masonclarkassociates
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DRAINAGE STRATEGY REPORT

The Cottage, Main Street, YO25 8HL

Commissioned by Morgan Lloyd Jones Ltd

Report: 18865-L-RP-001 R0
16th October 2020

Notation

DIA	Drainage Impact Assessment
EA	Environment Agency
FRA	Flood Risk Assessment
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems

DRAINAGE STRATEGY ASSESSMENT

The Cottage, Main Street, YO25 8HL

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ISSUE LOG FOR REPORT 18865-L-RP-001

Rev	*Date*	*Description*	*Author*	*Checked*
R0	16th October 2020	**FIRST ISSUE**	BW	GS

Issuing office: Mason Clark (LEEDS). Refer to final page for full office details.

1 INTRODUCTION

Mason Clark Associates (MCA) has been commissioned by Morgan Lloyd Jones Ltd to compile a drainage strategy report for the redevelopment of the cottage, Main Street, Driffield.

The proposed residential development of is located off Main Street, Driffield. An approximate post code is YO25 8HL and coordinates are (509800, 459460).

This report has been carried out to provide an initial feasibility assessment for suitable methods for discharge of surface and foul water from the proposed development.

2 PROPOSED DEVELOPMENT

The proposed residential development of is located off Main Street, Driffield. An approximate post code is YO25 8HL and coordinates are (509800, 459460).

The site is currently the location of a single detached dwelling including a garage and conservatory. The building is to be demolished to accommodate the new dwelling which is to be built on the existing footprint. An Existing Site Plan is included in Appendix A and a Proposed Site Plan can be found in Appendix B.

The proposed finished flood levels are to remain as per the existing levels, external levels have not been provided by the architect at the time of writing this report.

A site visit was carried out by Mason Clark Associates on 27th August 2020, a visual inspection of the site indicated that the site is generally level. External levels towards the front and sides of the property approximately match the finished floor levels however, the garden at the rear of the property is 0.8m higher than the finished floor levels. There is a slight slope at the front of the property towards the access in Main Street.

3 SURFACE WATER DRAINAGE STRATEGY

Building Regulations Part H states that the priority for discharging surface water runoff from a development is as follows; (1st) Infiltration into the ground, (2nd) discharge into a watercourse, (3rd) discharge into a sewer. These receptors have been investigated below.

3.1 Discharge via Infiltration

British Geological Survey (BGS) geological mapping suggests that the superficial deposits beneath the site comprise of Devensian Glacial Till which is described as firm-stiff sandy silty gravelly clay. The geological mapping suggests that bedrock geology beneath the site is Flamborough Chalk Formation. There are no borehole records in the immediate vicinity of the site available on the British Geological Society Borehole Scans.

Auger type soakaway testing was carried at the rear of the dwelling site on 27th August 2020. One trial hole (TH1) was excavated to establish ground conditions and complete the test, a single test was carried out in TH1 and produced an infiltration rate of 6.76×10^{-6} m/s. Infiltration rate calculations are shown in Appendix C.

The infiltration rate extrapolated from the test show 'low' permeability and 'poor' drainage conditions as per figure 1 below.

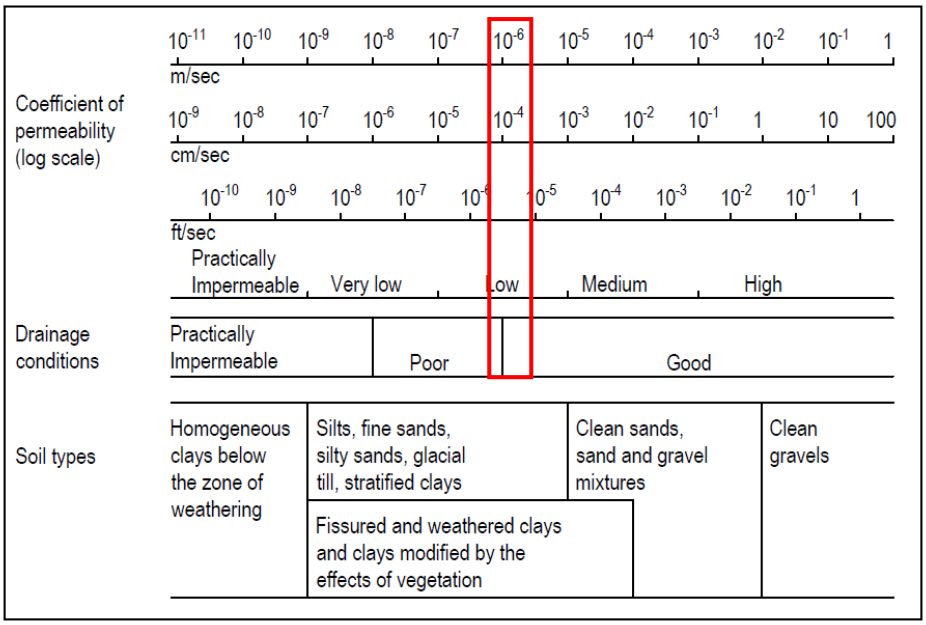

Figure 1 – Typical Permeability Values

This infiltration rate was used to calculate the size of a geocellular soakaway that would be required for the development. The calculations show a 32.4m^3 soakaway would be able to store the volume required however, this size soakaway would fail as the soakaway discharge time is significantly greater than 24 hours to empty the soakaway to half volume. A soakaway of this size would be unsuitable for this site given the scale of the proposed development.

The soakaway calculations can be found in Appendix D.

3.2 Discharge via Watercourse

There are no suitable watercourses within the vicinity of the site. The closest main river is Kelly Beck is approximately 500m west of the site, an unnamed watercourse which connects into the beck is present approximately 300m west of the site. Any connection to this would require a sewer that crosses significant amounts of 3rd party land and a public highway and therefore this would not be an acceptable method of surface water disposal.

