

Horncastle House, Plawhatch Lane, Sharpthorne
Our Ref: 29528-FLD-0101 Rev A
Drainage Technical Note
November 2025

Introduction

MEC Consulting Group has been commissioned by Splendid Projects Ltd (hereafter referred to as 'the Client') to prepare a drainage strategy to support a planning application for the construction of care facilities at Horncastle House, Plawhatch Lane, Sharpthorne (hereafter referred to as 'the Site').

Revision A of this Technical Note aims to address comments from West Sussex County Council (WSCC) as the Lead Local Flood Authority (LLFA), dated 29th July 2025, see **Appendix A**. The LLFA comments are provided below in *Italics* and a MEC response is provided in normal text, addressing each comment.

- *The hydraulic calculations are based on a site in Scotland (region 1). The drainage strategy and calculations will need to be updated based on the local region for the site.*

The calculations have been updated to be based on region 7 and can be found in **Appendix B**. This has decreased the QBAR calculation from 6.1l/s to 5.9l/s, but still provides a 95% betterment from the existing brownfield site. The drawing has been updated to reflect these changes in **Appendix C**.

- *Whilst source control SuDS features have been assessed in Table 3, only permeable paving has been used as well as an underground attenuation tank. It is unclear why the other source control features categorised as suitable are currently not proposed.*

The drainage strategy has been updated to include an above-ground attenuation basin, instead of the proposed geo-cellular tank. This allows for surface water to be treated on site, prior to outfalling into the ordinary watercourse, at a QBAR greenfield rate of 5.9l/s and provides sufficient mitigation.

- *As this is a full planning application, full network calculations are required. The drainage layout must be labelled to allow for cross-referencing with the calculations.*

Full network calculations, which include the pipe sizes and lengths have been included in **Appendix B** and the drainage strategy has been updated to show the pipe networks in **Appendix C**.

- *An impermeable areas plan is required.*

An impermeable areas plan is included in **Appendix D**, see drawing 29528_01_230_02.

- *Cross-sections of permeable paving and the tank is required.*

Cross sections of the permeable paving and proposed attenuation basin are provided in **Appendix E**, see drawing 29528_01_230_03.

- *Further evidence showing watercourse connectivity to the wider network is required. It appears the watercourse is outside the redline boundary; therefore, evidence of an agreement from a third-party landowner is required.*

The watercourse lies within the ownership of the site's neighbours Horncastle Place. The existing drainage strategy currently outfalls into the watercourse, via a piped network into an existing sewage treatment plant. Discussions are ongoing regarding a new third-party land agreement to discharge into the site from the proposed attenuation basin.

- *As the application is proposed to discharge surface water to an ordinary watercourse, a surcharged outfall is required.*

A surcharged outfall has been included within the calculations in **Appendix B**. The depths of the surcharged outfall have been set to 0.20m, which is the depth of surface water flooding around the watercourse.

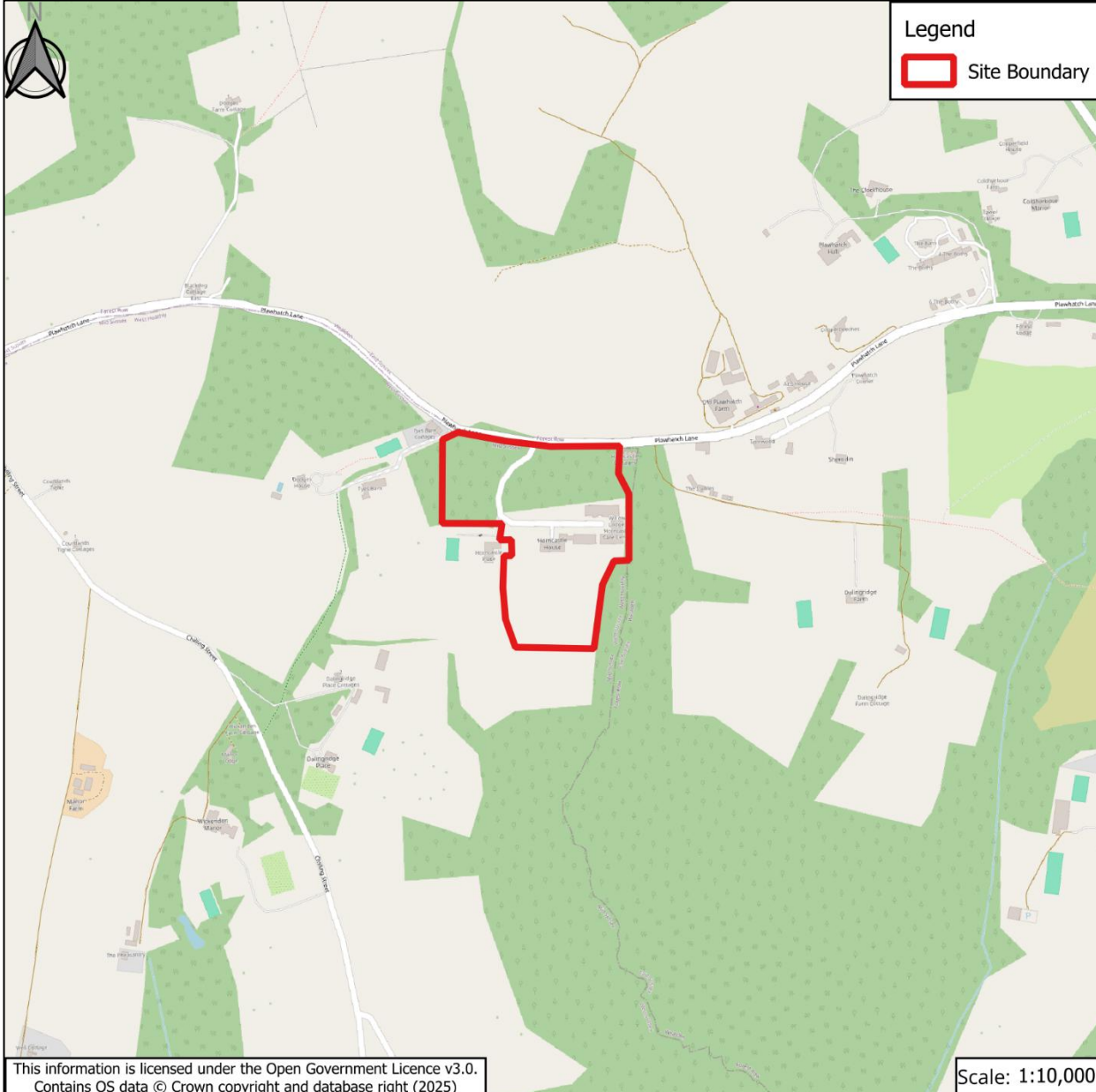
- *It is unclear how the site currently drains and what will happen to the existing network within the site.*

The site currently outfalls via a series of piped networks into the existing sewage treatment plant on site and outfalls into the watercourse. The existing network, including the sewage treatment plant, will be disconnected and a new surface water and foul water network will be put in place.

Site Location

In total, the site covers approximately 5.61ha, with proposals comprising an 80-bedroom care home with associated road infrastructure, green space, and SuDS systems. The proposed site location is shown in Figure 1.

Figure 1: Site Location and Proposed Layout



Surface Water Drainage

Surface water arising from the development should, as far as practicable, be managed in a sustainable manner to mimic the surface water flows if the site was undeveloped. When considering surface water discharge the SuDS hierarchy needs to be adhered to and is as follows;

- Water reuse, where a need is identified;
- Into the ground (infiltration), where ground conditions permit;
- To a surface water body
- To a surface water sewer, highway drain, or other drainage systems; or
- To a combined sewer

Water Reuse

Consideration should be given to the implementation of rainwater harvesting systems, including but not limited to water butts on residential dwellings to ensure rainwater reuse. The first 5mm of rainfall will be collected via water butts.

However, given the scale of the development and attenuation requirements calculated, it is not considered feasible to have a collection of rainwater for non-potable uses to provide a wholesale means of surface water runoff attenuation within the site boundary.

Discharge at Source

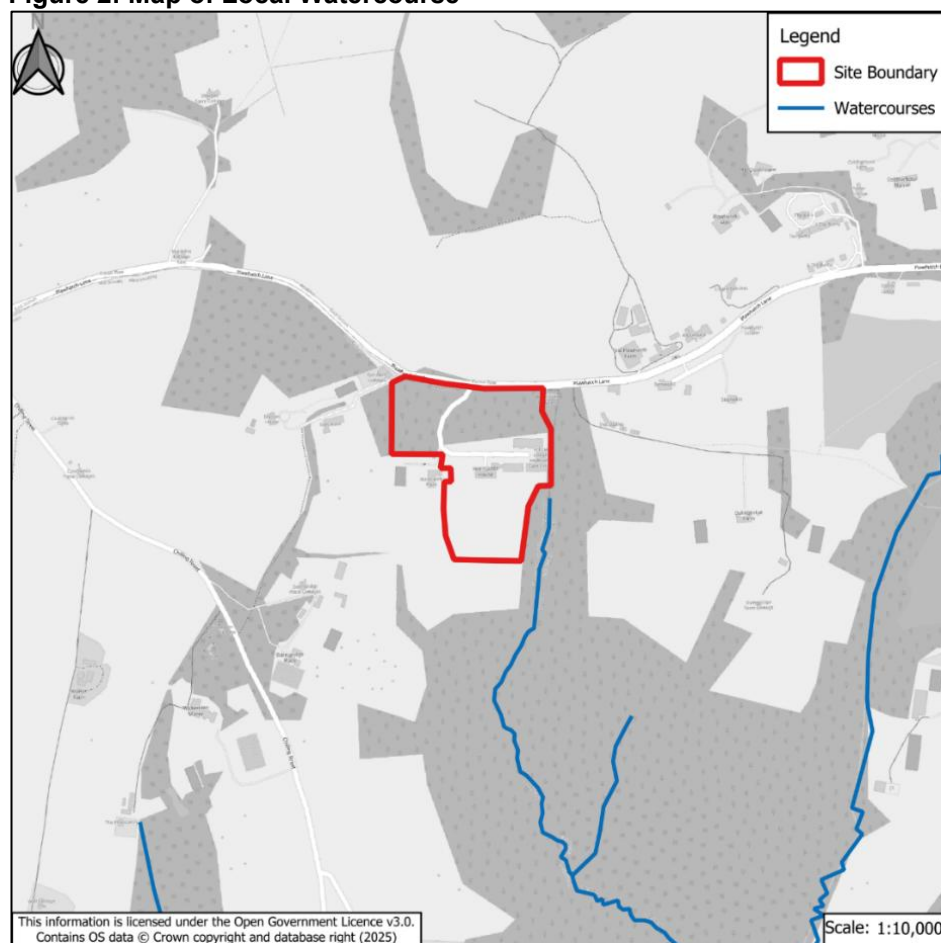
British Geological Survey (BGS) mapping suggests the site has no recorded superficial geology, with the site being wholly underlain by a bedrock geology comprising Ashdown Formation – sandstone and siltstone.

A review of boreholes TQ33SE11 and TQ33SE30, to the southwest and northeast respectively, reported superficial geology comprising areas of head and clayey deposits, with deeper strata comprising clay layers and hard sandstone. These areas of clays and hard sandstone were recorded to occur within 2m bgl. This suggests a generally permeable bedrock and impermeable superficial geology. This suggests that, at this stage and subject to further testing, infiltration is unlikely to be a suitable means of surface water disposal for the site.

