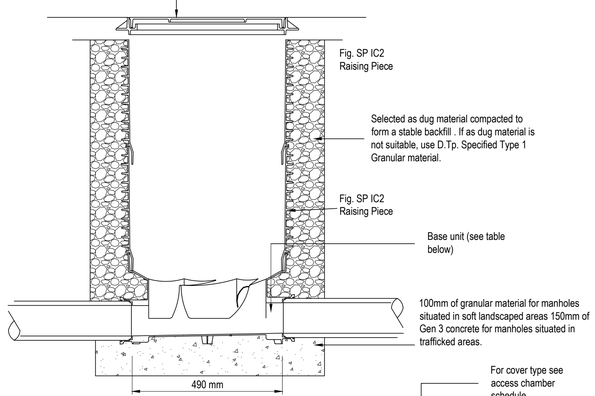


CLASS S - Bedding Factor 2.2
Granular bed and surround
For pipes under Private Roads with greater than 1200mm cover
NOT TO SCALE

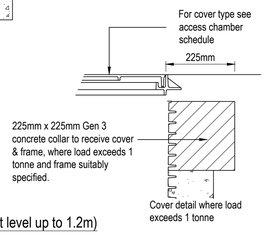
Envirocover circular cover with frame as supplied by PDS Plc.

This type of cover is not suitable where loads will exceed 1 tonne (For loads exceeding 1 tonne see detail below)

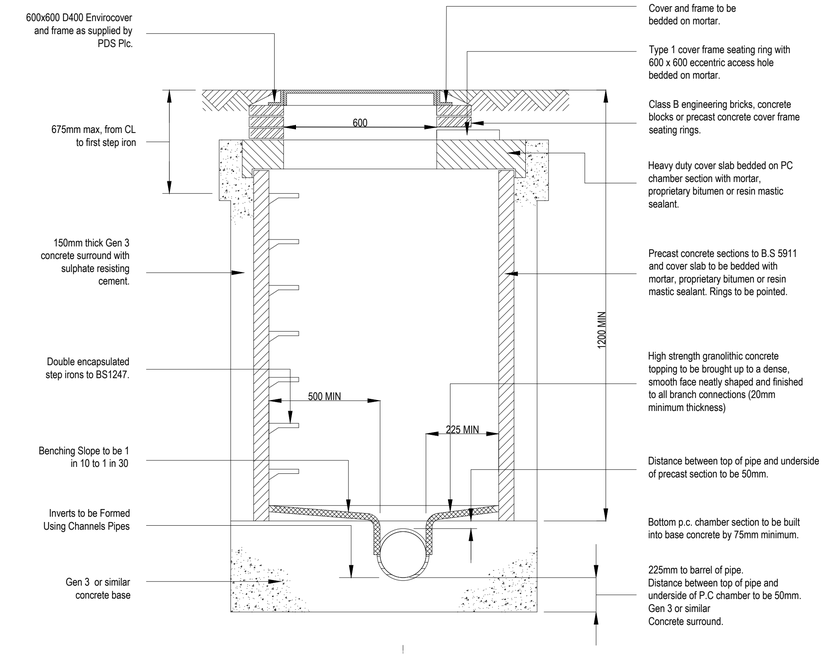
Note: All figures references are to Hepworth products - Refer to manufacturers literature.

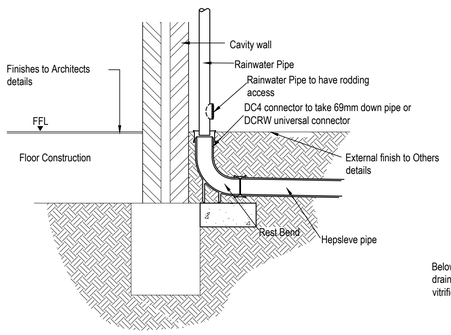


Base unit type	Pipe size	No of connections
SP IC1/1	1000Ø	6
SP IC1/2	1000Ø	6
SP IC2/1	1500Ø	4

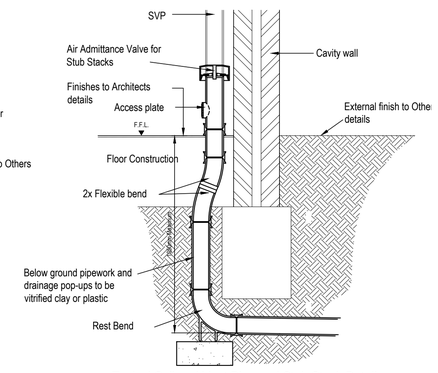


PPIC
(Depth from cover level to invert level up to 1.2m)
scale 1:10





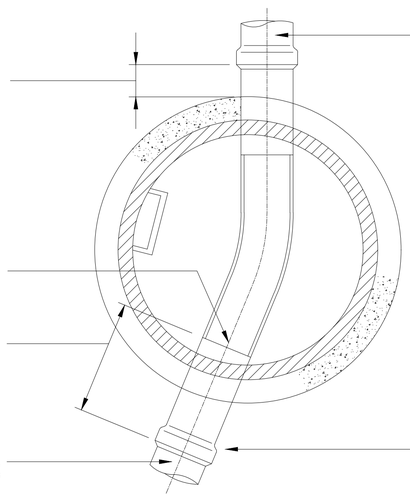
Typical Rainwater Pipe
Scale: 1:20



Typical Soil and Vent Pipe and Stub Stack Detail
Scale: 1:20

Joint to be as close as is practicable to outer face of manhole to permit the construction of satisfactory jointing to accomodate any subsequent movement

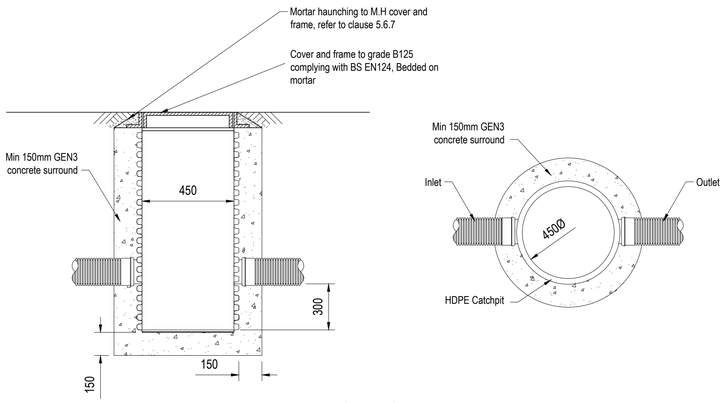
Rocker pipe, see table for details



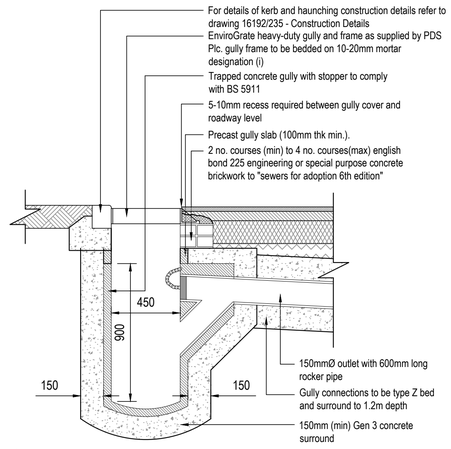
ROCKER PIPE DETAILS

NOMINAL DIAMETER (mm)	EFFECTIVE LENGTH (m)
150 to 600	0.6
675 to 750	1.0
825 and over	1.25