3.3 Discharge to Public Sewers

As a last resort following the hierarchy of surface water, disposal discharge to the public sewer system can be considered.

Yorkshire Water sewer records (Appendix E) indicate that there are no public sewers recorded in the vicinity of the site. Connection to public sewers will therefore not be feasible.

3.4 Discharge via Existing Arrangement

A CCTV survey was carried out on site on 27th August 2020. The existing drainage arrangement on site shows both surface water and foul water connecting into an on-site septic tank before discharging to a combined manhole in the corner of the site. The final chamber was accessed with a camera via the upstream pipes however, due to site constraints the chamber lid could not be removed and inspected and therefore it is unknown where the water discharges downstream of the chamber.

Based on the information available, it has been determined that surface and foul water discharge is connected to a manhole chamber 25m south west site of the site on the opposite side of Main Street. It is currently unknown where the water discharges to downstream of the manhole chamber, it is possible that it discharges to a nearby ditch or alternatively infiltrates via a drainage field.

3.5 Drainage Strategy and Attenuation Requirements for new Development

As discussed in Section 3.4, the surface water shall discharge from site via the existing arrangement.

Impermeable Areas

From the Existing Layout Plan (Appendix A) an estimation of the previous development currently draining to public sewers has been calculated to be 340m² or 0.034ha. Proposed impermeable areas from roofs and external from the Proposed Layout Plan (Appendix B) is 390m² or 0.039ha.

Using the Modified Rational Method, the discharge rate of the existing development is calculated as follows:

0.034ha x (2.78 x 50) = 4.73 l/s. A 50% reduction of this will give a final discharge rate of 2.36 l/s.

Details of the existing connection to the sewer main is to be confirmed. However, the capacity should be sufficient as the proposed impermeable area is not much greater than the existing and does not consider a 50% reduction in discharge rate.

Attenuation Requirements

MicroDrainage Source Control has been used to estimate the storage for the proposed impermeable areas shown above for a 1 in 100 year storm event including 30% increase for impacts of climate change on peak rainfall. The calculations included a limited flow rate of 2.36 l/s, as calculated in the previous section. The results of the modelling are included in Appendix F and summarised below in Table 1.

Return Period	**30 Year**	**100 Year + 30% Climate Change**
Estimated attenuation required	5.2m³	12.1m³

Table 1 - Modelled Attenuation Volume Requirements

A Drainage Schematic Layout can be found in Appendix G which shows that storage can be provided on site so that up to a 1 in 100 year event plus a 30% allowance for climate change can be safely accommodated on site.

4 SUSTAINABLE DRAINAGE SYSTEMS

Where possible, Sustainable drainage (SuDS) systems/techniques should be used to drain the site of surface water runoff. These could be in the form of permeable paving, rainwater harvesting, ponds and other above ground green systems. Swales could also be incorporated into the layout to convey surface runoff rather than below ground pipes (which tend to have a higher velocity).

4.1 Sustainable Drainage (Overview)

Drainage systems can contribute to sustainable development and improve urban design, by balancing the different issues that influence the development of communities. Approaches to manage surface water that take account of water quantity (flooding), water quality (pollution), amenity and biodiversity issues are collectively referred to as Sustainable Drainage Systems (SuDS).

SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to slow water down (attenuate) before it enters streams, rivers and other watercourses, they provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or evaporated from surface water and lost or transpired from vegetation (known as evapotranspiration).

SUDS are technically regarded a sequence of management practices, control structures and strategies designed to efficiently and sustainably drain surface water, while minimising pollution and managing the impact on water quality of local water bodies.

SuDS are more sustainable than traditional drainage methods because they:

- Manage runoff volumes and flow rates from hard surfaces, reducing the impact of urbanisation on flooding;
- Protect or enhance water quality (reducing pollution from runoff);
- Protect natural flow regimes in watercourses;
- Are sympathetic to the environment and the needs of the local community;
- Provide an attractive habitat for wildlife in urban watercourses;
- Provide opportunities for evapotranspiration from vegetation and surface water;
- Encourage natural groundwater/aquifer recharge (where appropriate);
- Create better places to live, work and play.

4.2 SuDS principles

Sustainable drainage is a departure from the traditional approach to draining sites. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:

- storing runoff and releasing it slowly (attenuation);
- allowing water to soak into the ground (infiltration);
- Slowly transporting (conveying) water on the surface;
- filtering out pollutants;
- allowing sediments to settle out by controlling the flow of the water.

The above was taken from www.susdrain.org

SUDS Technique	Can they be feasibly incorporated into the site?	Comments
Green Roofs	✓	The proposed development could be designed to incorporate these elements.
Basins and Ponds	×	The proposed development could not be designed to incorporate these elements due to the size of the site.
Filter Strips, Swales and Bio-Retention	×	The proposed development could not be designed to incorporate these elements due to the size of the site.
Infiltration techniques	×	Soakaway testing results indicate that the site would not be suitable for infiltration.
Permeable surfaces and tree pits	✓	Resurfacing of the external areas could be in a permeable material to provide surface water attenuation.
Rainwater Harvesting	✓	The proposed development could be designed to incorporate rainwater harvesting.
Tanked Systems	✓	Attenuation storage could be provided below ground.

4.3 SuDS Maintenance

On-site SuDS systems will be privately managed rather than put forward for adoption by the local Water Authority. Exact details of the drainage systems will be determined during detailed design stage. The below table shows an indicative maintenance schedule for a typical Geo-Cellular Storage system which appears to be the most feasible option to suit the layout on initial assessment.