Discharge to a Surface Water Body

An existing Ordinary Watercourse is found within Horncastle Wood to the east of the site, and likely serves as the existing Horncastle House Nursing Homes' discharge location for surface water and treated foul water. This watercourse runs southwards, where it converges with several other unnamed watercourses and ditches, converging with the Cockhaise Brook approximately 5km south of the site. Figure 2 shows the watercourse has further connectivity downstream.

Figure 2: Map of Local Watercourse



As this watercourse is the current point of discharge from the site a gravity-fed solution is considered feasible. A topographical survey has been included as **Appendix F**.

In accordance with the drainage hierarchy, surface water will discharge at a Greenfield QBAR rate into the existing watercourse to the east of the site.

In accordance with the drainage hierarchy, surface water will discharge into the existing watercourse to the east of the site.

The drainage hierarchy has been satisfied by the above outfall method.

Land Use

To calculate the drainage requirements, the existing and proposed land use are required. Table 1 below, summarises the proposed land uses within the site. The site currently comprises a mixture of open green space and the former Horncastle House Nursing Home. The current land use has been calculated using the existing site plan and the post-development land has been measured from the proposed layout. Due to the proposed use of the development, it is considered that urban creep will not be required to be added to the calculations due to the low likelihood of expansion in the future without the need for additional planning applications.

Table 1: Land Use Summary

Land Use Type	Existing Site Areas		Proposed Site Areas	
	ha	%	Ha	%
Impermeable Areas	0.880	16	0.902	16
Green Landscape / Permeable Areas	4.730	84	4.708	84
Total	5.610	100	5.610	100

Climate Change Allowances

The influence of climate change on rainfall intensity is likely to increase the frequency of flood events and the overall volume of water that passes the site. When considering surface water runoff from the site, the increases in peak rainfall intensity varies over the lifetime of the development. Where residential developments with a lifetime beyond the 2070s are proposed, the NPPF states that the Upper End allowances should be used, as highlighted in green in Table 2.

Table 2: Peak Rainfall intensity allowances from Flood Risk Assessments: Climate Change Allowances Guidance

Annual Exceedance Probability	Total potential change anticipated for the '2050s' (2022 to 2060)		Total potential change anticipated for the '2070s' (2061 to 2125)	
	Central	Upper End	Central	Upper End
3.3% AEP	20%	35%	20%	40%
1% AEP	20%	45%	25%	45%

Discharge Rates

Brownfield runoff conditions have been calculated using the Modified Rational Method to calculate the Brownfield Discharge Rates. For the existing impermeable area of 0.88ha, the peak discharge rate has been calculated as 110.09l/s based on a rainfall intensity of 50mm/hr.

Greenfield runoff conditions have been calculated using the FEH module within Causeway Flow. For the proposed impermeable area of 0.902ha, the peak discharge rate has been calculated as 5.9l/s, based on a Region 7 within the Flow Calculations. Calculations for the greenfield rate can be found within **Appendix B**. This is a 95% betterment from the original site.

In accordance with the National SuDS standards the drainage strategy involves conveying surface water flows to an attenuation basin, which will outfall into the existing ditch network within Horncastle Wood, subject to third-party land agreement.

Attenuation Basin

Surface water flows for an impermeable area of 0.90ha will be conveyed to a proposed attenuation basin within the south of the site. The location of the basin has been proposed away from neighbouring properties to ensure surface water associated within the development stays onsite. A storage volume of 892.287m³ is required within the attenuation basin to allow sufficient time for surface water to discharge into the proposed attenuation basin at a rate of 5.9l/s and cater for all events up to and including the 1 in 100-year + 45% climate change. The basin has been designed to a depth of 1.50m, which includes a 300mm allowance for freeboard. A surcharged outfall has been included within the calculations. The calculations for the proposed design can be seen in **Appendix B**, and the drainage strategy based on the principles above is shown in drawing ref: 29528_01_230_01a in **Appendix C**.

Additional drainage features such as permeable paving can be used across the site and will provide additional storage and treatment. Permeable paving will act as a first treatment stage for any runoff and will ensure adequate surface water treatment is provided. These features have been excluded from calculations at this stage.

Applicable SuDS Techniques

The Non-Statutory Technical Standards for Sustainable Drainage Systems that deals with SuDS, covers a whole range of sustainable approaches to surface water drainage management including;

- Source control measures including rainwater recycling and drainage;
- Filter strips and swales, which are vegetated features that hold and drainage water mimicking natural drainage patterns;
- Filter drains and permeable pavements to allow rainwater and runoff to infiltrate into permeable paving below ground and provide storage if needed; and
- Basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding.

Each of the five SuDS components listed above is discussed below in Table 3, with reference to their suitability for the proposed development.

Table 3: Suitability of SuDS Techniques

	COMPONENT	SUITABILITY	REASONS
Source Control	Rainwater Harvesting	Yes	Rainwater harvesting could be used across the site.
	Green Roofs	No	Green roofs are not generally suitable for residential developments.
	Bio-retention Systems / Rain Gardens	Yes	Open green space can be converted to provide additional water quality improvements.
Proprietary Systems	Proprietary bio-retention systems	No	More appropriate SuDS features can be accommodated within the development and are preferred.
Infiltration Devices	Permeable Paving	Yes	Permeable paving is suitable for the proposed development within parking spaces.
	Infiltration trenches / Soakaways	No	Infiltration is not considered suitable for the development.
Filtration	Open swales / Filter Strips / Drains	No	Due to the size and location of the site, open swales are not considered suitable.
Retention / Detention	Detention Basin, Attenuation Pond / Tanks	Yes	The proposed attenuation basin will provide surface water storage and treatment.

Surface Water Quality

The CIRIA SuDS Manual C753, indicates the minimum treatment indices appropriate for contributing pollution hazards for different land use classifications. To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant) that equals or exceeds the pollution hazard index.

When using more than one SuDS component in series the mitigation indices are multiplied by a factor of 0.5. This is to account for the reduced performance of secondary or tertiary components associated with the already reduced inflow concentrations. The SuDS Mitigation Index from the additional components will be added together up to a maximum value of 0.95, regardless of the number of components in series.

Surface water runoff from residential roofs will have a very low pollution hazard levels, whilst the residential parking areas will have a low pollution hazard index.

The pollution hazard indices, mitigation indices of each SuDS component and the accompanying calculations are provided in Table 4.

Table 4: SuDS Mitigation Indices (from CIRIA SuDS Manual)

SuDS Component	Mitigation Indices		
	<i>Total Suspended Solids</i>	<i>Metals</i>	<i>Hydrocarbons</i>
Residential Roofs	0.2	0.2	0.05
Residential Parking Areas	0.5	0.4	0.4
Permeable Paving	0.7	0.6	0.7
Attenuation Basin	0.5	0.5	0.6
Mitigation Calculation	0.7 + 0.5 (0.5)	0.6 + 0.5(0.5)	0.7 + 0.6(0.5)
SuDS Mitigation Index	0.95	0.85	0.95
Mitigation Requirement Met?	Yes	Yes	Yes

For the very low to low pollution hazard levels generated at the site, the proposed permeable paving and attenuation basin would provide sufficient treatment in accordance with the Simple Index Approach.

Exceedance and Flow Routing

The risk of overland flowing from adjacent land to the care home is low. The design of levels and features on the site will follow best practice by ensuring any overland flow is routed safely away from the care home and to areas of lowest risk. Any surcharging and subsequent flooding of sewers on or in the vicinity of the site will also be mitigated by the flood routing described above. As such, the risk of flooding on site from exceedance events and flood flow routes is low.

Maintenance and Management

An integrated approach to the maintenance and management of SuDS is a requirement of the NPPF and the Flood and Water Management Act 2010. The aim of a maintenance and management plan is to ensure that there is a clear understanding of drainage responsibilities and that a maintenance regime is implemented for all new drainage systems, for the lifetime of the development.

All private drainage, including SuDS, will be maintained by the landowners, or by an appointed management company.

A proposed maintenance schedule, which breaks down the maintenance requirements of the proposed SuDS features, is shown in **Appendix G**.

Foul Water Strategy

According to The Buildings Regulations (2010), foul water drainage from new developments should be discharged into the following, in order of priority;

- A public sewer;
- A private sewer communicating with a public sewer;
- A septic tanks, which has an appropriate form of secondary treatment; or
- A cesspool

Sewer asset plans have been received from Southern Water and have been included in **Appendix H**. The maps show there are no public sewers within the vicinity of the site.

It is understood that the site currently treats existing foul water from the site and the surrounding cottages via a Sewage Treatment Plant (STP). The treated discharge flows into the existing manhole to the east of the site and outfalls into the watercourse within Horncastle Wood. It is assumed that the remaining effluent is pumped away from the site at regular intervals.

A service of the STP conducted in February 2025 states the STP is generally in good condition; however, as there is no forward flow, effluent becomes trapped and the tank is beginning to leak. See the report in **Appendix I**. Therefore, it is proposed to replace the existing sewage treatment plant with a new system approximately 75m south of the existing plant.

The proposed sewage treatment plant has been sized based on the proposed 98 bedrooms multiplied by a flow rate of 350 litres per person per day (based on the British Flows and Loads Calculations for a residential care/nursing home). Foul flows entering the proposed Klargester Large Sewage Treatment Plant (BM) will be treated in line with national standards. The treated effluent will be conveyed into the proposed attenuation basin and discharged, with the surface water flows, into the existing watercourse, subject to agreement with third-party landowners.

The additional flows have been included within the surface water calculations by applying a 0.4l/s additional inflow based on the calculations above. The proposed drainage strategy can be found on drawing 29528_01_230_01a in **Appendix C**.

REGISTRATION OF AMENDMENTS

Date	Rev	Comment	Prepared By	Checked By	Approved By
April 2025	-	First issue	Thomas Sturtridge BSc (Hons) MSc PIEMA Flood Risk Engineer	Zoe Jordan BSc (Hons) Flood Risk Engineer	Tim Rose BA (Hons) MCIHT MTPS Regional Director
November 2025	A	Updates based on LLFA comments	Zoe Jordan BSc (Hons) Flood Risk Engineer	Ryan Chafer BSc (Hons) Principal Flood Risk Engineer	Tim Rose BA (Hons) MCIHT MTPS Regional Director

Appendices

- A. LLFA comments
- B. Surface and Foul Water Drainage Calculations (29528-CALC-0101 Rev A)
- C. Surface and Foul Water Drainage Strategy (29528_01_230_01a)
- D. Impermeable Areas Plan
- E. Cross-Section Drawing
- F. Topographical Survey
- G. Maintenance and Management Plan
- H. Sewer Asset Plans
- I. On-site Sewage Treatment Works Service Report, February 2025

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APPENDICES



APPENDIX A

Ground Floor
Northleigh
County Hall
Chichester
West Sussex
PO19 1RH



Lead Local Flood Authority

Date 29th July 2025

Joanne Fisher
Development Control
Mid Sussex District Council
Oaklands Road
Haywards Heath
West Sussex
RH16 1SS

Dear Joanne,

RE: DM/25/1650 – Horncastle Care Centre, Plawatch Lane, Sharpthorne, East Grinstead, East Sussex, RH19 4JH

Thank you for your consultation on the above site, received on 8th July 2025. We have reviewed the application as submitted and wish to make the following comments.

This application is for the demolition of the remaining parts of the redundant buildings in the western and southern part of the site; the development of a new specialist dementia care home (Use Class C2); the retention of an existing acquired brain injury (ABI) unit in the northern part of the site (Use Class C2), a retained access from Plawatch Lane and associated car and cycle parking and landscaping.

It is noted that the FRA was not provided until 24th July 2025, therefore we believe the application should not have been validated until then, as this means we have only had 5 days in this consultation period to carry out our review.