Typical Manhole Detail
Max depth from cover level to soffit of pipe 3.0m
NOT TO SCALE

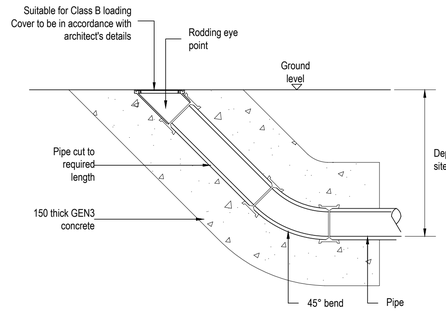


Typical Catchpit Chamber
(Scale 1:20)



Gully Notes
1. Excavations around gullies to be backfilled with class 1 material as described in table 6/1 and compacted as described in compliance with clause 612. Where mechanical compaction is impractical, or where adjacent to pedestrian crossings or within car parking areas. the excavation is to be backfilled with grade Gen 3 concrete
2. 'Pedestrian' gratings to be used in all pedestrianised areas
3. Desirable minimum gradient of outlet to be 1:10

Precast Concrete Road Gully
scale 1:20



Rodding Eye
Scale 1:10

Construction Risks	Maintenance/cleaning Risks	Demolition/adaptation Risks

In addition to the hazard/risks normally associated with the type of works detailed on this drawing take note of the above.
It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

NOTES
1. DO NOT SCALE.
2. This drawing is to be read in conjunction with all other relevant drawings and details.
3. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Engineer should be informed PRIOR to construction on site.
4. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his own risk.
5. All dimensions are in millimetres unless otherwise stated.
6. The BSP Hazard Identification and Risk Assessment information for this project must be reviewed and understood by the contractor PRIOR to the commencement of any works on site.
7. It is the responsibility of the contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015.
8. It is the responsibility of the Contractor to locate any service apparatus in the vicinity of the works. The Client will accept no claims whatsoever in respect of losses or damage caused in respect of such apparatus, however caused.
9. The Contractor shall check all tie-ins for line and level with existing before commencing any works. The Engineer should be notified immediately in writing, should any errors be found.
10. All levels are related to ordnance datum.
11. All private drainage works to be in accordance with the requirements of Building Regulations 2000, Part H, "Drainage and Waste disposal".
12. Pipes with less than 600mm cover are to be protected in accordance with Part H.
13. All pipes, chambers and fittings to be installed, bedded and backfilled in accordance with manufacturers instructions.
14. Pipe which run adjacent to buildings shall be installed in strict accordance with Part H, Clauses 2.23 to 2.25.
15. All drains in the vicinity of existing or proposed trees to be constructed in accordance with the requirements of current NHBC standards.
16. All existing land drains encountered on site during construction to be re-connected.
17. Should any change in slab level be considered, agreement shall be sought from the clients engineer prior to commencement and shall take full account of all restrictions to the slab level.
18. The layout of pipelines, manholes etc. is designed to suit the permanent case. Additional loads over & above those designed for may arise during the construction process. The Contractor shall provide any necessary temporary protection to ensure that pipelines, manholes etc. are not damaged as a result of his method of working.
19. All Rainwater Pipes are to be constructed to allow rodding from the pipe.
20.The positions of RWPs and foul connection points are shown for information only and are to be confirmed by architect - refer to architects drawings for setting out information.
21. All pipework is to be tested before and after backfilling in accordance with B.S. 1610:1998.
22. All pipework is to be of thermoplastic construction.

Information indicated on this drawing is to our knowledge representative of the project construction. BSP Consulting have not carried out full site supervision of the project during the construction stage and as such it is assumed that the construction has been carried out fully in accordance with the working drawings unless noted otherwise by the contractor. BSP Consulting accept no responsibility for any deviation to the work carried out on site, from that noted on the drawings unless full details have been received in writing prior to the issue of this drawing.

REV							
P01	First Issue						
	FE	05/09/23	TG	05/09/23	TG	05/09/23	
REV	COMMENT						
	DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE	