Schedule	Required Action	Frequency
Regular Maintenance	Inspect and Identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, Annually thereafter.
	Remove sediment from pre-treatment structures and/or internal forbays.	Annually, or as required.
Remedial Action	Repair/rehabilitate inlets, outlets and vents.	Annually, or as required.
Monitoring	Inspect/check all inlets, Outlets and vents.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years, or as required.

5 FOUL WATER DRAINAGE STRATEGY

Foul water drainage systems should be designed, where possible, to drain via gravity. Yorkshire Water sewer records (Appendix E) that there are no public sewers recorded in the vicinity of the site. Connection to public sewers will therefore not be feasible.

Foul Water currently drains to a septic tank prior to discharging from site. As this system is no longer approved, it is recommended that a package treatment plant such as a Klargester BioDisc is used to treat the sewage to an acceptable level before discharging from site via the existing arrangement.

All below ground foul water drainage is to be designed and constructed to the current Building Regulations standards or where drainage is to be adopted by the local water authority, Sewers for Adoption 7th Edition.

A proposed Drainage Schematic Layout can be found in Appendix G.

6 CONCLUSIONS

Soakaway testing carried out on site prove that the site is not suitable for the use of infiltration systems.

Connection to the nearest watercourses have been ruled out due to the distance away from site and the nature of the surrounding areas (3rd party ownership).

There are no public sewers within the vicinity of the site. Therefore, surface water from the site shall remain as per the existing arrangement however, a restricted discharge rate of 2.4 l/s shall be incorporated. Flows over this rate will be attenuated on site. MicroDrainage Source Control calculations estimate 12.1m^3 of storage is required for a 1 in 100 year event plus 30% allowance for climate change.

Sustainable drainage systems should be considered as part of the final site layout design. Systems such as, permeable paving and tanked systems are potentially feasible.

The septic tank on site should be replaced with an approved package treatment plant to allow an acceptable level of treatment to the sewage before discharging from site via the existing arrangement.

7 LIMITATIONS

All comments and proposals contained in this report, including any conclusions, are based on information available to Mason Clark Associates during investigations. The conclusions drawn by Mason Clark Associates could therefore differ if the information is found to be inaccurate or misleading. Mason Clark Associates accepts no liability should this be the case, nor if additional information exists or becomes available with respect to this scheme.

Where we have undertaken preliminary infiltration rate tests on site on your behalf this is for indicative purposes only to enable preliminary designs to progress. Where any subsequent designs rely upon infiltration and/or these test results then you should undertake further infiltration rate tests in accordance with accepted industry standard guidelines as detailed in Building Research Establishment publication BRE Digest 365.

Except as otherwise requested by the client, Mason Clark Associates is not obliged to and disclaims any obligation to update the report for events taking place after: -

(i) The date on which this assessment was undertaken, and
(ii) The date on which the final report is delivered

Mason Clark Associates makes no representation whatsoever concerning the legal significance of its findings or the legal matters referred to in the report.

The information presented and conclusions drawn are based on statistical data and are for guidance purposes only. The study provides no guarantee against flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates and associated probabilities.

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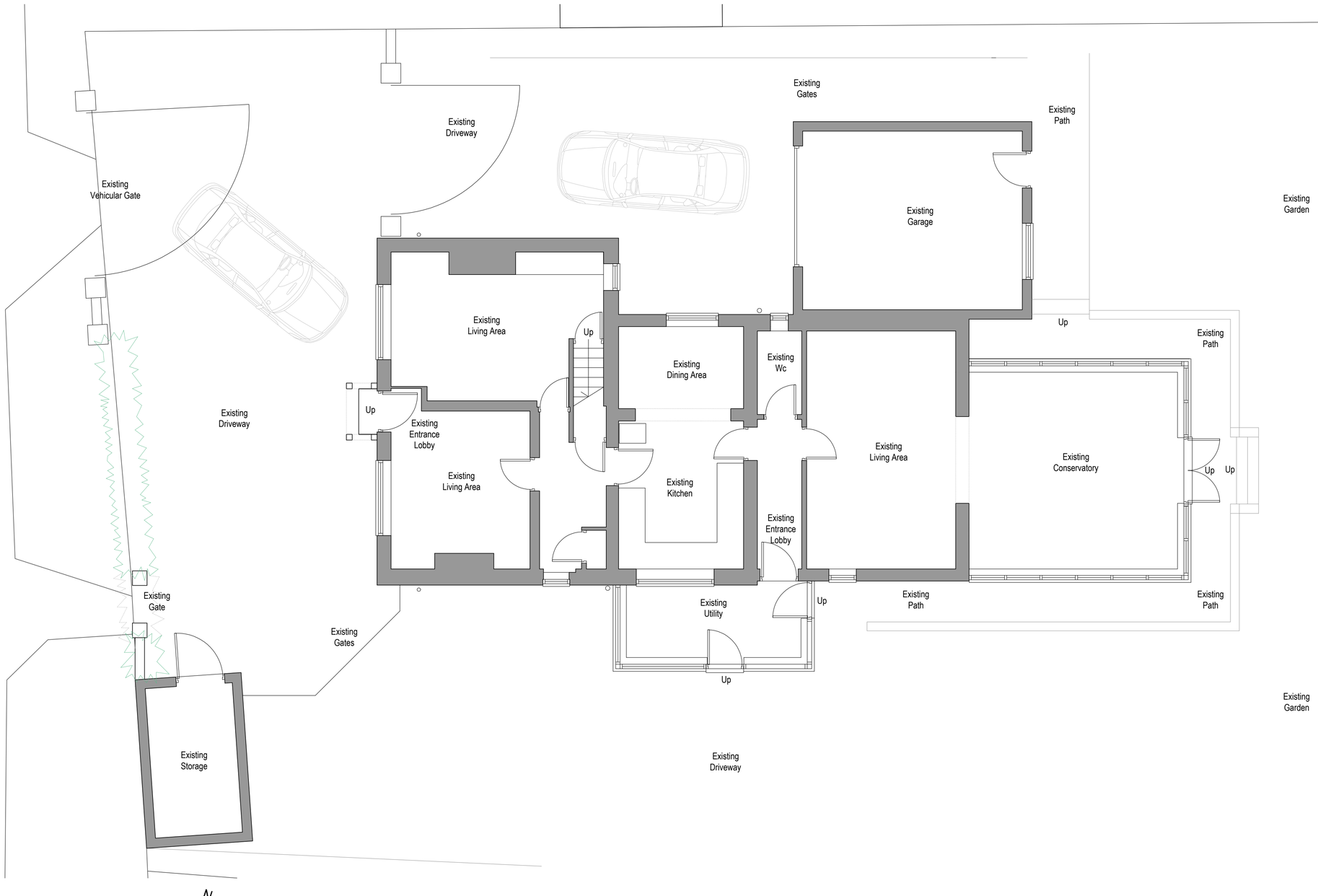
APPENDIX A