The application is currently not in accordance with NPPF, PPG Flood risk and coastal change, National Standards for SuDS and MSDC Local Plan, therefore flood risk could increase elsewhere. We **object** to this planning application and require further information on:

1. The hydraulic calculations are based on a site in Scotland (which is where hydrological region 1 is located). Sustainable drainage strategies must be site specific. Please submit the FEH-22 point data files for this application, in accordance with clause 5.1.7 of the FEH Web Service terms of use (<https://fehweb.ceh.ac.uk/Home/Terms>). These must be submitted directly to FRM@westsussex.gov.uk rather than to the planning portal (via the planning officer), to ensure that the data remains confidential in accordance with those terms.

The rest of the calculations and drainage strategy where required will then need to be updated to reflect any changes.

2. While source control SuDS features have been assessed in Table 3, only permeable paving has been used as well as an underground attenuation tank. It is unclear why the other source control features categorised as suitable are currently not proposed to be used.
3. As this is a full planning application, full network calculations are required. The drainage layout must be labelled to allow for cross referencing with the calculations.
4. An impermeable area plan is required.
5. Cross section of permeable paving and tank
6. Further evidence showing watercourse connectivity to the wider network is required. It appears that the watercourse is outside the red line boundary, therefore evidence of an agreement from third party landowner is required.
7. As the application is proposing to discharge surface water to ordinary watercourse, a surcharged outfall is required.
8. It is unclear how the site currently drains and what will happen with the existing network within the site.

It should be noted that the National Standards for SuDS have been updated, therefore we'd expect any re-submitted documents to follow updated standards.

The level of detail provided in this application more reflects what we require for an outline planning application rather than a full planning application.

Yours sincerely,

Eleanor Read
Flood Risk Management Team
FRM@westsussex.gov.uk

Annex

The following documents have been reviewed, which have been submitted to support the application;

Flood Risk Assessment by MEC Consulting Group, July 2025

Outline Drainage Strategy by MEC Consulting Group, 15.04.2025

Drainage Technical Note by MEC Consulting Group, April 2025



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APPENDICES



APPENDIX B

Doc. Ref.	29528-CALC-0101
Sheet	1 of 10
Engineer	Z. Jordan
Date	11 Nov 25
Revision	A

DESIGN CALCULATIONS FRONT SHEET

SCHEME	Horncastle House Nursing Home, Plawhatch Lane, Sharpthorne
CLIENT	Splendid Projects
ASPECTS OF SCHEME TO BE DESIGNED	Brownfield Calculations Greenfield Calculations Surface water attenuation design and simulation results for the 50%AEP, 3.3%AEP40CC and 1%AEP45CC event for the development site. Foul Water Calculations
CODES OF PRACTICE, DESIGN SPECIFICATIONS & BRITISH STANDARDS	- Design and analysis of urban storm drainage. Wallingford Procedure Vol.1 - Sustainable Drainage Systems- Non-Statutory technical standards for Sustainable drainage systems- 2015 - The SuDS Manual – CIRIA C753
NOTES	Brownfield runoff conditions have been calculated using the Modified Rational Method to calculate the Brownfield Discharge Rates. For the existing impermeable area of 0.88ha, the peak discharge rate has been calculated as 110.09l/s based on a rainfall intensity of 50mm/hr. Greenfield runoff conditions have been calculated using the FEH module within Causeway Flow. For the proposed impermeable area of 0.902ha, the peak discharge rate has been calculated as 5.9l/s. This is a 95% betterment from the original site. In accordance with the National SuDS standards the drainage strategy involves conveying surface water flows to an attenuation basin, which will discharge at the greenfield discharge rate of 5.9l/s into the existing ditch network within Horncastle Wood.

INDEX

Pages	Calculations	Checked by	Date
2	Modified Rational Method to calculate Brownfield Discharge Rate based on a rainfall intensity of 50mm/hr.	RC	11.11.2025
3 – 8	Surface Water Sewer design details for the 50%, 3.3%AEP40CC and 1%AEP45CC simulation results	RC	11.11.2025
9 - 10	Foul Water Calculations	RC	11.11.2025



Brownfield Run-off Calculation

Project: Horncastle House Nursing Home, Plawhatch Lane, Sharpthorne

File Ref: 29528

O.S. Grid Ref: 539175 , 132267

The Rational Method equation used to calculate peak stormwater runoff rate is:

$$Q = 2.78 CiA$$

Where;

Q = The peak stormwater runoff rate from the drainage area (L/S).

2.78 = Conversion factor to use standard units.

C = Runoff coefficient for drainage area (A).

i = The intensity of the design storm for peak runoff calculation (mm/hr).

A = The area of the watershed that drains to the point for which the peak runoff rate is calculated (ha).

The following figures will be used to calculate the peak runoff for the site;

C = 0.9, as not all run-off will discharge from the site.

i = 50 mm/hr

A = 0.88 ha

Peak run-off for the site;

$$Q = 2.78 \times 0.9 \times 50 \times 0.88$$

$$Q = 110.088 \text{ l/s}$$



Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	4.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	100.0		

Nodes

Name	Area (ha)	T of E (mins)	Add Inflow (l/s)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.095	4.00		168.870	1200	539113.717	132287.135	1.575
S2	0.089	4.00		167.610	1200	539158.263	132287.286	2.347
S3	0.085	4.00		167.500	1200	539195.279	132286.690	2.360
S4	0.238	4.00		167.620	1200	539242.955	132286.221	2.726
S5	0.065	4.00		167.640	1200	539243.921	132264.751	3.140
S6				167.380	1200	539243.331	132244.921	3.100
S7				165.930	1200	539232.468	132222.651	3.000
S8	0.022	4.00		167.000	1200	539136.140	132242.748	1.425
S9	0.083	4.00		166.970	1200	539168.182	132242.706	1.583
S10				166.900	1200	539187.506	132242.512	1.627
S11	0.065	4.00		166.900	1200	539187.568	132245.478	1.644
S12	0.052	4.00		167.210	1200	539208.033	132245.120	3.415
S13	0.108	4.00		166.020	1200	539207.731	132223.429	3.490
Klargester		4.00	0.4	161.000	1500	539206.657	132177.819	2.830
S14				161.000	1200	539198.308	132176.321	3.105
Headwall				158.500	1200	539192.955	132155.321	1.463
Basin				158.500	1500	539207.957	132153.533	1.500
HydroBrake				158.500	1500	539221.085	132149.423	1.600
Outfall				155.000	1350	539263.287	132144.492	0.500

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	44.546	0.600	167.295	165.263	2.032	21.9	375	4.19	100.0
1.001	S2	S3	37.021	0.600	165.263	165.140	0.123	300.0	375	4.78	100.0
1.002	S3	S4	47.678	0.600	165.140	164.894	0.246	193.8	375	5.40	100.0
1.003	S4	S5	21.492	0.600	164.894	164.575	0.319	67.4	375	5.56	100.0
1.004	S5	S6	19.839	0.600	164.500	164.280	0.220	90.2	450	5.71	100.0
1.005	S6	S7	24.778	0.600	164.280	162.930	1.350	18.4	450	5.80	100.0
1.006	S7	S13	24.749	0.600	162.930	162.530	0.400	61.9	450	5.96	100.0
2.000	S8	S9	32.042	0.600	165.575	165.387	0.188	170.0	225	4.53	100.0
2.001	S9	S10	19.325	0.600	165.387	165.273	0.114	170.0	225	4.86	100.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	3.884	429.0	34.3	1.200	1.972	0.095	0.0
1.001	1.041	114.9	66.5	1.972	1.985	0.184	0.0
1.002	1.298	143.3	97.2	1.985	2.351	0.269	0.0
1.003	2.210	244.1	183.2	2.351	2.690	0.507	0.0
1.004	2.141	340.6	206.7	2.690	2.650	0.572	0.0
1.005	4.762	757.4	206.7	2.650	2.550	0.572	0.0
1.006	2.588	411.6	206.7	2.550	3.040	0.572	0.0
2.000	1.000	39.7	8.0	1.200	1.358	0.022	0.0
2.001	1.000	39.7	37.9	1.358	1.402	0.105	0.0



Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2.002	S10	S11	2.967	0.600	165.273	165.256	0.017	170.0	225	4.91	100.0
2.003	S11	S12	20.468	0.600	165.256	163.870	1.386	14.8	225	5.01	100.0
2.004	S12	S13	21.693	0.600	163.795	162.680	1.115	19.5	300	5.11	100.0
1.007	S13	S14	48.041	0.600	162.530	157.895	4.635	10.4	450	6.09	100.0
3.000	Klargester	S14	8.482	0.600	158.170	158.120	0.050	169.6	225	4.14	100.0
1.008	S14	Headwall	21.672	0.600	157.895	157.037	0.858	25.3	450	6.17	100.0
1.009	Headwall	Basin	15.108	0.600	157.037	157.000	0.037	408.0	450	6.43	100.0
1.010	Basin	HydroBrake	13.756	0.600	157.000	156.900	0.100	137.6	450	6.56	100.0
1.011	HydroBrake	Outfall	42.489	0.600	156.900	154.500	2.400	17.7	150	6.85	100.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
2.002	1.000	39.7	37.9	1.402	1.419	0.105	0.0
2.003	3.422	136.1	61.4	1.419	3.115	0.170	0.0
2.004	3.580	253.1	80.2	3.115	3.040	0.222	0.0
1.007	6.341	1008.6	326.0	3.040	2.655	0.902	0.0
3.000	1.001	39.8	0.4	2.605	2.655	0.000	0.4
1.008	4.057	645.3	326.4	2.655	1.013	0.902	0.4
1.009	1.000	159.0	326.4	1.013	1.050	0.902	0.4
1.010	1.731	275.3	326.4	1.050	1.150	0.902	0.4
1.011	2.405	42.5	326.4	1.450	0.350	0.902	0.4

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	44.546	21.9	375	Circular	168.870	167.295	1.200	167.610	165.263	1.972
1.001	37.021	300.0	375	Circular	167.610	165.263	1.972	167.500	165.140	1.985
1.002	47.678	193.8	375	Circular	167.500	165.140	1.985	167.620	164.894	2.351
1.003	21.492	67.4	375	Circular	167.620	164.894	2.351	167.640	164.575	2.690
1.004	19.839	90.2	450	Circular	167.640	164.500	2.690	167.380	164.280	2.650
1.005	24.778	18.4	450	Circular	167.380	164.280	2.650	165.930	162.930	2.550
1.006	24.749	61.9	450	Circular	165.930	162.930	2.550	166.020	162.530	3.040
2.000	32.042	170.0	225	Circular	167.000	165.575	1.200	166.970	165.387	1.358
2.001	19.325	170.0	225	Circular	166.970	165.387	1.358	166.900	165.273	1.402
2.002	2.967	170.0	225	Circular	166.900	165.273	1.402	166.900	165.256	1.419
2.003	20.468	14.8	225	Circular	166.900	165.256	1.419	167.210	163.870	3.115
2.004	21.693	19.5	300	Circular	167.210	163.795	3.115	166.020	162.680	3.040
1.007	48.041	10.4	450	Circular	166.020	162.530	3.040	161.000	157.895	2.655
3.000	8.482	169.6	225	Circular	161.000	158.170	2.605	161.000	158.120	2.655