SCALE @ A1	ISSUING OFFICE	PROJECT NUMBER
As Shown	NOTTINGHAM	23-0452

CLIENT APPROVAL

	A - APPROVED
	B - APPROVED WITH COMMENTS
	C - DO NOT USE

STATUS	PURPOSE OF ISSUE
S1	PRELIMINARY

• CIVIL • STRUCTURAL • TRANSPORTATION • GEOTECHNICAL • ENVIRONMENTAL

bsp CONSULTING
12 Oxford Street
Nottingham, NG1 5BG

QUALITY ASSURED FM 718302 BS EN ISO 19650

BIM Design and Construction KITEMARK™

PROJECT

Clacton Road, Weeley Heath

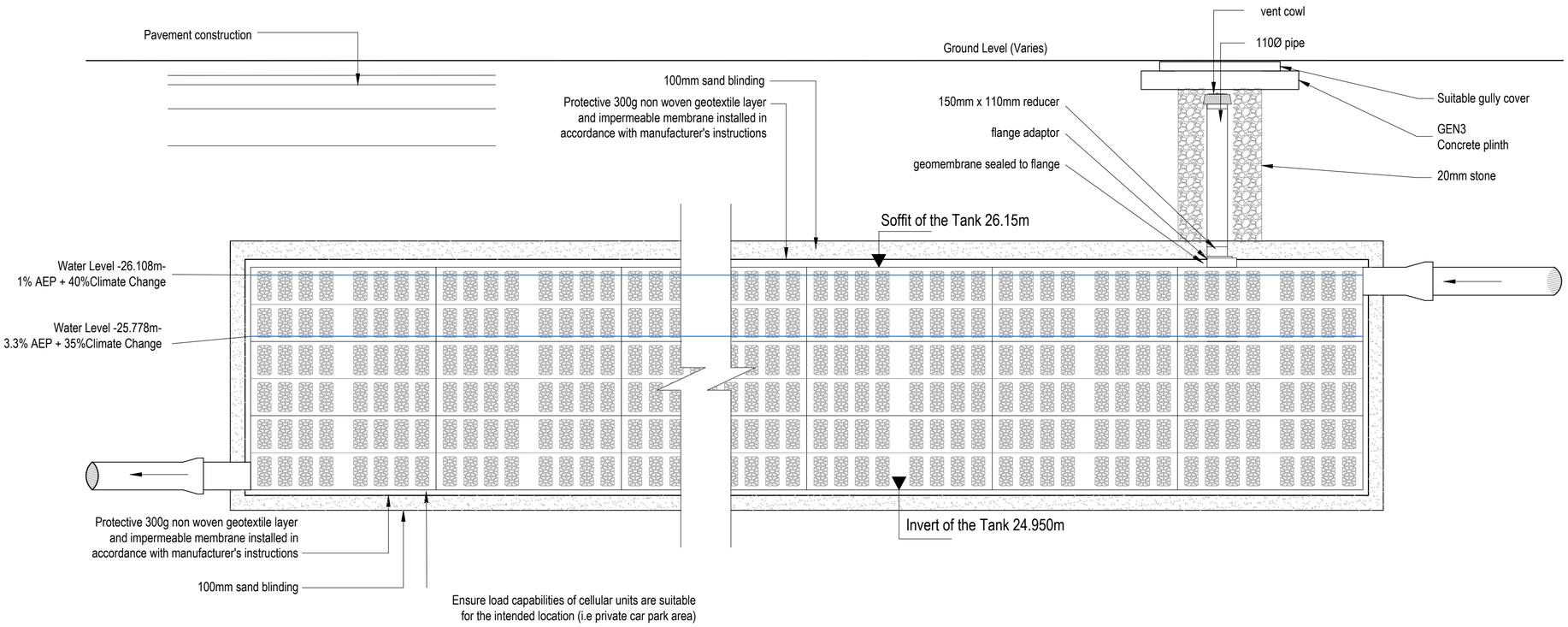
TITLE

Private Drainage Details
Sheet 1 of 2

CLIENT

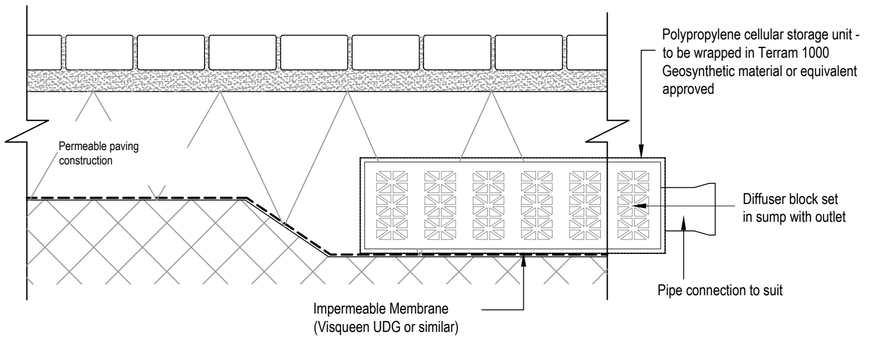
LNT Construction Ltd.

PROJECT ORIGINATOR ZONE LEVEL TYPE ROLE NUMBER	REV
CRWH-BSP-ZZ-XX-DR-C-SK245	P01



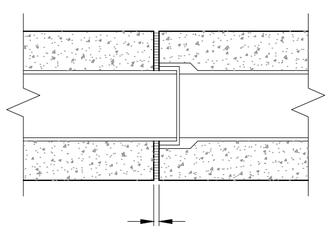
Typical Cellular Storage Tank

Scale 1:20



Permeable Paving Sump Outlet

Scale 1:10



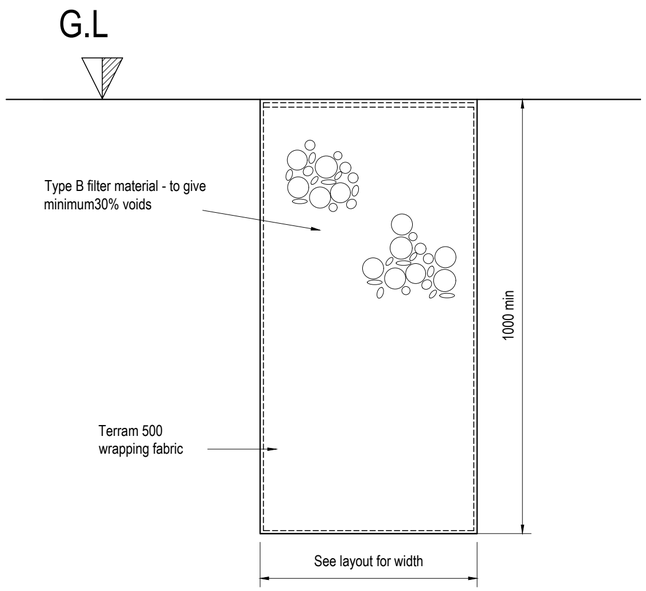
COMPRESSIBLE FILLER BOARD
18mm FOR PIPES UP TO 450 DIA 36mm FOR PIPES 450 TO 1200 DIA

Pipe Joint Detail
Type Z Surround

Scale 1:20

Pipe bedding material table

Nominal Pipe Diameter (mm)	BS 882: 1992 Course Aggregate (Table 3)	
	Graded Aggregate Ranges (mm)	Single Sized Aggregate Sizes (mm)
110mm	14 - 5	10
160mm	20 to 5 or 14 to 5	10 or 14
Exceeding 200	14 to 5, 20 to 5	10,14, or 20



Typical Detail for Filter Drain
NOT TO SCALE

NOTES

1. DO NOT SCALE.
2. This drawing is to be read in conjunction with all other relevant drawings and details.
3. Should there be any conflict between the details indicated on this drawing and those indicated on other drawings the Engineer should be informed PRIOR to construction on site.
4. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the contractor commence site work prior to such approval being given, it is entirely at his own risk.
5. All dimensions are in millimetres unless otherwise stated.
6. The BSP Hazard Identification and Risk Assessment information for this project must be reviewed and understood by the contractor PRIOR to the commencement of any works on site.
7. It is the responsibility of the contractor to execute the works at all times in strict accordance with the requirements of the Health and Safety at Work Act 1974, and the C.D.M. Regulations 2015.
8. It is the responsibility of the Contractor to locate any service apparatus in the vicinity of the works. The Client will accept no claims whatsoever in respect of losses or damage caused in respect of such apparatus, however caused.
9. The Contractor shall check all tie-ins for line and level with existing before commencing any works. The Engineer should be notified immediately in writing, should any errors be found.
10. All levels are related to ordnance datum.
11. All private drainage works to be in accordance with the requirements of Building Regulations 2000, Part H, "Drainage and Waste disposal".
12. Pipes with less than 600mm cover are to be protected in accordance with Part H.
13. All pipes, chambers and fittings to be installed, bedded and backfilled in accordance with manufacturers instructions.
14. Pipe which run adjacent to buildings shall be installed in strict accordance with Part H, Clauses 2.23 to 2.25.
15. All drains in the vicinity of existing or proposed trees to be constructed in accordance with the requirements of current NHBC standards.
16. All existing land drains encountered on site during construction to be re-connected.
17. Should any change in slab level be considered, agreement shall be sought from the clients engineer prior to commencement and shall take full account of all restrictions to the slab level.
18. The layout of pipelines, manholes etc. is designed to suit the permanent case. Additional loads over & above those designed for may arise during the construction process. The Contractor shall provide any necessary temporary protection to ensure that pipelines, manholes etc. are not damaged as a result of his method of working.
19. All Rainwater Pipes are to be constructed to allow rodding from the pipe.
20.The positions of RWPs and foul connection points are shown for information only and are to be confirmed by architect - refer to architects drawings for setting out information.
21. All pipework is to be tested before and after backfilling in accordance with B.S. 1610:1998.
22. All pipework is to be of thermoplastic construction.