Existing Site Layout



EXISTING GROUND FLOOR PLAN

Scale 1:50

Existing Ground Floor GIFA = 107.4m²

EXISTING

0 1 2 3 4 5

Rev	Description	Date	By	Chkd
P1	Initial Issue	31.01.20	GD	NS

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CLIENT
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PROJECT
PROPOSED NEW DWELLING
THE COTTAGE, MAIN STREET
KELK, E YORKS YO25 8HL

TITLE
EXISTING GROUND FLOOR PLAN

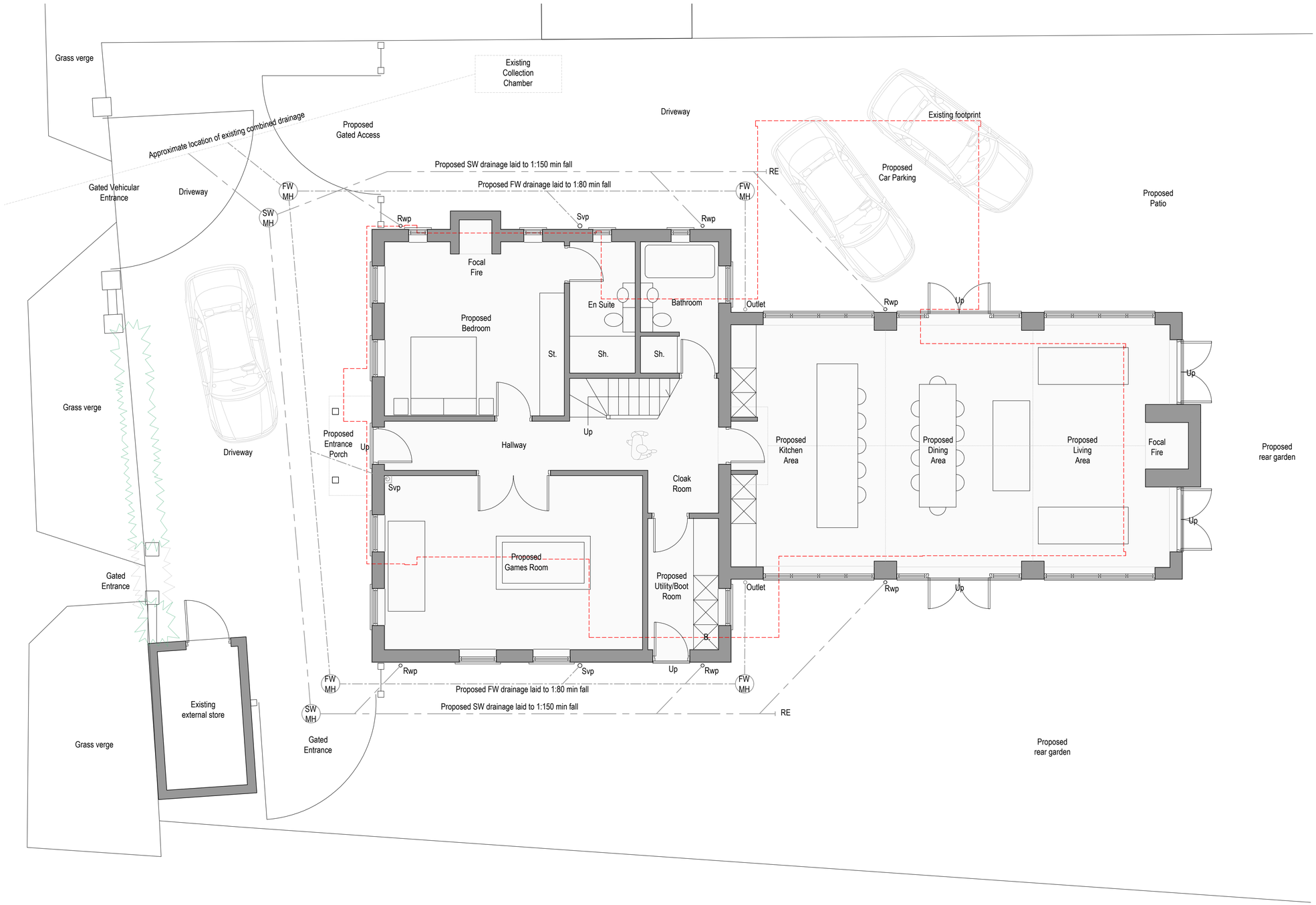
SCALE 1:50 (A1) DRAWN GD CHECKED NS DATE 14/01/20

CAD FILE

DRAWING NO.
192010 200-001P1

APPENDIX B

Proposed Site Layout



PROPOSED GROUND FLOOR PLAN

Scale 1:50

0 1 2 3 4 5

Proposed Ground Floor GIFA = 149.8m²

PROPOSED

Rev	Description	Date	By	Chkd
P2	Ground Floor Living Room revised to ensuite bedroom in accordance with Clients requirements.	13.02.20	GD	NS
P1	Initial Issue	31.01.20	GD	NS