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1200	Manhole	Adoptable	S2	1200	Manhole	Adoptable
1.001	S2	1200	Manhole	Adoptable	S3	1200	Manhole	Adoptable
1.002	S3	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.003	S4	1200	Manhole	Adoptable	S5	1200	Manhole	Adoptable
1.004	S5	1200	Manhole	Adoptable	S6	1200	Manhole	Adoptable
1.005	S6	1200	Manhole	Adoptable	S7	1200	Manhole	Adoptable
1.006	S7	1200	Manhole	Adoptable	S13	1200	Manhole	Adoptable
2.000	S8	1200	Manhole	Adoptable	S9	1200	Manhole	Adoptable
2.001	S9	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
2.002	S10	1200	Manhole	Adoptable	S11	1200	Manhole	Adoptable
2.003	S11	1200	Manhole	Adoptable	S12	1200	Manhole	Adoptable
2.004	S12	1200	Manhole	Adoptable	S13	1200	Manhole	Adoptable
1.007	S13	1200	Manhole	Adoptable	S14	1200	Manhole	Adoptable
3.000	Klargester	1500	Manhole	Adoptable	S14	1200	Manhole	Adoptable

**Pipeline Schedule**

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.008	21.672	25.3	450	Circular	161.000	157.895	2.655	158.500	157.037	1.013
1.009	15.108	408.0	450	Circular	158.500	157.037	1.013	158.500	157.000	1.050
1.010	13.756	137.6	450	Circular	158.500	157.000	1.050	158.500	156.900	1.150
1.011	42.489	17.7	150	Circular	158.500	156.900	1.450	155.000	154.500	0.350

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.008	S14	1200	Manhole	Adoptable	Headwall	1200	Junction	
1.009	Headwall	1200	Junction		Basin	1500	Manhole	Adoptable
1.010	Basin	1500	Manhole	Adoptable	HydroBrake	1500	Manhole	Adoptable
1.011	HydroBrake	1500	Manhole	Adoptable	Outfall	1350	Manhole	Adoptable

Node Outfall Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m ²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		
Applies to 100yr+45% CC 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 minute storms					

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.200	240	0.200	480	0.200	720	0.200	960	0.200	1200	0.200	1440	0.200
60	0.200	300	0.200	540	0.200	780	0.200	1020	0.200	1260	0.200		
120	0.200	360	0.200	600	0.200	840	0.200	1080	0.200	1320	0.200		
180	0.200	420	0.200	660	0.200	900	0.200	1140	0.200	1380	0.200		

Node HydroBrake Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	156.900	Product Number	CTL-SHE-0110-5900-1300-5900
Design Depth (m)	1.300	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.9	Min Node Diameter (mm)	1200

Node Basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	157.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	419.2	0.0	1.200	1080.4	0.0	1.500	1269.8	0.0

**Results for 2 year Critical Storm Duration. Lowest mass balance: 99.98%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	167.349	0.054	19.3	0.0607	0.0000	OK
15 minute summer	S2	10	165.414	0.151	37.3	0.1704	0.0000	OK
15 minute summer	S3	10	165.301	0.161	54.0	0.1820	0.0000	OK
15 minute summer	S4	10	165.074	0.180	100.0	0.2038	0.0000	OK
15 minute summer	S5	10	164.696	0.196	110.5	0.2221	0.0000	OK
15 minute summer	S6	10	164.394	0.114	109.7	0.1286	0.0000	OK
15 minute summer	S7	11	163.104	0.174	108.8	0.1973	0.0000	OK
15 minute summer	S8	10	165.626	0.051	4.5	0.0572	0.0000	OK
15 minute summer	S9	10	165.510	0.123	21.3	0.1391	0.0000	OK
15 minute summer	S10	10	165.391	0.118	21.1	0.1330	0.0000	OK
15 minute summer	S11	10	165.336	0.080	34.2	0.0907	0.0000	OK
15 minute summer	S12	10	163.884	0.089	44.6	0.1006	0.0000	OK
15 minute summer	S13	10	162.654	0.124	173.0	0.1399	0.0000	OK
15 minute summer	Klargester	14	158.186	0.016	0.4	0.0288	0.0000	OK
15 minute summer	S14	11	158.052	0.157	171.7	0.1772	0.0000	OK
15 minute winter	Headwall	8	157.971	0.934	156.1	0.0000	0.0000	SURCHARGED
480 minute summer	Basin	360	157.313	0.313	47.5	158.7827	0.0000	OK
480 minute summer	HydroBrake	344	157.329	0.429	23.3	0.7572	0.0000	SURCHARGED
15 minute summer	Outfall	1	154.500	0.000	5.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	19.3	0.825	0.045	1.1365	
15 minute summer	S2	1.001	S3	36.8	0.850	0.320	1.6016	
15 minute summer	S3	1.002	S4	52.2	1.097	0.364	2.3235	
15 minute summer	S4	1.003	S5	97.3	1.998	0.399	1.0528	
15 minute summer	S5	1.004	S6	109.7	2.275	0.322	0.9702	
15 minute summer	S6	1.005	S7	108.8	2.511	0.144	1.0913	
15 minute summer	S7	1.006	S13	110.4	2.412	0.268	1.1387	
15 minute summer	S8	2.000	S9	4.5	0.317	0.112	0.4622	
15 minute summer	S9	2.001	S10	21.1	0.979	0.532	0.4172	
15 minute summer	S10	2.002	S11	21.0	1.255	0.529	0.0499	
15 minute summer	S11	2.003	S12	34.1	2.778	0.251	0.2513	
15 minute summer	S12	2.004	S13	44.4	2.637	0.176	0.3656	
15 minute summer	S13	1.007	S14	171.3	4.109	0.170	2.0255	
15 minute summer	Klargester	3.000	S14	0.4	0.331	0.010	0.0102	
15 minute summer	S14	1.008	Headwall	173.1	2.010	0.268	2.1637	
15 minute winter	Headwall	1.009	Basin	160.6	2.543	1.010	1.2081	
480 minute summer	Basin	1.010	HydroBrake	23.3	0.410	0.085	1.8794	
480 minute summer	HydroBrake	Hydro-Brake®	Outfall	5.9				216.6

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	167.397	0.102	70.3	0.1148	0.0000	OK
15 minute summer	S2	11	166.527	1.264	136.2	1.4294	0.0000	SURCHARGED
15 minute summer	S3	11	166.335	1.194	179.1	1.3510	0.0000	SURCHARGED
15 minute summer	S4	10	165.900	1.006	336.8	1.1373	0.0000	SURCHARGED
15 minute summer	S5	10	165.049	0.549	381.3	0.6204	0.0000	SURCHARGED
15 minute summer	S6	10	164.515	0.235	377.9	0.2655	0.0000	OK
15 minute summer	S7	11	163.335	0.405	376.8	0.4584	0.0000	OK
15 minute summer	S8	10	166.150	0.575	16.3	0.6500	0.0000	SURCHARGED
15 minute summer	S9	10	166.118	0.730	75.7	0.8262	0.0000	SURCHARGED
15 minute summer	S10	10	165.611	0.338	74.4	0.3819	0.0000	SURCHARGED
15 minute summer	S11	10	165.446	0.190	121.9	0.2148	0.0000	OK
15 minute summer	S12	10	163.987	0.192	159.5	0.2175	0.0000	OK
15 minute summer	S13	11	162.781	0.251	604.3	0.2839	0.0000	OK
15 minute summer	Klargester	11	159.163	0.993	19.0	1.7545	0.0000	SURCHARGED
15 minute summer	S14	11	159.159	1.264	601.7	1.4296	0.0000	SURCHARGED
15 minute winter	Headwall	6	158.222	1.185	555.1	0.0000	0.0000	FLOOD RISK
720 minute winter	Basin	705	157.929	0.929	48.8	629.0581	0.0000	SURCHARGED
960 minute winter	HydroBrake	915	157.930	1.030	17.8	1.8203	0.0000	SURCHARGED
15 minute summer	Outfall	1	154.500	0.000	5.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	70.3	1.061	0.164	2.9921	
15 minute summer	S2	1.001	S3	133.5	1.211	1.162	4.0833	
15 minute summer	S3	1.002	S4	182.3	1.653	1.272	5.2587	
15 minute summer	S4	1.003	S5	333.2	3.021	1.365	2.3705	
15 minute summer	S5	1.004	S6	377.9	2.922	1.110	2.4009	
15 minute summer	S6	1.005	S7	376.8	3.163	0.497	2.8855	
15 minute summer	S7	1.006	S13	380.3	3.171	0.924	2.9854	
15 minute summer	S8	2.000	S9	17.0	0.427	0.427	1.2743	
15 minute summer	S9	2.001	S10	74.4	1.871	1.872	0.7686	
15 minute summer	S10	2.002	S11	73.8	1.871	1.857	0.1121	
15 minute summer	S11	2.003	S12	121.0	3.625	0.889	0.6828	
15 minute summer	S12	2.004	S13	158.5	3.561	0.626	0.9652	
15 minute summer	S13	1.007	S14	599.7	4.361	0.595	5.9887	
15 minute summer	Klargester	3.000	S14	-18.6	0.711	-0.467	0.3373	
15 minute summer	S14	1.008	Headwall	606.9	3.831	0.940	3.4338	
15 minute winter	Headwall	1.009	Basin	556.6	3.986	3.499	2.3447	
720 minute winter	Basin	1.010	HydroBrake	22.3	0.328	0.081	2.1795	
960 minute winter	HydroBrake	Hydro-Brake®	Outfall	5.9				357.3

**Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.42%**

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	11	167.671	0.376	91.7	0.4249	0.0000	SURCHARGED
15 minute summer	S2	11	167.578	2.315	175.3	2.6187	0.0000	FLOOD RISK
15 minute summer	S3	10	167.301	2.161	223.7	2.4445	0.0000	FLOOD RISK
15 minute summer	S4	10	166.718	1.824	428.7	2.0625	0.0000	SURCHARGED
15 minute summer	S5	10	165.349	0.849	485.6	0.9600	0.0000	SURCHARGED
15 minute summer	S6	11	164.597	0.317	480.9	0.3581	0.0000	OK
15 minute summer	S7	11	163.704	0.774	473.2	0.8750	0.0000	SURCHARGED
15 minute summer	S8	11	166.941	1.366	22.6	1.5448	0.0000	FLOOD RISK
15 minute summer	S9	11	166.883	1.496	94.2	1.6920	0.0000	FLOOD RISK
15 minute summer	S10	11	166.183	0.910	87.8	1.0295	0.0000	SURCHARGED
15 minute summer	S11	11	165.964	0.708	143.9	0.8008	0.0000	SURCHARGED
15 minute summer	S12	10	164.015	0.220	188.7	0.2483	0.0000	OK
15 minute summer	S13	11	162.902	0.372	750.9	0.4208	0.0000	OK
15 minute summer	Klargester	11	160.070	1.900	20.3	3.3573	0.0000	SURCHARGED
15 minute summer	S14	11	160.062	2.167	755.0	2.4507	0.0000	SURCHARGED
15 minute summer	Headwall	11	158.500	1.463	749.7	0.0000	0.0000	FLOOD RISK
1440 minute winter	Basin	1380	158.191	1.191	38.6	892.2865	0.0000	SURCHARGED
1440 minute winter	HydroBrake	1380	158.191	1.291	21.0	2.2813	0.0000	SURCHARGED
15 minute summer	Outfall	1	154.700	0.200	5.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1	1.000	S2	94.2	1.101	0.220	4.9112	
15 minute summer	S2	1.001	S3	182.1	1.652	1.585	4.0833	
15 minute summer	S3	1.002	S4	234.9	2.130	1.639	5.2587	
15 minute summer	S4	1.003	S5	422.9	3.835	1.733	2.3705	
15 minute summer	S5	1.004	S6	480.9	3.209	1.412	2.7540	
15 minute summer	S6	1.005	S7	473.2	3.209	0.625	3.4397	
15 minute summer	S7	1.006	S13	479.4	3.239	1.165	3.6949	
15 minute summer	S8	2.000	S9	24.5	0.616	0.616	1.2743	
15 minute summer	S9	2.001	S10	87.8	2.208	2.209	0.7686	
15 minute summer	S10	2.002	S11	89.0	2.238	2.239	0.1180	
15 minute summer	S11	2.003	S12	142.5	3.584	1.048	0.8139	
15 minute summer	S12	2.004	S13	187.5	3.660	0.741	1.1754	
15 minute summer	S13	1.007	S14	755.0	4.821	0.749	7.1722	
15 minute summer	Klargester	3.000	S14	-19.9	0.701	-0.500	0.3373	
15 minute summer	S14	1.008	Headwall	749.7	4.732	1.162	3.4338	
15 minute summer	Headwall	1.009	Basin	749.9	5.037	4.715	2.3938	
1440 minute winter	Basin	1.010	HydroBrake	21.0	0.389	0.076	2.1795	
1440 minute winter	HydroBrake	Hydro-Brake®	Outfall	5.9				533.1