KEY PLAN

Construction Risks	Maintenance/cleaning Risks	Demolition/adaptation Risks

In addition to the hazard/risks normally associated with the type of works detailed on this drawing take note of the above.
It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION BOX

REV		DRAWN BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE
P01	First Issue	FE	05/09/23	TG	05/09/23	TG	05/09/23

SCALE @ A2	ISSUING OFFICE	PROJECT NUMBER
As Shown	NOTTINGHAM	23-0452

CLIENT APPROVAL

- A - APPROVED
- B - APPROVED WITH COMMENTS
- C - DO NOT USE

STATUS	PURPOSE OF ISSUE
S1	PRELIMINARY

• CIVIL • STRUCTURAL • TRANSPORTATION • GEOTECHNICAL • ENVIRONMENTAL

bsp CONSULTING
12 Oxford Street
Nottingham, NG1 5BG
[redacted]

QUALITY ASSURED BS EN ISO 9001 QUAL-AUDIT LLP
ASCHO
bsi BIM Design and Construction KITEMARK™
KM 718353 BS EN ISO 19650

PROJECT

Clacton Road, Weeley Heath

TITLE

Private Drainage Details
Sheet 2 of 2

CLIENT

LNT Construction Ltd.

PROJECT	ORIGINATOR	FUNCTIONAL	SPATIAL	FORM	DISCIPLINE	NUMBER	REV
CRWH-	BSP-	ZZ-	XX-	DR-	C-	SK246	P01

MAINTENANCE MANUAL DATA SHEET

bsp

Reference: MM-AT-01
V1 – Nov 2016

Element:

Surface Water Pump

Function Served:

Pumping rainwater, which has been collected from the development site to the existing outfall chamber

Features:

Pump rate 1.0 litre / sec, pump details to be provided by Alton Pumps Service Ltd. or any other similar pump feature to be confirmed by management company / contractor.

Owned:

Management Company

Location:

Refer to drawing CRWH-BSP-ZZ-XX-DR-C-SK240.pdf

General Notes:

Maintenance strategy should be reviewed on a regular basis and performance of the maintenance activities assessed.

Reference should be made to recognised industry standards in undertaking maintenance.

Where activities are required outside ownership permission must be sought from relevant party.

Requirement for reporting of inspections to be confirmed by responsible party. May be required as evidence of activities to prove activity as part of funding arrangements.

Routine Maintenance (typically monthly):

Maintenance Activity	Comments	Frequency
Check the asset, and report any abnormal event to the pump service provider.	Resident shall check the asset without opening the cover due to health and safety concern	Monthly

Occasional Maintenance (typically every 6 months):

Resident of the property shall organise the pump service with the pump provider in every 6 months (twice in a year) to ensure the pump maintaining the appropriate working condition in accordance with the manufacturer's standard. For every visit, the pump provider offers the following schedule of works:

- Clean the pump
- Check stator case
- Check motor insulation / resistance / continuity
- Check cable condition and security
- Check oil if contaminated renew mechanical seal / oil
- Check impeller
- Check wear ring
- Check wear place / suction cover
- Check volute
- Run pump and check bearings
- Check control panel / contractor / sequence
- Clean and check level control system
- Check discharge connection for leaks
- Check pump fixings on guide rail
- Run pump and check running amps
- Check high level warning system
- Check earth bonding
- Check lifting chains
- Check valves
- Check telemetry if fitted
- Monitoring equipment
- Check general site security & safety
- Check general site condition

Infrequent/Corrective Activities:

Maintenance Activity	Comments	Frequency
Repair / replacement of the pump if necessary		As required

Note;

Pump manufacturer has maintenance guidance. This can be obtained from them and appended to this data-sheet and any recommended actions above and beyond stated here should be included in the maintenance regime.

SUDS Maintenance Manual Data Sheet

Reference: MM-AT-01
V1 – Nov 2016

SUDS Element:
Attenuation Tanks

Function Served:
Acting as attenuation tank

Features:
Crate storage with maintenance access tunnel with catch-pits above and below

Owned:
Management Company

Location:
Refer to drawing CRWH-BSP-ZZ-XX-DR-C-SK240.pdf

General Notes:
Maintenance strategy should be reviewed on a regular basis and performance of the maintenance activities assessed.

Reference should be made to recognised industry standards in undertaking maintenance.

Where activities are required outside ownership permission must be sought from relevant party.

Refer to section 22 of CIRIA C697 for discussion on maintenance techniques.

Requirement for reporting of inspections to be confirmed by responsible party. May be required as evidence of activities to prove activity as part of funding arrangements.

Routine Maintenance (typically monthly):

Maintenance Activity	Comments	Frequency
Litter and debris removal		Monthly
Inspect structures for evidence of poor operation		Monthly

Occasional Maintenance (typically every 6 months):

Maintenance Activity	Comments	Frequency
Inspect inlet catch pit and pre-treatment components for silt accumulation	Includes visual inspection of inlet chamber, forebay and inspection of flow control.	6 monthly
Visual inspection catch-pits, linking pipework etc for evidence of physical damage	Visual inspection from surface only, CCTV survey required if evidence present of structural issues.	6 monthly
Check mechanical devices within control chambers	Includes inspection of orifice plate for signs of damage	6 monthly

Annual Activities:

Maintenance Activity	Comments	Frequency
Remove sediment from catch-pits	Remove accumulated silt with suction tanker when 50% full.	Annual/as required

Infrequent/Corrective Activities:

Maintenance Activity	Comments	Frequency
Repair/rehabilitation of inlets and outlets.		As required
Jetting and vacuuming inspection tunnel	Remove accumulated silt with suction tanker when 20% section loss (or 100mm whichever the lesser).	As required

Note;

Attenuation crate manufacturers have suppliers maintenance guidance. This should be obtained from the supplier and appended to this data-sheet and any recommended actions above and beyond stated here should be included in the maintenance regime.

SUDS Maintenance Manual Data Sheet

Reference: MM-FT-01
V1 – March 2021

SUDS Element:
Filter Trench

Function Served:
Cleanses surface water runoff and facilitates filtration.

Features:
Stone-filled trench.

Owned:
Management Company

Location:
Refer to drawing CRWH-BSP-ZZ-XX-DR-C-SK240.pdf

General Notes:
Maintenance strategy should be reviewed on a regular basis and performance of the maintenance activities assessed.

Reference should be made to recognised industry standards in undertaking maintenance.

Where activities are required outside ownership permission must be sought from relevant party.

Refer to section 22 of CIRIA C697 for discussion on maintenance techniques.