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PROJECT
PROPOSED NEW DWELLING
THE COTTAGE, MAIN STREET
KELK, E YORKS YO25 8HL

TITLE
PROPOSED GROUND FLOOR PLAN

SCALE 1:50 (A1) DRAWN GD CHECKED NS DATE 14/01/20

CAD FILE

DRAWING NO.
192010 200-004P2

APPENDIX C

Infiltration Rate Calculations

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Project No.	Sheet No.
18865L	1
Prepared by	Date
BW	27.08.2020
Checked By	Date
GS	

The Cottage, Kelk

Soakaway Test Data TH1

TEST 1

Real Time	Time elapsed (days hh:mm)	Time elapsed (minutes)	Depth to Water (m)	Water Height	Comment
27/08/2020 11:13	0 00:00	0	0.400	0.350	
27/08/2020 11:15	0 00:02	2	0.500	0.250	75%
27/08/2020 11:17	0 00:04	4	0.530	0.220	
27/08/2020 11:23	0 00:10	10	0.550	0.200	
27/08/2020 11:30	0 00:17	17	0.570	0.180	
27/08/2020 11:32	0 00:19	19	0.575	0.175	50%
27/08/2020 11:35	0 00:22	22	0.580	0.170	
27/08/2020 11:40	0 00:27	27	0.580	0.170	
27/08/2020 11:45	0 00:32	32	0.590	0.160	
27/08/2020 11:50	0 00:37	37	0.600	0.150	
27/08/2020 12:00	0 00:47	47	0.610	0.140	
27/08/2020 12:10	0 00:57	57	0.610	0.140	
27/08/2020 12:20	0 01:07	67	0.620	0.130	
27/08/2020 12:30	0 01:17	77	0.630	0.120	
27/08/2020 12:40	0 01:27	87	0.640	0.110	
27/08/2020 12:50	0 01:37	97	0.650	0.100	
27/08/2020 13:00	0 01:47	107	0.660	0.090	25%
27/08/2020 13:10	0 01:57	117	0.670	0.080	

	TEST 1
Total depth	0.750
H (m)	0.350
$H_{75\%}$ (m)	0.263
$H_{50\%}$ (m)	0.175
$H_{25\%}$ (m)	0.088

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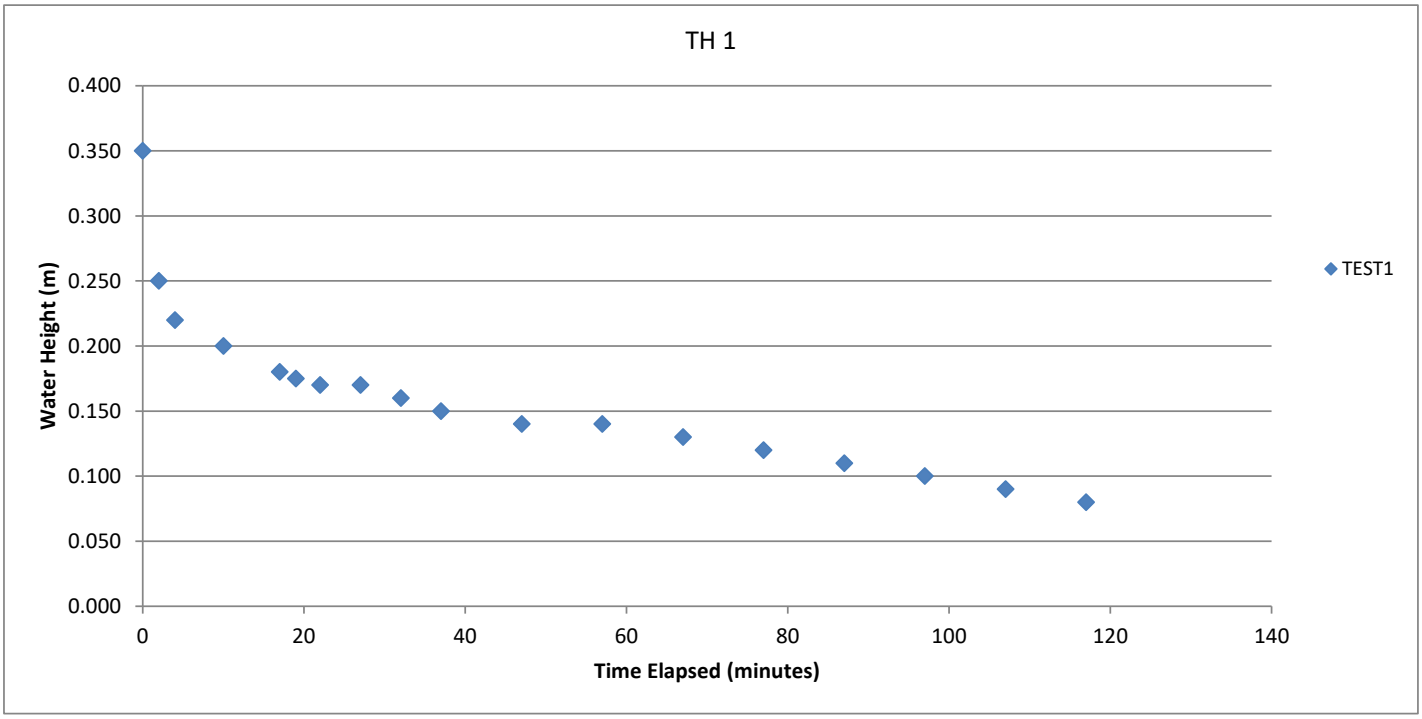
Project No.	Sheet No.
18865L	2
Prepared by	Date
BW	27.08.2020
Checked By	Date
GS	