**Design Settings**

Frequency of use (kDU)	0.50	Minimum Velocity (m/s)	0.75
Flow per dwelling per day (l/day)	4000	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
F1	166.980	900	539134.786	132243.733	1.350
F2	167.010	900	539170.861	132243.402	1.741
F3	167.040	900	539185.661	132243.251	1.919
F4	166.990	900	539185.685	132246.437	1.901
F5	167.210	900	539199.874	132246.528	2.263
F6	166.980	900	539200.136	132254.003	2.108
F7	167.210	900	539209.895	132254.003	2.436
F8	170.430	1200	539246.631	132297.118	1.350
F9	166.000	1200	539246.258	132244.459	1.350
F10	166.580	1200	539237.110	132226.787	2.129
F11	166.710	1200	539210.518	132226.766	3.130
F12 Klargest	161.000	1200	539206.657	132177.819	2.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	F1	F2	36.077	1.500	165.630	165.269	0.361	100.0	150
1.001	F2	F3	14.801	1.500	165.270	165.122	0.148	100.0	150
1.002	F3	F4	3.186	1.500	165.121	165.089	0.032	100.0	150
1.003	F4	F5	14.189	1.500	165.089	164.947	0.142	100.0	150
1.004	F5	F6	7.480	1.500	164.947	164.872	0.075	100.0	150
1.005	F6	F7	9.759	1.500	164.872	164.774	0.098	100.0	150
1.006	F7	F11	27.244	1.500	164.774	163.580	1.194	22.8	150
2.000	F8	F9	52.660	1.500	169.080	164.650	4.430	11.9	150
2.001	F9	F10	19.899	1.500	164.650	164.451	0.199	100.0	150
2.002	F10	F11	26.592	1.500	164.451	163.610	0.841	31.6	150
1.007	F11	F12 Klargest	49.099	1.500	163.610	158.700	4.910	10.0	150

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)
1.000	0.876	15.5	0.0	1.200	1.591	0.000	0	0.0	0.0
1.001	0.876	15.5	0.0	1.590	1.768	0.000	0	0.0	0.0
1.002	0.876	15.5	0.0	1.769	1.751	0.000	0	0.0	0.0
1.003	0.876	15.5	0.0	1.751	2.113	0.000	0	0.0	0.0
1.004	0.876	15.5	0.0	2.113	1.958	0.000	0	0.0	0.0
1.005	0.876	15.5	0.0	1.958	2.286	0.000	0	0.0	0.0
1.006	1.839	32.5	0.0	2.286	2.980	0.000	0	0.0	0.0
2.000	2.550	45.1	0.0	1.200	1.200	0.000	0	0.0	0.0
2.001	0.876	15.5	0.0	1.200	1.979	0.000	0	0.0	0.0
2.002	1.561	27.6	0.0	1.979	2.950	0.000	0	0.0	0.0
1.007	2.781	49.1	0.0	2.950	2.150	0.000	0	0.0	0.0

**Pipeline Schedule**

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	36.077	100.0	150	Circular	166.980	165.630	1.200	167.010	165.269	1.591
1.001	14.801	100.0	150	Circular	167.010	165.270	1.590	167.040	165.122	1.768
1.002	3.186	100.0	150	Circular	167.040	165.121	1.769	166.990	165.089	1.751
1.003	14.189	100.0	150	Circular	166.990	165.089	1.751	167.210	164.947	2.113
1.004	7.480	100.0	150	Circular	167.210	164.947	2.113	166.980	164.872	1.958
1.005	9.759	100.0	150	Circular	166.980	164.872	1.958	167.210	164.774	2.286
1.006	27.244	22.8	150	Circular	167.210	164.774	2.286	166.710	163.580	2.980
2.000	52.660	11.9	150	Circular	170.430	169.080	1.200	166.000	164.650	1.200
2.001	19.899	100.0	150	Circular	166.000	164.650	1.200	166.580	164.451	1.979
2.002	26.592	31.6	150	Circular	166.580	164.451	1.979	166.710	163.610	2.950
1.007	49.099	10.0	150	Circular	166.710	163.610	2.950	161.000	158.700	2.150

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	F1	900	Manhole	Adoptable	F2	900	Manhole	Adoptable
1.001	F2	900	Manhole	Adoptable	F3	900	Manhole	Adoptable
1.002	F3	900	Manhole	Adoptable	F4	900	Manhole	Adoptable
1.003	F4	900	Manhole	Adoptable	F5	900	Manhole	Adoptable
1.004	F5	900	Manhole	Adoptable	F6	900	Manhole	Adoptable
1.005	F6	900	Manhole	Adoptable	F7	900	Manhole	Adoptable
1.006	F7	900	Manhole	Adoptable	F11	1200	Manhole	Adoptable
2.000	F8	1200	Manhole	Adoptable	F9	1200	Manhole	Adoptable
2.001	F9	1200	Manhole	Adoptable	F10	1200	Manhole	Adoptable
2.002	F10	1200	Manhole	Adoptable	F11	1200	Manhole	Adoptable
1.007	F11	1200	Manhole	Adoptable	F12 Klargest	1200	Manhole	Adoptable

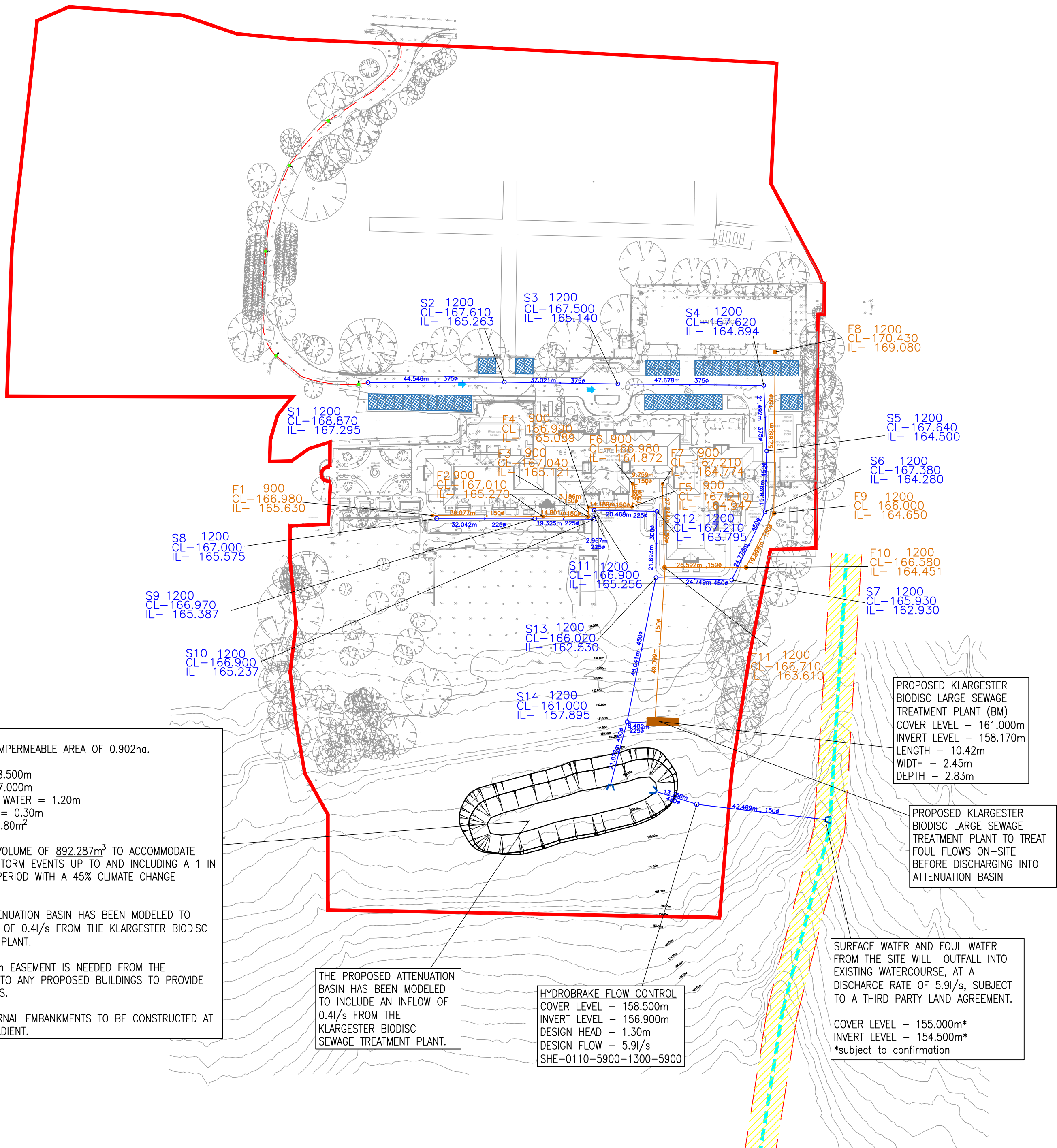
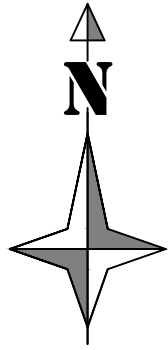


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APPENDICES



APPENDIX C



ATTENUATION BASIN
DESIGN BASED ON IMPERMEABLE AREA OF 0.902ha.

COVER LEVEL = 158.500m
INVERT LEVEL = 157.000m
MAXIMUM DEPTH OF WATER = 1.20m
MINIMUM FREEBOARD= 0.30m
PLAN AREA = 1,269.80m²

MAXIMUM STORAGE VOLUME OF 892.287m³ TO ACCOMMODATE STORAGE FOR ALL STORM EVENTS UP TO AND INCLUDING A 1 IN 100 YEAR RETURN PERIOD WITH A 45% CLIMATE CHANGE ALLOWANCE.

THE PROPOSED ATTENUATION BASIN HAS BEEN MODELED TO INCLUDE AN INFLOW OF 0.4l/s FROM THE KLARGESTER BIODISC SEWAGE TREATMENT PLANT.

A MINIMUM OF A 3m EASEMENT IS NEEDED FROM THE ATTENUATION BASIN TO ANY PROPOSED BUILDINGS TO PROVIDE MAINTENANCE ACCESS.

INTERNAL AND EXTERNAL EMBANKMENTS TO BE CONSTRUCTED AT A MAXIMUM 1:4 GRADIENT.

THE PROPOSED ATTENUATION BASIN HAS BEEN MODELED TO INCLUDE AN INFLOW OF 0.4l/s FROM THE KLARGESTER BIODISC SEWAGE TREATMENT PLANT.