Requirement for reporting of inspections to be confirmed by responsible party. May be required as evidence of activities to prove activity as part of funding arrangements.

Routine Maintenance (typically monthly):

Maintenance Activity	Comments	Frequency
Litter and debris removal	Litter and debris (removed prior to any grass cutting activity) to minimise risk of shredding litter	Monthly
Grass cutting of landscaped areas	All cuttings to be removed from SUDS components	Monthly (during growing season) or as required
Remove nuisance plants	Invasive species should be removed in accordance with best practice	Monthly (at implementation) then as required.
Inspect any inlet and outlet structures for evidence of poor operation		Monthly
Safety signage and safety equipment inspection	Generally limited to knee-rail fencing	Monthly

Occasional Maintenance (typically 6 monthly):

Maintenance Activity	Comments	Frequency
Inspect inlet catch pit and pre-treatment components for silt accumulation	Includes visual inspection of inlet chamber, forebay and inspection of flow control.	6 monthly
Visual inspection catch-pits, linking pipework etc for evidence of physical damage	Visual inspection from surface only, CCTV survey required if evidence present of structural issues.	6 monthly

Annual Activities:

Maintenance Activity	Comments	Frequency
Tidy all dead growth before start of growing season		Annually
Prune and trim nearby trees and remove cuttings	Where vegetation is planted as a barrier management of upward growth to encourage outward growth is necessary (after shrub seedlings are established).	As required
Remove sediment from catch-pit	Remove accumulated silt with suction tanker when 50% full.	As required

Infrequent/Corrective Activities:

Maintenance Activity	Comments	Frequency
Remove dead vegetation from trench edges		As required
Repair erosion or other damage	Required to maintain the bed at original design level	As required
Repair/rehabilitation of any inlets and outlets.		As required
Rehabilitation following a pollution event		As required
Rehabilitate/replace filter medium	Required when all mechanical elements checked and performance remains inadequate.	As required
Jetting of any linking pipework	Where CCTV survey shows siltation of pipework has occurred	As required

SUDS Maintenance Manual Data Sheet

Reference: MM-GS-02
V1 – Nov 2016

Element:
Gullies and Catchpits

Function Served:
Gullies are drainage pots with grating cover located at the lower side of the road to collect surface rainwater, and allows the rainwater flow into the main drainage network. Catchpits are manholes with the sump to remove debris from the network

Features:
Internal diameter of 450mm (gully) and 450/600mm (catchpit) with a sump to trap rainwater and rubbish.

Owned:
Management Company

Location:
Refer to drawing CRWH-BSP-ZZ-XX-DR-C-SK240.pdf

General Notes:
Maintenance strategy should be reviewed on a regular basis and performance of the maintenance activities assessed.

Reference should be made to recognised industry standards in undertaking maintenance.

Where activities are required outside ownership permission must be sought from relevant party.

Part A: Routine Maintenance (typically monthly):

Maintenance Activity	Comments	Frequency
Litter and debris removal to prevent blockage		Monthly
Inspect structure for evidence of poor operation		Monthly
Inspect cover for any sign of damage		Monthly

Where Part A activities do not address deficient performance refer to Part B, see General Notes.

Part B: Occasional Maintenance (typically 6 monthly):

Maintenance Activity	Comments	Frequency
Carry out gully/catchpit maintenance by sucking and cleaning the gully/catchpit pot		6 monthly
Visual inspection of gullies/catchpits, linking pipework etc for evidence of physical damage	Visual inspection from surface only, CCTV survey required if evidence present of structural issues.	6 monthly

Annual Activities:

Maintenance Activity	Comments	Frequency
Carry out gully/catchpit maintenance by emptying and cleaning the gully/catchpit pot	Employing gully/catchpit emptiers vehicle to empty the gullies/catchpits.	Once every year

Infrequent/Corrective Activities:

Maintenance Activity	Comments	Frequency
Repair/replace cover		As required
Rehabilitate/replacement of the gully	Required when all mechanical elements checked and performance remains inadequate.	As required
Jetting linking pipework	Where CCTV survey shows blockage of the linked pipework	As required

SUDS Maintenance Manual Data Sheet

bsp

Reference: MM-GS-02
V1 – Nov 2016

Element:
Inspection Chamber

Function Served:
Accessible chamber with cover located at where the pipes change direction and size.

Features:
Plastic PPIC internal diameter of 450mm, 600mm. Concrete PCCIC internal diameter 1050mm, 1200mm or 1500mm, accessible with steps inside the chamber, for maintenance purposes.

Owned:
Management Company

Location:
Refer to drawing CRWH-BSP-ZZ-XX-DR-C-SK240.pdf

General Notes:
Maintenance strategy should be reviewed on a regular basis and performance of the maintenance activities assessed.

Reference should be made to recognised industry standards in undertaking maintenance.

Where activities are required outside ownership permission must be sought from relevant party.

Part A: Routine Maintenance (typically monthly):

Maintenance Activity	Comments	Frequency
Litter and debris removal to prevent blockage		Monthly
Inspect structure for evidence of poor operation		Monthly
Inspect cover for any sign of damage		Monthly

Where Part A activities do not address deficient performance refer to Part B, see General Notes.

Part B: Occasional Maintenance (typically 6 monthly):

Maintenance Activity	Comments	Frequency
Carry out maintenance by cleaning the internal chamber	Includes visual inspection.	6 monthly
Visual inspection of chamber, linking pipework etc for evidence of physical damage	Visual inspection from surface only, CCTV survey required if evidence present of structural issues.	6 monthly

Annual Activities:

Maintenance Activity	Comments	Frequency
Carry out structural inspection to ensure the asset in good working condition		Once every year

Infrequent/Corrective Activities:

Maintenance Activity	Comments	Frequency
Repair/replace cover		As required
Rehabilitate/replacement of the chamber	Required when all mechanical elements checked and performance remains inadequate.	As required
Jetting linking pipework	Where CCTV survey shows blockage of the linked pipework	As required

SUDS Maintenance Manual Data Sheet

bsp

Reference: MM-PP-01
V2 – June 2015

SUDS Element:
Permeable Paved Driveway

Function Served:
Permeable paving acting as drainage, conveyance, allowing infiltration and functioning as attenuation.

Features:
60mm permeable block paviour, bedding material over 30% voided stone. Including perforated pipework and catch pits for drain down and conveyance.

Owned:
Management Company

Location:
Refer to drawing CRWH-BSP-ZZ-XX-DR-C-SK240.pdf

General Notes:
As a private owner scope of maintenance requirements are limited to what can reasonably be expected under routine maintenance of property. i.e. Part A.