The Cottage, Kelk



A_{P50}	TEST 1
Side (Round)	0.707
Base	0.040
A_P50	**0.163**
V_{p75-25}	**0.007**
t_{p75}	120
t_{p25}	6420
t_{p75-25}	**6300**
Soil infiltration rate, f (m/s)	6.76E-06

Upper Square Section	
Length/Width	0.250
Height	0.300

Lower Circular Section	
Diameter	0.225
Height	0.550

APPENDIX D

Tedds Soakaway Calculations

Tekla Tedds mason clark associates	Project: The cottage, Main Street				Job no.: 18865L	
	Calcs for: New Impermeable Area				Start page no./Revision: 1 P1	
	Calcs by: BW	Calcs date: 12/10/2020	Checked by: GS	Checked date: 12/10/2020	Approved by: GS	Approved date: 12/10/2020

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.04

Design rainfall intensity

Location of catchment area	York
Impermeable area drained to the system	A = **390.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.392**
5-year return period rainfall of 60 minutes duration	M5_60min = **19.0** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **30** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **800** mm
Width of pit	w = **5500** mm
Length of pit	l = **8000** mm
Percentage free volume	V_{free} = **95** %
Soil infiltration rate	f = **6.76×10^{-6}** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **10800000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M100 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.37;	9.2;	1.89;	17.3;	6.75;	0.02;	6.73
10	0.52;	12.9;	1.96;	25.2;	9.81;	0.04;	9.77
15	0.63;	15.6;	1.99;	31.1;	12.12;	0.07;	12.05
30	0.80;	19.8;	2.03;	40.1;	15.64;	0.13;	15.51
60	1.00;	24.7;	2.01;	49.7;	19.37;	0.26;	19.11
120	1.21;	29.9;	1.97;	58.9;	22.96;	0.53;	22.44
240	1.46;	36.0;	1.92;	69.2;	26.98;	1.05;	25.93
360	1.62;	39.9;	1.89;	75.5;	29.44;	1.58;	27.87
600	1.81;	44.8;	1.85;	83.0;	32.36;	2.63;	29.74
1440	2.27;	56.1;	1.77;	99.2;	38.70;	6.31;	32.40

Required storage volume: S_{req} = **32.40** m^3

Soakaway storage volume: S_{act} = l × d × w × V_{free} = **33.44** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume: t_{s50} = S_{req} × 0.5 / (a_{s50} × f) = 61hr 38min 14s

FAIL - Soakaway discharge time greater than 24 hours

APPENDIX E

Yorkshire Water Sewer Records

YORKSHIRE WATER
PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the ***general*** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.

2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.

3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will ***generally*** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will ***generally*** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.

4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.

5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45o and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter *(see illustration below)*. Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.

6. All excavation works near to YW apparatus should be by hand digging only.

7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.

8. Adequate support must be provided where any works pass under YW apparatus.

9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.

10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.

11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.

12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.

13. ***Under no circumstances*** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.

14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionary Works).

15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.

16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.

17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available*" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.

18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.

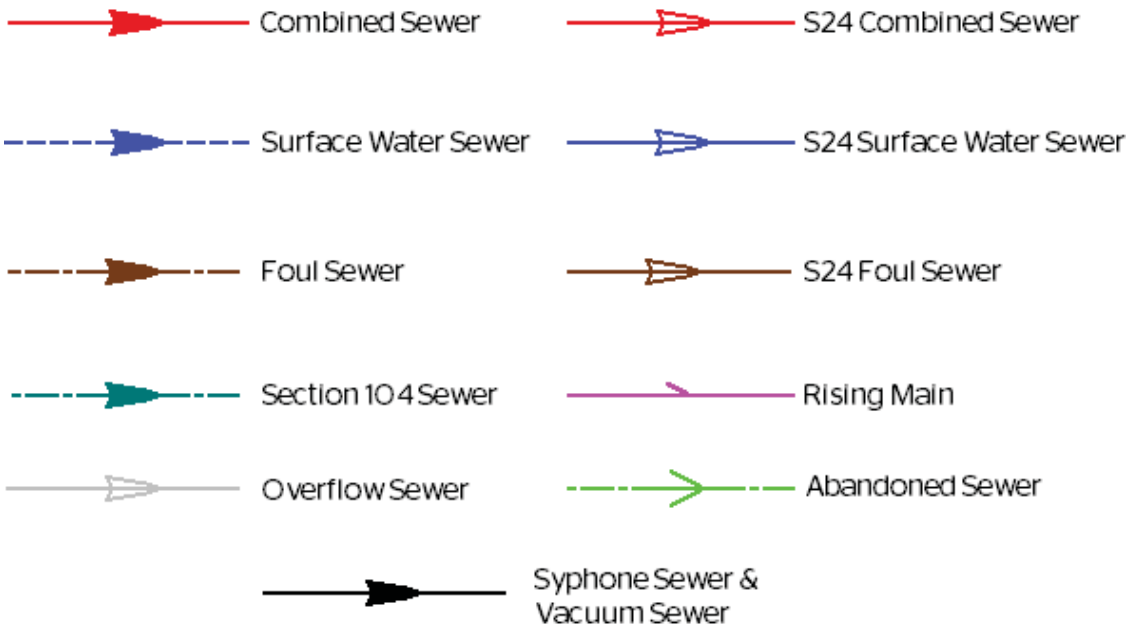
Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

19. Please note that the information supplied on the enclosed plans is reproduced from Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number 1000019559.