HYDROBRAKE FLOW CONTROL
COVER LEVEL - 158.500m
INVERT LEVEL - 156.900m
DESIGN HEAD - 1.30m
DESIGN FLOW - 5.9l/s
SHE-0110-5900-1300-5900

PROPOSED KLARGESTER BIODISC LARGE SEWAGE TREATMENT PLANT (BM)
COVER LEVEL - 161.000m
INVERT LEVEL - 158.170m
LENGTH - 10.42m
WIDTH - 2.45m
DEPTH - 2.83m

PROPOSED KLARGESTER BIODISC LARGE SEWAGE TREATMENT PLANT TO TREAT FOUL FLOWS ON-SITE BEFORE DISCHARGING INTO ATTENUATION BASIN

SURFACE WATER AND FOUL WATER FROM THE SITE WILL OUTFALL INTO EXISTING WATERCOURSE, AT A DISCHARGE RATE OF 5.9l/s, SUBJECT TO A THIRD PARTY LAND AGREEMENT.

COVER LEVEL - 155.000m*
INVERT LEVEL - 154.500m*
*subject to confirmation

- NOTES:**
- DO NOT SCALE THIS DRAWING.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SPECIALIST DESIGN DRAWINGS AND DETAILS.
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 - THIS DRAWING IS FOR STRATEGY PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION PURPOSES.
 - DESIGN BASED ON EXISTING LEVELS AND SUBJECT TO CHANGE WITH EXTERNAL WORKS DESIGN / CONFIRMATION OF FFLS.
 - DRAINAGE STRATEGY IS SUBJECT TO AGREEMENT WITH RELEVANT THIRD PARTIES, INCLUDING ENVIRONMENT AGENCY, LOCAL PLANNING AUTHORITY, LEAD LOCAL FLOOD AUTHORITY AND WATER AUTHORITY.
 - THE DRAINAGE STRATEGY WILL NEED UPDATING IF THE LAYOUT IS REVISED.
 - SURFACE WATER AND FOUL WATER FLOWS FROM THE SITE WILL DISCHARGE INTO THE EXISTING SEWAGE TREATMENT PLANT WITHIN THE SITE AND CLEANED EFFLUENT WILL OUTFALL INTO A WATERCOURSE WITHIN HORNCASTLE WOOD TO THE EAST OF THE SITE, SUBJECT TO CONFIRMATION OF EXISTING DRAINAGE STRATEGY. THIS IS LIKELY TO BE A GRAVITY FED SOLUTION.
 - SURFACE WATER FLOWS WILL DISCHARGE AT A QBAR GREENFIELD RATE OF 5.9l/s.
 - IT IS RECOMMENDED FURTHER INVESTIGATION OF THE DITCH IS UNDERTAKEN TO DETERMINE ITS EXTENT.

- KEY**
- SITE BOUNDARY
 - PROPOSED SURFACE WATER SEWER
 - PROPOSED FOUL WATER SEWER
 - EXISTING DITCH NETWORK WITH 5m EASEMENT
 - PROPOSED GEO-CELLULAR TANK
 - PROPOSED PERMEABLE PAVING
 - PROPOSED EXCEEDANCE FLOWS
 - PROPOSED ROAD GULLIES
 - PROPOSED KLARGESTER

A	UPDATES BASED ON LLFA COMMENTS	ZJ	RC	TR	08.11.25
REV:	FIRST ISSUE	ZJ	TS	TR	15.04.25
REV:	AMENDMENTS:	DRN	CHK	APP	DATE:
PROJECT: HORNCastle HOUSE CARE HOME PLAWHATCH LANE SHARPTHORNE					
DRAWING TITLE: DRAINAGE STRATEGY					
CLIENT: SPLENDID PROJECTS LTD					
DRAWING NUMBER: 29528_01_230_01					
REVISION: A	SHEET SIZE: A2		SCALE: 1:1000		
STATUS: FOR INFORMATION / APPROVAL					
MEC Consulting Group Birmingham Brighton Leicester			Telephone: 01530 284 753 Email: group@m-e-c.co.uk Website: www.m-e-c.co.uk ORDNANCE SURVEY © CROWN COPYRIGHT 2015, ALL RIGHTS RESERVED. LICENCE NUMBER 100055865.		

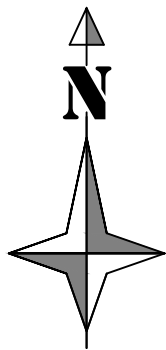
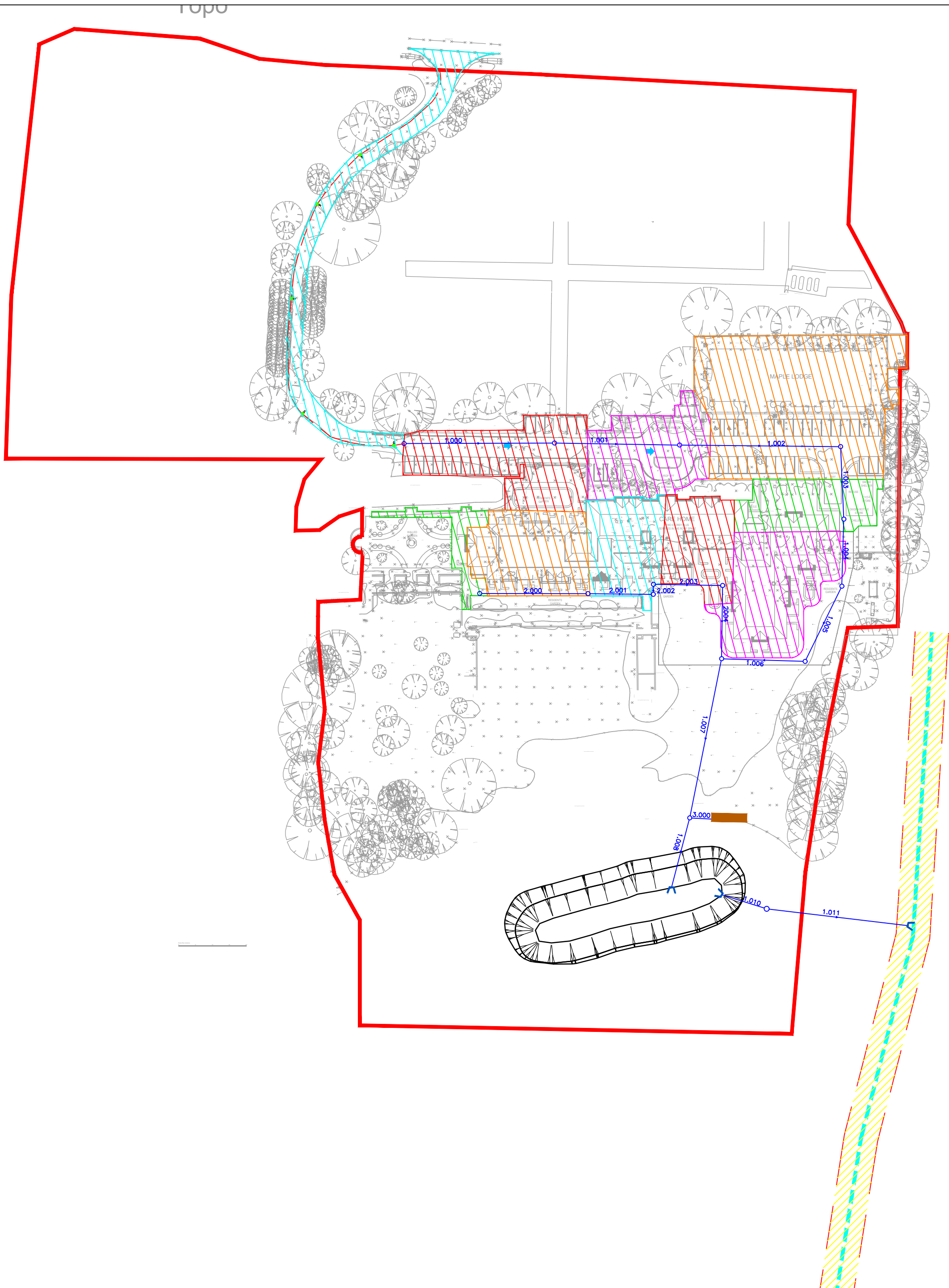


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APPENDICES



APPENDIX D



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	IMPERMEABLE AREA (m ²)
1.000	95
1.001	89
1.002	85
1.003	238
1.004	65
1.005	0
1.006	0
2.000	22
2.001	83
2.002	0
2.003	65
2.004	52
1.007	108
3.000	0
1.008	0
1.009	0
1.010	0
1.011	0
TOTAL	902

KEY

- SITE BOUNDARY
- PROPOSED SURFACE WATER SEWER
- EXISTING WATERCOURSE WITH 5m EASEMENT
- PROPOSED ATTENUATION BASIN
- PROPOSED KLARGESTER

REV:	FIRST ISSUE	JJ	RC	TR	06.11.25
	AMENDMENTS:	DRN	CHK	APP	DATE:

PROJECT: HORNCastle HOUSE CARE HOME
PLAWHATCH LANE
SHARPTHORNE

DRAWING TITLE: IMPERMEABLE AREAS
DRAWING

CLIENT: SPLENDID PROJECTS LTD

DRAWING NUMBER: 29528_01_230_02

REVISION: -	SHEET SIZE: A2	SCALE: 1:1000
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STATUS: FOR INFORMATION / APPROVAL

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Consulting Group
Birmingham | Brighton | Leicester

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Website: www.mec.co.uk
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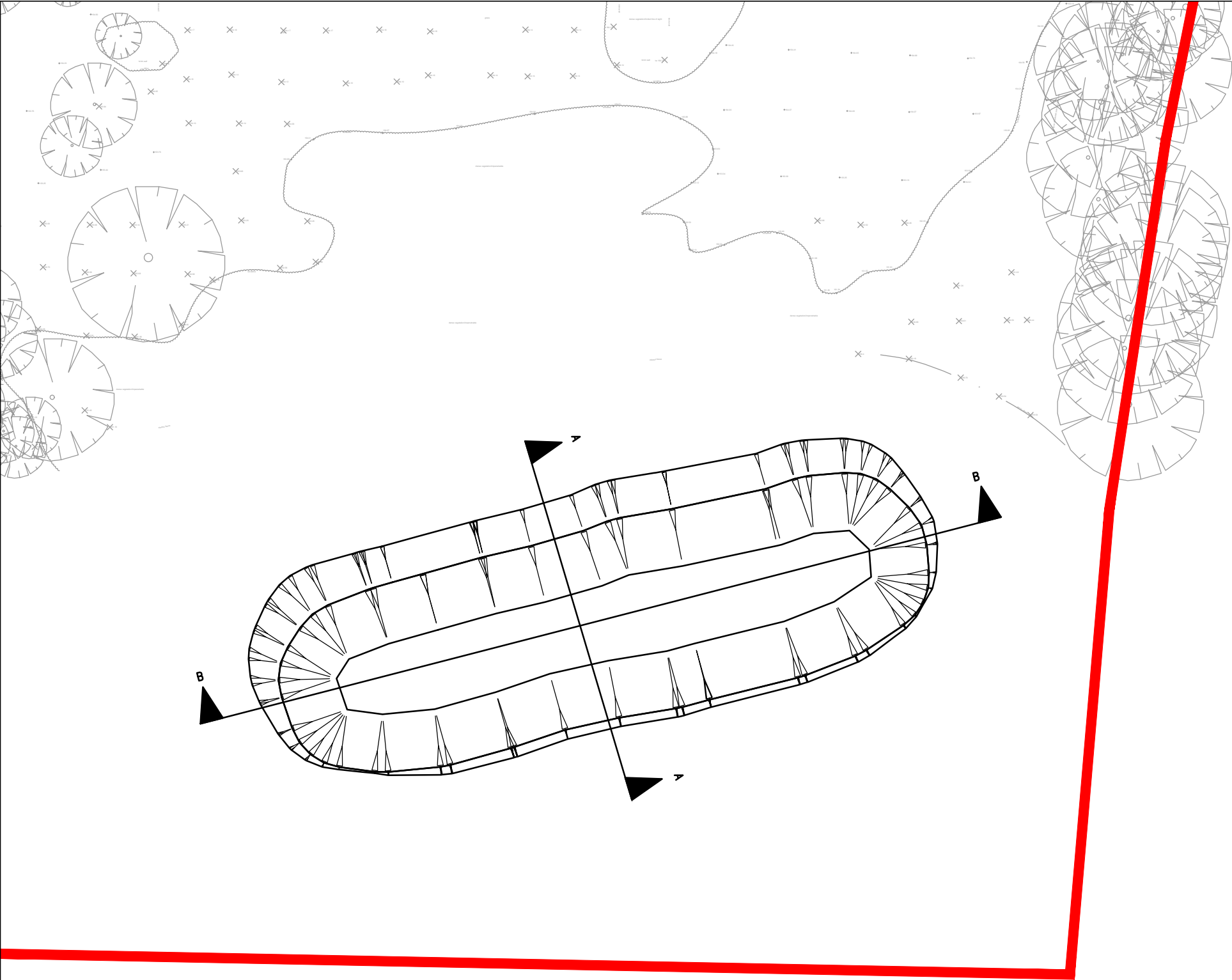