Where normal maintenance is not sufficient items from Part B. of the schedule should be undertaken by a suitably experienced body

Part A: Routine Maintenance (typically monthly):

Maintenance Activity	Comments	Frequency
Litter and debris removal		Monthly
Inspect structures for evidence of poor operation		Monthly

Occasional Maintenance (typically every 6 months):

Maintenance Activity	Comments	Frequency
Brushing of pavement surface	Joints in paving become silted over time. Inspect visually. Undertake maintenance where joints are greater than 50% silted.	6 monthly or more frequently if required
Filling joints between paving blocks with suitable material	Following brushing joints may need to be topped up with suitable material. Specification as follows: *"Jointing material: 2/6.3mm clean crushed stone (no fines) to BS RN 13242:2002 or BS EN 12620"*	6 monthly as required following brushing

Where Part A activities do not address deficient performance refer to Part B, see General Notes.

Part B: Occasional Maintenance (typically every 6 months):

Maintenance Activity	Comments	Frequency
Inspect inlet catch pit and pre-treatment components for silt accumulation	Includes visual inspection of inlet chamber, forebay and inspection of flow control.	Half yearly
Visual inspection catch-pits, linking pipework etc. for evidence of physical damage	Visual inspection from surface only, CCTV survey required if evidence present of structural issues.	Half yearly

Annual Activities:

Maintenance Activity	Comments	Frequency
Remove sediment from catch-pits	Remove accumulated silt with suction tanker when 50% full.	Annual/as required

Infrequent/Corrective Activities:

Maintenance Activity	Comments	Frequency
Repair damage to paving	Damage may include rutting or local failure of structure	As required
Repair/rehabilitation of inlets and outlets.		As required
Rehabilitation following a pollution event	Pollution includes potential sealants of joints	As required
Repair/replace geotextile base.	If evidence from CCTV suggests a direct source of silt is present intrusive works will be required to the geotextile	As required
Rehabilitate sub-base	If, following brushing, the structure continues to perform below standard structural overhaul may be required. Stone may require reprocessing to reinstate original void ratio.	As required Evidence of similar structures installed around the country suggests rebuilding of the structures may be required typically every 25 years.

ICP SUDS Mean Annual Flood

Input

Return Period (years)	1	Soil	0.150
Area (ha)	0.285	Urban	0.000
SAAR (mm)	550	Region Number	Region 6

Results l/s

QBAR Rural	0.1
QBAR Urban	0.1
Q1 year	0.1
Q1 year	0.1
Q30 years	0.2
Q100 years	0.3

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model

Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 615685 220277 TM 15685 20277
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	0.750
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.000	4-8	0.101	8-12	0.184	12-16	0.000

Total Area Contributing (ha) = 0.285

Total Pipe Volume (m³) = 7.983

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	24.865	0.188	132.3	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.48	26.300	0.018	0.0	0.0	0.0	0.87	15.4	2.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.000	8.480	0.060	141.3	0.021	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	4.959	0.100	49.6	0.023	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	5.656	0.038	148.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	19.169	0.431	44.5	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.000	19.854	0.669	29.7	0.022	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	8.221	0.055	149.5	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.000	18.483	0.724	25.5	0.022	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	20.252	0.135	150.0	0.006	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	30.425	0.061	498.8	0.018	0.00	0.0	1.500	o	150	Pipe/Conduit	
6.000	24.743	0.171	144.7	0.018	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.000	2.001	0.013	153.9	0.058	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	10.227	0.068	150.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.000	50.00	5.17	26.210	0.021	0.0	0.0	0.0	0.84	14.9	2.8
3.000	50.00	5.06	26.250	0.023	0.0	0.0	0.0	1.43	25.3	3.1
2.001	50.00	5.28	26.150	0.044	0.0	0.0	0.0	0.82	14.5	6.0
1.001	50.00	5.69	26.112	0.068	0.0	0.0	0.0	1.51	26.7	9.2
4.000	50.00	5.18	26.350	0.022	0.0	0.0	0.0	1.86	32.8	3.0
1.002	50.00	5.85	25.681	0.090	0.0	0.0	0.0	0.82	14.5	12.2
5.000	50.00	5.15	26.350	0.022	0.0	0.0	0.0	2.00	35.4	3.0
1.003	50.00	6.27	25.626	0.118	0.0	0.0	0.0	0.82	14.5«	16.0
1.004	50.00	7.57	25.325	0.136	0.0	0.0	0.0	0.39	6.9«	18.4
6.000	50.00	5.49	26.300	0.018	0.0	0.0	0.0	0.83	14.7	2.4
7.000	50.00	5.04	26.210	0.058	0.0	0.0	0.0	0.81	14.3	7.9
7.001	50.00	5.25	26.197	0.058	0.0	0.0	0.0	0.82	14.4	7.9

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
6.001	19.169	0.274	70.0	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit	
8.000	18.193	0.495	36.8	0.022	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.002	8.221	0.055	149.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
9.000	18.483	0.550	33.6	0.022	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.003	20.252	0.135	150.0	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.004	30.527	0.061	500.4	0.017	0.00	0.0	1.500	o	225	Pipe/Conduit	
1.005	5.343	0.036	148.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	4.646	0.031	149.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	23.719	-1.331	-17.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.008	1.455	0.010	150.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
6.001	50.00	5.70	26.054	0.082	0.0	0.0	0.0	1.57	62.2	11.1
8.000	50.00	5.18	26.350	0.022	0.0	0.0	0.0	1.67	29.4	3.0
6.002	50.00	5.83	25.780	0.104	0.0	0.0	0.0	1.07	42.4	14.1
9.000	50.00	5.18	26.350	0.022	0.0	0.0	0.0	1.74	30.8	3.0
6.003	50.00	6.14	25.725	0.132	0.0	0.0	0.0	1.07	42.4	17.9
6.004	50.00	7.14	25.325	0.149	0.0	0.0	0.0	0.51	20.3	20.2
1.005	50.00	7.65	25.264	0.285	0.0	0.0	0.0	1.07	42.6	38.6
1.006	50.00	7.75	24.950	0.285	0.0	0.0	0.0	0.82	14.5«	38.6
1.007	50.00	12.01	24.919	0.285	0.0	0.0	0.0	0.09	1.6«	38.6
1.008	50.00	12.04	26.250	0.285	0.0	0.0	0.0	0.82	14.5«	38.6

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008		26.760	26.240	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	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	4
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	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 615685 220277 TM 15685 20277
Data Type	Point
Summer Storms	Yes
Winter Storms	No
Cv (Summer)	1.000
Cv (Winter)	0.840
Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: TANK, DS/PN: 1.006, Volume (m³): 2.2

Invert Level (m) 24.950

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	1.0000	0.600	1.0000	1.200	1.0000	1.500	1.0000

Storage Structures for Storm

Porous Car Park Manhole: Permeable Paving, DS/PN: 2.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	24.8
Max Percolation (l/s)	34.4	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	26.210	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: Permeable Paving, DS/PN: 3.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	16.2
Max Percolation (l/s)	22.5	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	26.250	Cap Volume Depth (m)	0.350

Porous Car Park Manhole: Permeable Paving, DS/PN: 7.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	25.5
Max Percolation (l/s)	35.4	Slope (1:X)	500.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	26.210	Cap Volume Depth (m)	0.350

Tank or Pond Manhole: TANK, DS/PN: 1.006

Invert Level (m) 24.950

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	195.0	1.200	195.0	1.201	0.0