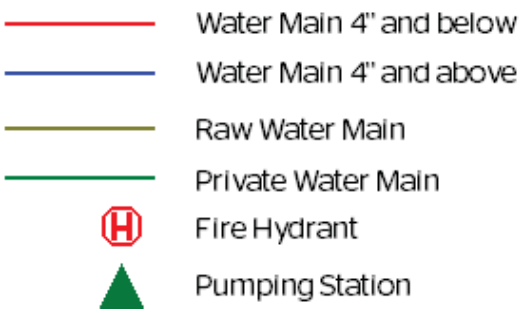
20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trail holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0845 124 24 24.

Property Identfier

Sewer Legend



Water Legend



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APPENDIX F

Source Control Attenuation Calculations

Summary of Results for 30 year Return Period

Half Drain Time : 26 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	12.998	0.598	0.0	1.7	1.7	3.7	O K
30 min Summer	13.124	0.724	0.0	1.9	1.9	4.5	O K
60 min Summer	13.169	0.769	0.0	2.0	2.0	4.7	O K
120 min Summer	13.127	0.727	0.0	1.9	1.9	4.5	O K
180 min Summer	13.059	0.659	0.0	1.8	1.8	4.1	O K
240 min Summer	12.992	0.592	0.0	1.7	1.7	3.7	O K
360 min Summer	12.883	0.483	0.0	1.6	1.6	3.0	O K
480 min Summer	12.803	0.403	0.0	1.4	1.4	2.5	O K
600 min Summer	12.742	0.342	0.0	1.3	1.3	2.1	O K
720 min Summer	12.694	0.294	0.0	1.2	1.2	1.8	O K
960 min Summer	12.626	0.226	0.0	1.0	1.0	1.4	O K
1440 min Summer	12.549	0.149	0.0	0.8	0.8	0.9	O K
2160 min Summer	12.495	0.095	0.0	0.6	0.6	0.6	O K
2880 min Summer	12.469	0.069	0.0	0.5	0.5	0.4	O K
4320 min Summer	12.446	0.046	0.0	0.4	0.4	0.3	O K
5760 min Summer	12.440	0.040	0.0	0.3	0.3	0.2	O K
7200 min Summer	12.435	0.035	0.0	0.3	0.3	0.2	O K
8640 min Summer	12.432	0.032	0.0	0.2	0.2	0.2	O K
10080 min Summer	12.430	0.030	0.0	0.2	0.2	0.2	O K
15 min Winter	13.075	0.675	0.0	1.8	1.8	4.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	68.461	0.0	5.0	21
30 min Summer	45.456	0.0	6.6	31
60 min Summer	28.921	0.0	8.5	48
120 min Summer	17.873	0.0	10.5	80
180 min Summer	13.341	0.0	11.7	114
240 min Summer	10.790	0.0	12.6	146
360 min Summer	7.971	0.0	14.0	208
480 min Summer	6.428	0.0	15.0	268
600 min Summer	5.437	0.0	15.9	328
720 min Summer	4.740	0.0	16.6	388
960 min Summer	3.814	0.0	17.8	508
1440 min Summer	2.805	0.0	19.7	744
2160 min Summer	2.060	0.0	21.7	1104
2880 min Summer	1.653	0.0	23.2	1468
4320 min Summer	1.211	0.0	25.5	2156
5760 min Summer	0.971	0.0	27.2	2872
7200 min Summer	0.817	0.0	28.7	3552
8640 min Summer	0.710	0.0	29.9	4400
10080 min Summer	0.630	0.0	31.0	5008
15 min Winter	68.461	0.0	5.6	21

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	13.316	0.916	0.0	2.2	2.2	5.1	Flood Risk
60 min Winter	13.488	1.088	0.0	2.4	2.4	5.2	Flood Risk
120 min Winter	13.177	0.777	0.0	2.0	2.0	4.8	O K
180 min Winter	13.069	0.669	0.0	1.8	1.8	4.1	O K
240 min Winter	12.972	0.572	0.0	1.7	1.7	3.5	O K
360 min Winter	12.828	0.428	0.0	1.5	1.5	2.6	O K
480 min Winter	12.732	0.332	0.0	1.3	1.3	2.0	O K
600 min Winter	12.665	0.265	0.0	1.1	1.1	1.6	O K
720 min Winter	12.617	0.217	0.0	1.0	1.0	1.3	O K
960 min Winter	12.555	0.155	0.0	0.8	0.8	1.0	O K
1440 min Winter	12.495	0.095	0.0	0.6	0.6	0.6	O K
2160 min Winter	12.460	0.060	0.0	0.5	0.5	0.4	O K
2880 min Winter	12.446	0.046	0.0	0.4	0.4	0.3	O K
4320 min Winter	12.437	0.037	0.0	0.3	0.3	0.2	O K
5760 min Winter	12.432	0.032	0.0	0.2	0.2	0.2	O K
7200 min Winter	12.429	0.029	0.0	0.2	0.2	0.2	O K
8640 min Winter	12.427	0.027	0.0	0.2	0.2	0.2	O K
10080 min Winter	12.425	0.025	0.0	0.1	0.1	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	45.456	0.0	7.4	31
60 min Winter	28.921	0.0	9.5	50
120 min Winter	17.873	0.0	11.7	86
180 min Winter	13.341	0.0	13.1	120
240 min Winter	10.790	0.0	14.1	152
360 min Winter	7.971	0.0	15.7	216
480 min Winter	6.428	0.0	16.8	276
600 min Winter	5.437	0.0	17.8	336
720 min Winter	4.740	0.0	18.6	394
960 min Winter	3.814	0.0	20.0	512
1440 min Winter	2.805	0.0	22.1	744
2160 min Winter	2.060	0.0	24.3	1104
2880 min Winter	1.653	0.0	26.0	1460
4320 min Winter	1.211	0.0	28.6	2192
5760 min Winter	0.971	0.0	30.5	2896
7200 min Winter	0.817	0.0	32.1	3616
8640 min Winter	0.710	0.0	33.5	4336
10080 min Winter	0.630	0.0	34.7	4968