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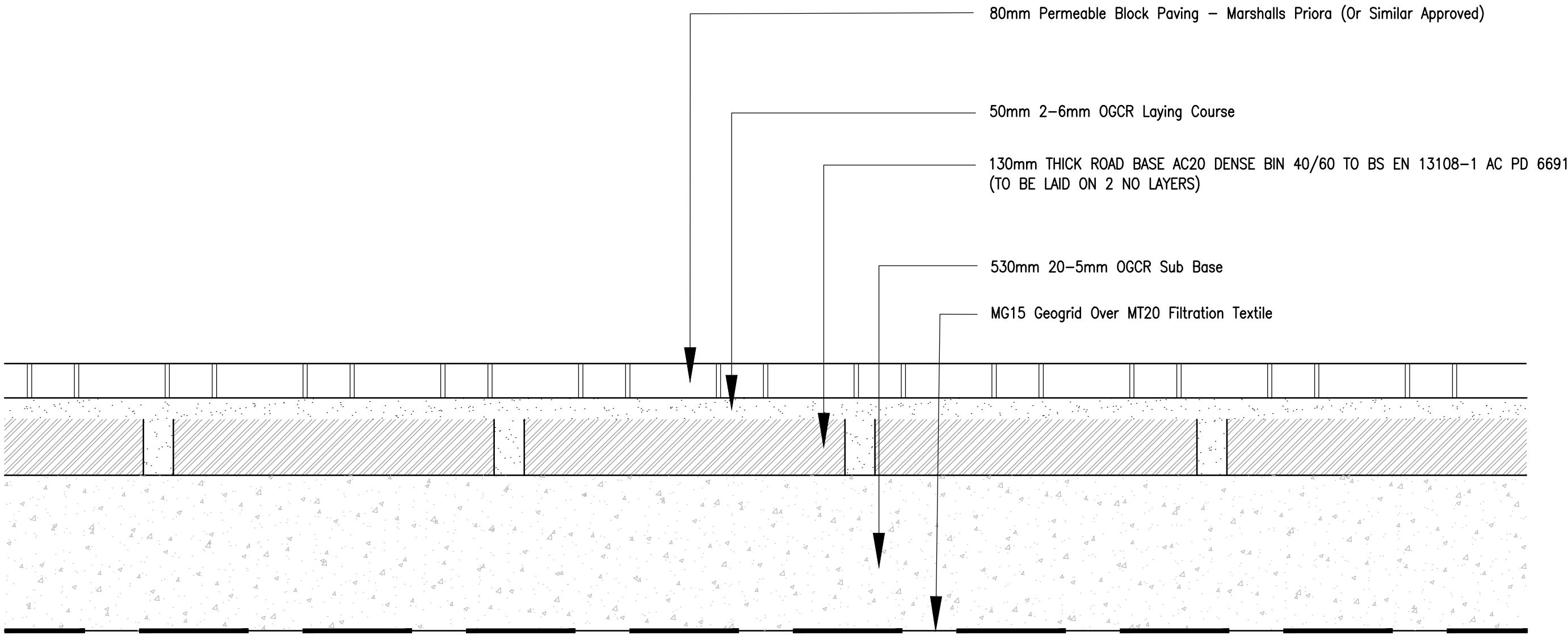
APPENDICES



APPENDIX E

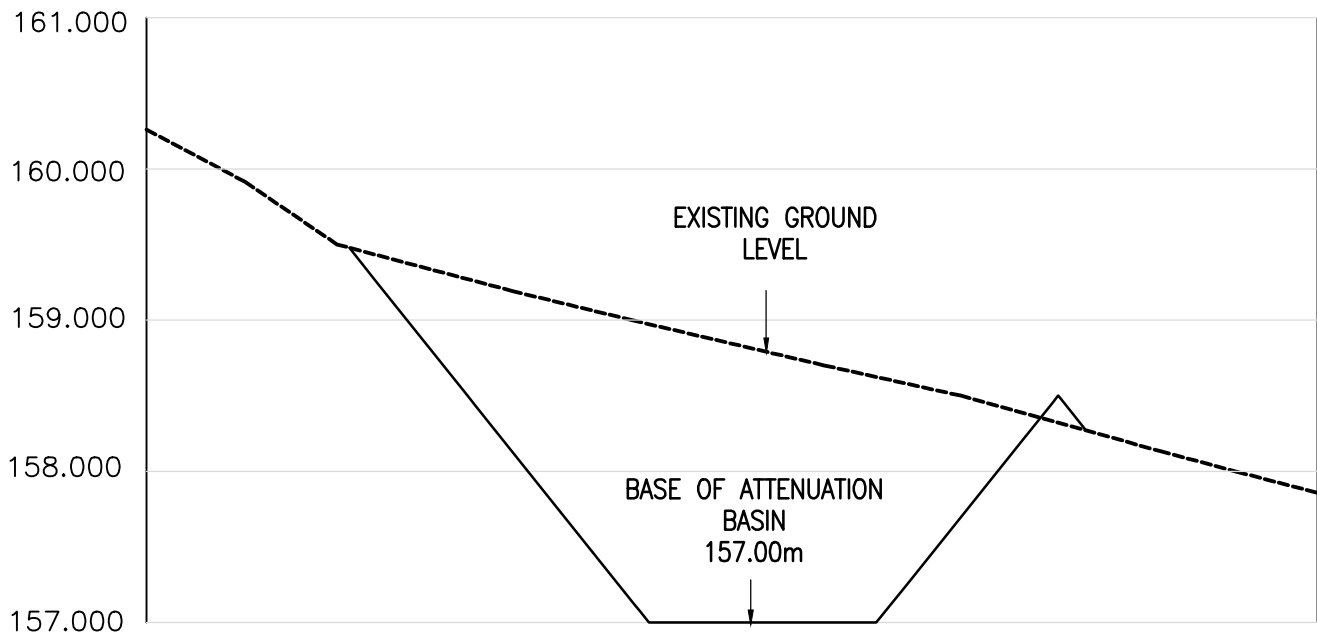


ATTENUATION BASIN CROSS SECTION LOCATIONS
SCALE: 1:500m



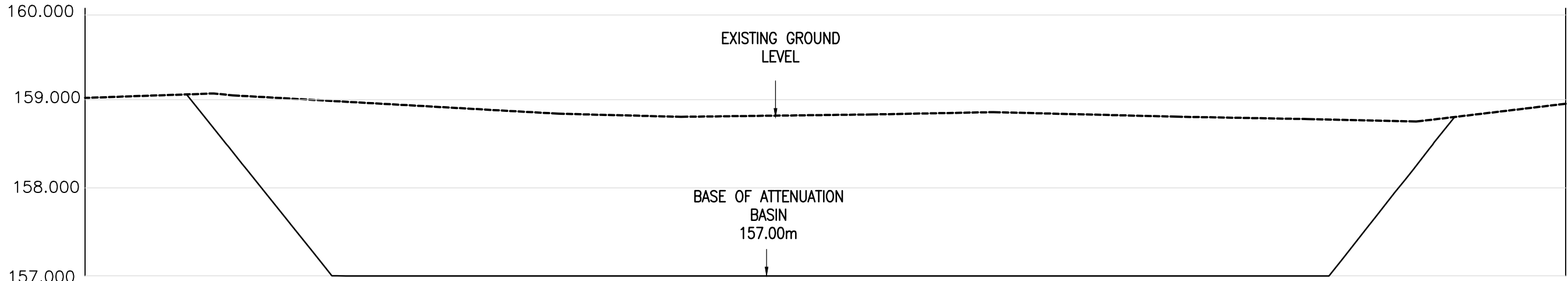
TYPICAL PERMEABLE CONSTRUCTION SECTION –
(TO BE INSTALLED TO MANUFACTURERS SPECIFICATION)
NOT TO SCALE

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 - DESIGN BASED ON EXISTING LEVELS AND SUBJECT TO CHANGE WITH EXTERNAL WORKS DESIGN / CONFIRMATION OF FFLS.
 - DRAINAGE STRATEGY IS SUBJECT TO AGREEMENT WITH RELEVANT THIRD PARTIES, INCLUDING ENVIRONMENT AGENCY, LOCAL PLANNING AUTHORITY, LEAD LOCAL FLOOD AUTHORITY AND WATER AUTHORITY.
 - THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE DETAILED DRAINAGE STRATEGY 29528_01_230_01 AND THE IMPERMEABLE AREAS DRAWING 29528_01_230_02.



CHAINAGE	0.000	5.000	6.708	10.000	15.000	20.000	25.000	30.000	31.066	35.000	38.723
BASIN LEVEL		159.478		158.652	157.402	157.000	157.217	158.464	158.270		
EXISTING LEVEL	160.260	159.677		159.304	159.051	158.814	158.585	158.329		158.054	157.857

A–A
ATTENUATION BASIN CROSS
SECTION (A–A)
SCALE: 1:250m
1:500V, 1:100H



CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	70.000	75.000	77.753	80.000	84.065
BASIN LEVEL		159.060	158.004	157.000	157.000	157.000	157.000	157.000	157.000	157.000	157.000	157.000	157.000	157.000	157.000	158.105	158.804		
EXISTING LEVEL	159.020	159.055	159.031	158.975	158.919	158.862	158.825	158.809	158.821	158.834	158.853	158.842	158.817	158.796	158.777	158.755	158.857		158.954

B–B
ATTENUATION BASIN CROSS
SECTION (B–B)
SCALE: 1:250m
1:500V, 1:100H

* FIRST ISSUE		ZJ	RC	TR	11.11.25
REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
PROJECT: HORNCastle HOUSE CARE HOME PLAWHATCH LANE SHARPTHORNE					
DRAWING TITLE: ATTENUATION BASIN & PERMEABLE PAVING CROSS SECTIONS					
CLIENT: SPLENDID PROJECTS					
DRAWING NUMBER: 29528_01_230_03					
REVISION: -	SHEET SIZE: A1	SCALE: AS SHOWN			
STATUS: FOR INFORMATION / APPROVAL					
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APPENDICES



APPENDIX F



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APPENDICES



APPENDIX G

MAINTENANCE AND MANAGEMENT

A proposed maintenance plan is shown in the table below and breaks down the maintenance requirements of the various proposed assets in accordance with the CIRIA C753 SuDS Manual guidance.