2 year Return Period 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	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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	4
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	FEH
FEH Rainfall Version	2013
Site Location	GB 615685 220277 TM 15685 20277
Data Type	Point
Cv (Summer)	1.000
Cv (Winter)	1.000

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)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	SW RE01	15 Summer	2	+0%	30/15 Summer		
2.000	Permeable Paving	30 Summer	2	+0%	30/15 Summer		
3.000	Permeable Paving	15 Summer	2	+0%	30/15 Summer		
2.001	SW MH01	30 Summer	2	+0%	30/15 Summer		
1.001	SW MH02	30 Summer	2	+0%	30/15 Summer		
4.000	SW RE02	15 Summer	2	+0%	30/15 Summer		
1.002	SW MH03	30 Summer	2	+0%	2/15 Summer		
5.000	SW RE03	15 Summer	2	+0%	30/15 Summer		
1.003	SW MH04	30 Summer	2	+0%	2/15 Summer		
1.004	SW RE04	30 Summer	2	+0%	2/15 Summer		
6.000	SW RE05	15 Summer	2	+0%	100/15 Summer		
7.000	Permeable Paving	30 Summer	2	+0%	30/15 Summer		
7.001	SW MH05	30 Summer	2	+0%	30/15 Summer		

2 year Return Period 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 (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1.000	SW RE01		26.349	-0.101	0.000	0.23		3.3
2.000	Permeable Paving		26.250	-0.110	0.000	0.16		2.0
3.000	Permeable Paving		26.289	-0.111	0.000	0.15		2.9
2.001	SW MH01		26.217	-0.083	0.000	0.41		5.0
1.001	SW MH02		26.171	-0.091	0.000	0.33		8.2
4.000	SW RE02		26.386	-0.114	0.000	0.13		4.1
1.002	SW MH03		25.884	0.053	0.000	0.80		10.1
5.000	SW RE03		26.385	-0.115	0.000	0.12		4.1
1.003	SW MH04		25.855	0.079	0.000	0.94		12.8
1.004	SW RE04		25.746	0.271	0.000	2.11		14.1
6.000	SW RE05		26.350	-0.100	0.000	0.24		3.4
7.000	Permeable Paving		26.291	-0.069	0.000	0.56		6.1
7.001	SW MH05		26.269	-0.078	0.000	0.47		6.1

PN	US/MH Name	Status	Level Exceeded
1.000	SW RE01	OK	
2.000	Permeable Paving	OK	
3.000	Permeable Paving	OK	
2.001	SW MH01	OK	
1.001	SW MH02	OK	
4.000	SW RE02	OK	
1.002	SW MH03	SURCHARGED	
5.000	SW RE03	OK	
1.003	SW MH04	SURCHARGED	
1.004	SW RE04	SURCHARGED	
6.000	SW RE05	OK	
7.000	Permeable Paving	OK	
7.001	SW MH05	OK	

2 year Return Period 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.
6.001	SW MH06	30 Summer	2	+0%	30/15 Summer			
8.000	SW RE06	15 Summer	2	+0%	100/15 Summer			
6.002	SW MH07	15 Summer	2	+0%	30/15 Summer			
9.000	SW RE07	15 Summer	2	+0%	100/15 Summer			
6.003	SW MH08	15 Summer	2	+0%	30/15 Summer			
6.004	SW RE08	15 Summer	2	+0%	30/15 Summer			
1.005	SW MH08	15 Summer	2	+0%	30/15 Summer			
1.006	TANK	360 Winter	2	+0%	2/60 Summer			
1.007	SW MH09	2880 Summer	2	+0%	2/15 Summer			
1.008	SW MH10	960 Summer	2	+0%				

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
6.001	SW MH06	26.114	-0.165	0.000	0.16		9.2	OK	
8.000	SW RE06	26.389	-0.111	0.000	0.15		4.1	OK	
6.002	SW MH07	25.877	-0.128	0.000	0.38		12.6	OK	
9.000	SW RE07	26.388	-0.112	0.000	0.14		4.1	OK	
6.003	SW MH08	25.831	-0.119	0.000	0.45		17.1	OK	
6.004	SW RE08	25.519	-0.031	0.000	0.98		18.9	OK	
1.005	SW MH08	25.480	-0.009	0.000	1.00		29.9	OK	
1.006	TANK	25.225	0.125	0.000	0.09		1.0	SURCHARGED	
1.007	SW MH09	26.303	1.234	0.000	0.23		1.0	SURCHARGED	
1.008	SW MH10	26.281	-0.119	0.000	0.09		1.0	OK	

30 year Return Period 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	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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	4
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	FEH
FEH Rainfall Version	2013
Site Location	GB 615685 220277 TM 15685 20277
Data Type	Point
Cv (Summer)	1.000
Cv (Winter)	1.000

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)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	SW RE01	15 Summer	30	+35%	30/15 Summer		
2.000	Permeable Paving	30 Summer	30	+35%	30/15 Summer		
3.000	Permeable Paving	30 Summer	30	+35%	30/15 Summer		
2.001	SW MH01	30 Summer	30	+35%	30/15 Summer		
1.001	SW MH02	15 Summer	30	+35%	30/15 Summer		
4.000	SW RE02	15 Summer	30	+35%	30/15 Summer		
1.002	SW MH03	15 Summer	30	+35%	2/15 Summer		
5.000	SW RE03	15 Summer	30	+35%	30/15 Summer		
1.003	SW MH04	15 Summer	30	+35%	2/15 Summer		
1.004	SW RE04	15 Summer	30	+35%	2/15 Summer		
6.000	SW RE05	15 Summer	30	+35%	100/15 Summer		
7.000	Permeable Paving	30 Summer	30	+35%	30/15 Summer		
7.001	SW MH05	15 Summer	30	+35%	30/15 Summer		

30 year Return Period 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 (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1.000	SW RE01		26.613	0.163	0.000	0.58		8.5
2.000	Permeable Paving		26.447	0.087	0.000	0.64		8.3
3.000	Permeable Paving		26.470	0.070	0.000	0.32		6.3
2.001	SW MH01		26.460	0.160	0.000	1.20		14.4
1.001	SW MH02		26.543	0.281	0.000	0.62		15.4
4.000	SW RE02		26.701	0.201	0.000	0.36		11.0
1.002	SW MH03		26.619	0.788	0.000	1.27		16.0
5.000	SW RE03		26.686	0.186	0.000	0.34		11.1
1.003	SW MH04		26.610	0.834	0.000	1.25		17.0
1.004	SW RE04		26.429	0.954	0.000	3.46		23.1
6.000	SW RE05		26.394	-0.056	0.000	0.70		9.7
7.000	Permeable Paving		26.423	0.063	0.000	1.38		14.9
7.001	SW MH05		26.372	0.025	0.000	1.13		14.5