Table 1.1: Proposed Maintenance Regime

Drainage Asset	Responsible Organisation	Maintenance Work	Frequency
Pipework / Manholes	Private Ownership / Management Company	Inspect pipework and clear blockages	Annually or after severe storms.
		Inspect manholes and clear blockages	
		Repair any defects in the network	
		Inspect flow control, ensure operating freely and pivoting bypass door and penstock valve operating correctly	
Headwalls	Private Ownership / Management Company	Inspect the structure and remove any debris/litter on the structure.	Annually or after severe storms
		Replace malfunctioning parts or structures	As required
Gullies	Private Ownership / Management Company	Inspect structure and remove any debris/litter on structure	Annually or after severe storms
		Replace malfunctioning parts or structures	As required
Flow Control Chamber	Private Ownership / Management Company	Inspect structure and remove excessive silt build-up	Monthly during construction and then annually or after severe storms
		Inspect pipework and manholes also clear blockages	Annually or after severe storms
		Inspect manholes and clear blockages	
		Inspect flow control, ensure operating freely and pivoting bypass door and penstock valve operating correctly	
		Replace malfunctioning parts or structures	
		Inspect for evidence of poor operation	6 monthly
		Inspect sediment accumulation rates and establish appropriate removal frequencies	
		Test control structure to ensure operating as per original design	5 yearly
Permeable Pavements	Private Ownership / Management Company	Brushing and vacuuming (standard cosmetic sweep over the whole surface)	Once a year after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging of manufacturer's recommendations.
		Stabilise and mow contributing and adjacent areas	As required
		Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than sweeping	



		Remediate any landscaping which, through vegetation maintenance of soil slip, has been raised to within 50 mm of the level of the paving	
		Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material	
		Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
		Initial inspection	Monthly for 3 months after installation
		Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	3 monthly, 48 hours after large storms in first 6 months
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	
Attenuation/Detention Basins	Private Ownership / Management Company	Remove litter and debris	Monthly
		Cut grass – for spillways and access routes	
		Cut grass – meadow grass in and around the basin	
		Manage other vegetation and remove nuisance plants	
		Inspect inlets, outlets and overflows for blockages, and clean if required	
		Inspect banksides, structures for silt accumulation. Establish appropriate silt removal frequencies	
		Check any penstocks and other mechanical devices	Annually
		Tidy all dead growth before the start of the growing season	
		Remove the sediment from inlets, outlets and forebay	
		Manage wetland plants in outlet pool – where provided	

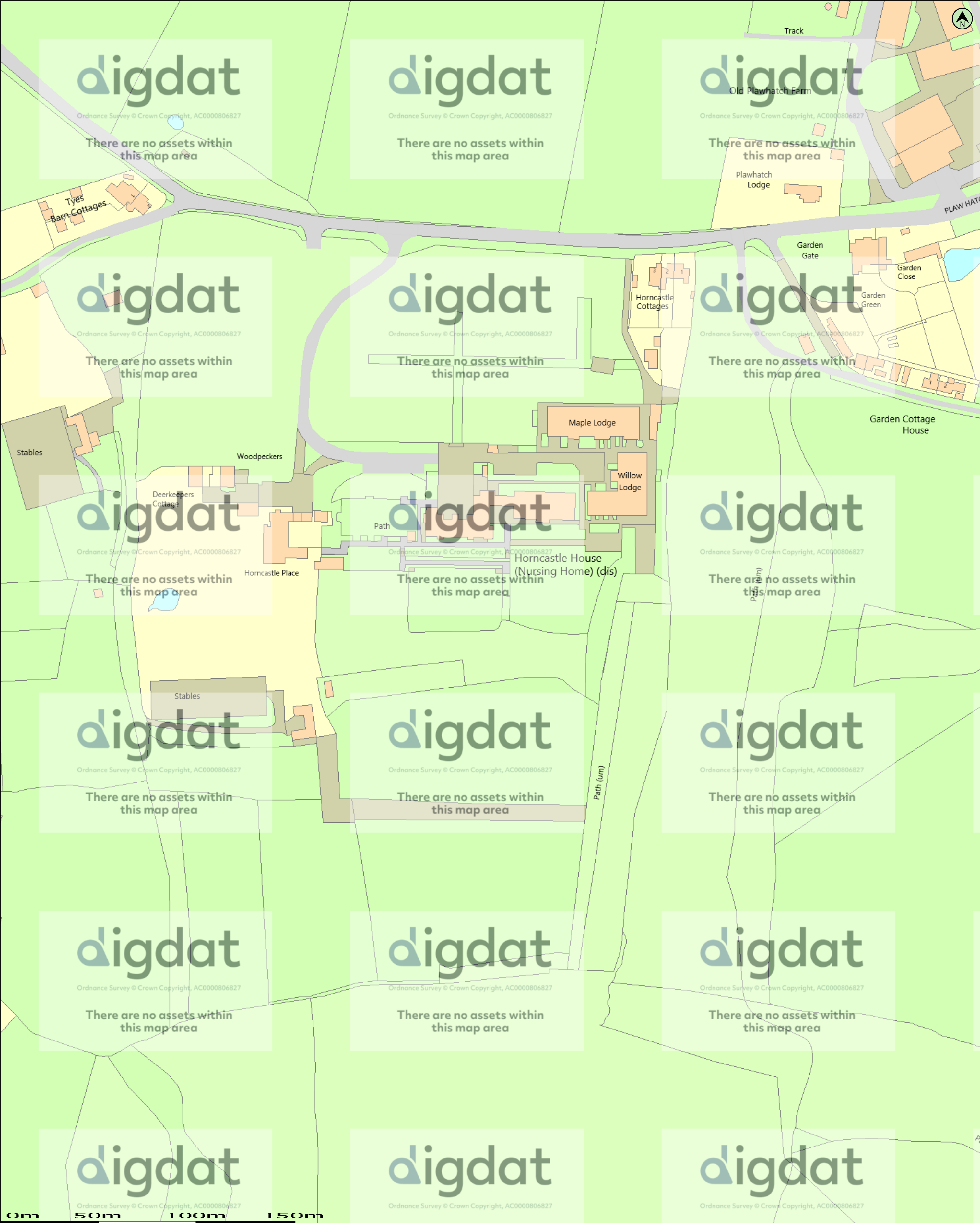


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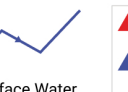
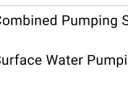
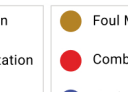
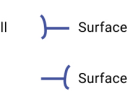
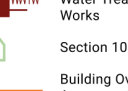
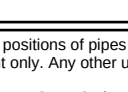
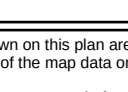
APPENDICES



APPENDIX H



(c) Crown copyright and database rights 2025 Ordnance Survey AC0000806827
Data updated: 26/02/25
Scale: 1:1250
Map Centre: 539176.132210
Date: 27/03/25
Our Ref: 1728417 - 1
Wastewater Plan A2
Powered by digdat

 Foul Gravity Sewer	 Combined Gravity Sewer	 Culverted Water Course or Treated Effluent	 Surface Water Gravity Sewer	 Combined Pumping Station	 Foul Manhole
 Rising Main, Vacuum or Syphon	 Combined Outfall	 Surface Water Outfall	 Surface Water Inlet	 Water Treatment Works	 Side Entry Manhole, Demarcation Chamber, Dummy Manhole or Surface Water Soakaway
 Section 104 Area	 Building Over Agreement Area				

emma.harris@m-ec.co.uk
29528



The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. This plan is produced by Southern Water Services Ltd (c) Crown copyright and database rights 2025 Ordnance Survey AC0000806827. This map is to be used for the purposes of viewing the location of Southern Water plant only. Any other uses of the map data or further copies is not permitted.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

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



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APPENDICES



APPENDIX I

Inspection Report – Sewage Treatment Plant (STP)

Dirk Daude Wastewater Consultancy Services

t: +44 (0) 7903 296772

e: dirk@dirkdaude.com

Site and STP Details

Site Name: Horncastle Contract/Ref.: SA121
Site Address: Plawhatch Lane, Sharpthorne Date: 11 February 2025
East Grinstead, East Sussex, RH19 4JH

STP/Equipment:

EnSo Ocean Professional sewage treatment plant, incl. 1x PST (approx. 25m3), 2x Bioclere Trickling Filters (incl. HST section) and 1x above ground SAF/HST (approx. 15m3) - Access is only via prior arrangement – please contact David or Graham

General Condition and Effluent Quality of STP

Installation (civil and electrical): ☐ good ☒ acceptable ☐ poor (see comment below)
Effluent Quality (visual): ☒ good ☐ acceptable ☐ poor (see comment below)
Effluent Turbidity: 5 NTU Effluent Ammonia: <10 mg/l

Note: effluent sample (from final HST) taken for laboratory analysis

Primary Settlement Stage

Sludge levels: ☒ low ☐ normal ☐ high Desludged during service: ☐ yes ☒ no

Biological Treatment Stages

Blowers/pumps in operation: ☒ yes ☐ no Air Filter: ☒ good ☐ changed
Aeration/Biomass growth: ☐ good ☒ poor

Note: Both irrigation pumps are faulty and have been disconnected. The air blower is working.

Final Clarification (Humus Settlement)

Sludge levels: ☒ low ☐ normal ☐ high Desludged during service: ☐ yes ☒ no
SSR Pumps in operation: ☐ yes ☒ no SSR Timer Settings: ☒ good ☐ changed

Note: The SSR pump has been disconnected.

Comments and Notes

As previously stated in reports the STP system remains in the same condition.

As no forward flow then effluent sample taken from HST and remains as previous service visit. Treated effluent is "trapped " in HST as not enough forward flow.

Above ground tank continues to leak but condition as before.

Ground water witnessed entering the primary tank.

Lawrence M on site during inspection and all findings were discussed.

Parts and Consumables

Service undertaken by:



Christian Rubra

Certificate of Analysis

ANALYSED BY



Report Number: **COV/2796565/2025**
Laboratory Number: **25000613**
Sample Source: **Dirk Daude Wastewater Con**
Sample Point Description:
Sample Description: **SA121-FINAL EFFLUENT**
Sample Matrix: **Treated Sewage**
Sample Date/Time: **11 February 2025**
Sample Received: **26 February 2025**
Analysis Complete: **10 March 2025**

Issue 1
Sample 4 of 7

Test Description	Result	Units	Completed	Accreditation	Method
pH	7.2	pH units	27/02/2025	Y Cov	WAS039
Ammoniacal Nitrogen as N	12.1	mg/l	26/02/2025	Y Cov	WAS036
Total Suspended Solids	1.00	mg/l	27/02/2025	Y Cov	WAS006
BOD + ATU (5 day)	2	mg/l	04/03/2025	Y Cov	WAS001
COD (Total)	32.0	mg/l	27/02/2025	Y Cov	WAS040

Analyst Comments for 25000613:

This sample has been analysed for pH, Total Suspended Solids, BOD + ATU (5 day), Ammoniacal Nitrogen as N, COD (Total) outside recommended stability times. It is therefore possible that the results provided may be compromised.

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: Che = Chester(CH5 3US), Cov = Coventry(CV4 9GU), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG), F = Data supplied by customer.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered.

I/S=Insufficient sample For soil/sludge samples: AR=As received, DW=Dry weight.

Signed:

Name: **A. Zunzunegui**

Date: **10 March 2025**

Title: **Organics Chemistry Manager**



CIVIL ENGINEERING



TRANSPORT



FLOOD RISK & DRAINAGE



STRUCTURES



GEO-ENVIRONMENTAL



ACOUSTIC AIR



UTILITIES



GEOMATICS



LIGHTING



EXPERT WITNESS



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