PN	US/MH Name	Status	Level Exceeded
1.000	SW RE01	SURCHARGED	
2.000	Permeable Paving	SURCHARGED	
3.000	Permeable Paving	SURCHARGED	
2.001	SW MH01	SURCHARGED	
1.001	SW MH02	SURCHARGED	
4.000	SW RE02	FLOOD RISK	
1.002	SW MH03	FLOOD RISK	
5.000	SW RE03	SURCHARGED	
1.003	SW MH04	FLOOD RISK	
1.004	SW RE04	SURCHARGED	
6.000	SW RE05	OK	
7.000	Permeable Paving	SURCHARGED	
7.001	SW MH05	SURCHARGED	

30 year Return Period 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.
6.001	SW MH06	15 Summer	30	+35%	30/15 Summer			
8.000	SW RE06	15 Summer	30	+35%	100/15 Summer			
6.002	SW MH07	15 Summer	30	+35%	30/15 Summer			
9.000	SW RE07	15 Summer	30	+35%	100/15 Summer			
6.003	SW MH08	15 Summer	30	+35%	30/15 Summer			
6.004	SW RE08	15 Summer	30	+35%	30/15 Summer			
1.005	SW MH08	600 Winter	30	+35%	30/15 Summer			
1.006	TANK	600 Winter	30	+35%	2/60 Summer			
1.007	SW MH09	7200 Summer	30	+35%	2/15 Summer			
1.008	SW MH10	10080 Winter	30	+35%				

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
6.001	SW MH06	26.309	0.030	0.000	0.43		24.1	SURCHARGED	
8.000	SW RE06	26.420	-0.080	0.000	0.44		12.1	OK	
6.002	SW MH07	26.256	0.251	0.000	0.95		31.4	SURCHARGED	
9.000	SW RE07	26.418	-0.082	0.000	0.42		12.1	OK	
6.003	SW MH08	26.178	0.228	0.000	1.07		41.0	SURCHARGED	
6.004	SW RE08	26.022	0.472	0.000	2.34		45.1	SURCHARGED	
1.005	SW MH08	25.779	0.290	0.000	0.47		14.1	SURCHARGED	
1.006	TANK	25.778	0.678	0.000	0.09		1.0	SURCHARGED	
1.007	SW MH09	26.303	1.234	0.000	0.23		1.0	SURCHARGED	
1.008	SW MH10	26.281	-0.119	0.000	0.09		1.0	OK	

100 year Return Period 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	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	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	4
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	FEH
FEH Rainfall Version	2013
Site Location	GB 615685 220277 TM 15685 20277
Data Type	Point
Cv (Summer)	1.000
Cv (Winter)	1.000

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)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 35, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
1.000	SW RE01	15 Summer	100	+40%	30/15 Summer		
2.000	Permeable Paving	30 Summer	100	+40%	30/15 Summer		
3.000	Permeable Paving	30 Summer	100	+40%	30/15 Summer		
2.001	SW MH01	30 Summer	100	+40%	30/15 Summer		
1.001	SW MH02	15 Summer	100	+40%	30/15 Summer		
4.000	SW RE02	15 Summer	100	+40%	30/15 Summer		
1.002	SW MH03	15 Summer	100	+40%	2/15 Summer		
5.000	SW RE03	15 Summer	100	+40%	30/15 Summer		
1.003	SW MH04	15 Summer	100	+40%	2/15 Summer		
1.004	SW RE04	15 Summer	100	+40%	2/15 Summer		
6.000	SW RE05	15 Summer	100	+40%	100/15 Summer		
7.000	Permeable Paving	30 Summer	100	+40%	30/15 Summer		
7.001	SW MH05	30 Summer	100	+40%	30/15 Summer		

100 year Return Period 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 (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)
1.000	SW RE01		26.821	0.371	0.000	0.74		10.8
2.000	Permeable Paving		26.575	0.215	0.000	0.69		9.0
3.000	Permeable Paving		26.599	0.199	0.000	0.34		6.8
2.001	SW MH01		26.590	0.290	0.000	1.27		15.3
1.001	SW MH02		26.714	0.452	0.000	0.64		16.1
4.000	SW RE02		26.986	0.486	0.000	0.44		13.5
1.002	SW MH03		26.848	1.017	0.000	1.31		16.5
5.000	SW RE03		26.983	0.483	0.000	0.41		13.6
1.003	SW MH04		26.853	1.077	0.000	1.31		17.8
1.004	SW RE04		26.673	1.198	0.000	3.83		25.6
6.000	SW RE05		26.587	0.137	0.000	0.86		12.0
7.000	Permeable Paving		26.556	0.196	0.000	1.79		19.5
7.001	SW MH05		26.519	0.172	0.000	1.53		19.7

PN	US/MH Name	Status	Level Exceeded
1.000	SW RE01	FLOOD RISK	
2.000	Permeable Paving	FLOOD RISK	
3.000	Permeable Paving	SURCHARGED	
2.001	SW MH01	SURCHARGED	
1.001	SW MH02	FLOOD RISK	
4.000	SW RE02	FLOOD RISK	
1.002	SW MH03	FLOOD RISK	
5.000	SW RE03	FLOOD RISK	
1.003	SW MH04	FLOOD RISK	
1.004	SW RE04	FLOOD RISK	
6.000	SW RE05	SURCHARGED	
7.000	Permeable Paving	SURCHARGED	
7.001	SW MH05	SURCHARGED	

100 year Return Period 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.
6.001	SW MH06	30 Summer	100	+40%	30/15 Summer			
8.000	SW RE06	15 Summer	100	+40%	100/15 Summer			
6.002	SW MH07	30 Summer	100	+40%	30/15 Summer			
9.000	SW RE07	15 Summer	100	+40%	100/15 Summer			
6.003	SW MH08	15 Summer	100	+40%	30/15 Summer			
6.004	SW RE08	15 Summer	100	+40%	30/15 Summer			
1.005	SW MH08	720 Winter	100	+40%	30/15 Summer			
1.006	TANK	720 Winter	100	+40%	2/60 Summer			
1.007	SW MH09	8640 Winter	100	+40%	2/15 Summer			
1.008	SW MH10	2160 Winter	100	+40%				

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
6.001	SW MH06	26.484	0.205	0.000	0.50		28.1	SURCHARGED	
8.000	SW RE06	26.582	0.082	0.000	0.55		15.3	SURCHARGED	
6.002	SW MH07	26.449	0.444	0.000	1.02		33.9	SURCHARGED	
9.000	SW RE07	26.504	0.004	0.000	0.55		15.8	SURCHARGED	
6.003	SW MH08	26.375	0.425	0.000	1.17		44.9	SURCHARGED	
6.004	SW RE08	26.213	0.663	0.000	2.68		51.7	SURCHARGED	
1.005	SW MH08	26.109	0.620	0.000	0.53		15.9	SURCHARGED	
1.006	TANK	26.108	1.008	0.000	0.09		1.0	SURCHARGED	
1.007	SW MH09	26.303	1.234	0.000	0.23		1.0	SURCHARGED	
1.008	SW MH10	26.281	-0.119	0.000	0.09		1.0	OK	

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