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Shortest Storm (mins)	15
Ratio R	0.356	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.039

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.013	4	8	0.013	8	12	0.013

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Model Details

Storage is Online Cover Level (m) 13.500

Cellular Storage Structure

Invert Level (m) 12.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	6.5	0.0	0.801	0.0	0.0
0.800	6.5	0.0			

Orifice Outflow Control

Diameter (m) 0.033 Discharge Coefficient 0.600 Invert Level (m) 12.400

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

Half Drain Time : 63 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	12.871	0.471	0.0	1.5	1.5	7.2	O K
30 min Summer	12.999	0.599	0.0	1.7	1.7	9.1	O K
60 min Summer	13.081	0.681	0.0	1.9	1.9	10.3	O K
120 min Summer	13.107	0.707	0.0	1.9	1.9	10.8	O K
180 min Summer	13.089	0.689	0.0	1.9	1.9	10.5	O K
240 min Summer	13.056	0.656	0.0	1.8	1.8	10.0	O K
360 min Summer	12.988	0.588	0.0	1.7	1.7	8.9	O K
480 min Summer	12.928	0.528	0.0	1.6	1.6	8.0	O K
600 min Summer	12.877	0.477	0.0	1.5	1.5	7.2	O K
720 min Summer	12.832	0.432	0.0	1.5	1.5	6.6	O K
960 min Summer	12.761	0.361	0.0	1.3	1.3	5.5	O K
1440 min Summer	12.664	0.264	0.0	1.1	1.1	4.0	O K
2160 min Summer	12.581	0.181	0.0	0.9	0.9	2.8	O K
2880 min Summer	12.534	0.134	0.0	0.8	0.8	2.0	O K
4320 min Summer	12.486	0.086	0.0	0.6	0.6	1.3	O K
5760 min Summer	12.462	0.062	0.0	0.5	0.5	0.9	O K
7200 min Summer	12.449	0.049	0.0	0.4	0.4	0.7	O K
8640 min Summer	12.444	0.044	0.0	0.4	0.4	0.7	O K
10080 min Summer	12.440	0.040	0.0	0.3	0.3	0.6	O K
15 min Winter	12.932	0.532	0.0	1.6	1.6	8.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	115.077	0.0	8.4	23
30 min Summer	77.153	0.0	11.3	34
60 min Summer	49.388	0.0	14.4	54
120 min Summer	30.553	0.0	17.9	88
180 min Summer	22.743	0.0	19.9	122
240 min Summer	18.321	0.0	21.4	156
360 min Summer	13.442	0.0	23.6	222
480 min Summer	10.793	0.0	25.2	288
600 min Summer	9.095	0.0	26.6	350
720 min Summer	7.904	0.0	27.7	412
960 min Summer	6.328	0.0	29.6	536
1440 min Summer	4.617	0.0	32.4	774
2160 min Summer	3.362	0.0	35.4	1132
2880 min Summer	2.681	0.0	37.6	1496
4320 min Summer	1.945	0.0	41.0	2208
5760 min Summer	1.547	0.0	43.4	2936
7200 min Summer	1.294	0.0	45.4	3672
8640 min Summer	1.119	0.0	47.1	4376
10080 min Summer	0.990	0.0	48.6	5048
15 min Winter	115.077	0.0	9.4	23

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	13.078	0.678	0.0	1.8	1.8	10.3	O K
60 min Winter	13.174	0.774	0.0	2.0	2.0	11.8	O K
120 min Winter	13.193	0.793	0.0	2.0	2.0	12.1	O K
180 min Winter	13.158	0.758	0.0	2.0	2.0	11.5	O K
240 min Winter	13.106	0.706	0.0	1.9	1.9	10.7	O K
360 min Winter	13.004	0.604	0.0	1.7	1.7	9.2	O K
480 min Winter	12.920	0.520	0.0	1.6	1.6	7.9	O K
600 min Winter	12.850	0.450	0.0	1.5	1.5	6.8	O K
720 min Winter	12.792	0.392	0.0	1.4	1.4	6.0	O K
960 min Winter	12.706	0.306	0.0	1.2	1.2	4.6	O K
1440 min Winter	12.601	0.201	0.0	1.0	1.0	3.0	O K
2160 min Winter	12.524	0.124	0.0	0.7	0.7	1.9	O K
2880 min Winter	12.488	0.088	0.0	0.6	0.6	1.3	O K
4320 min Winter	12.455	0.055	0.0	0.4	0.4	0.8	O K
5760 min Winter	12.444	0.044	0.0	0.4	0.4	0.7	O K
7200 min Winter	12.439	0.039	0.0	0.3	0.3	0.6	O K
8640 min Winter	12.435	0.035	0.0	0.3	0.3	0.5	O K
10080 min Winter	12.433	0.033	0.0	0.2	0.2	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	77.153	0.0	12.6	34
60 min Winter	49.388	0.0	16.2	58
120 min Winter	30.553	0.0	20.0	94
180 min Winter	22.743	0.0	22.3	132
240 min Winter	18.321	0.0	24.0	168
360 min Winter	13.442	0.0	26.4	236
480 min Winter	10.793	0.0	28.3	304
600 min Winter	9.095	0.0	29.8	368
720 min Winter	7.904	0.0	31.1	430
960 min Winter	6.328	0.0	33.2	552
1440 min Winter	4.617	0.0	36.3	790
2160 min Winter	3.362	0.0	39.6	1144
2880 min Winter	2.681	0.0	42.1	1500
4320 min Winter	1.945	0.0	45.9	2208
5760 min Winter	1.547	0.0	48.6	2872
7200 min Winter	1.294	0.0	50.9	3648
8640 min Winter	1.119	0.0	52.8	4400
10080 min Winter	0.990	0.0	54.5	5008

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.800	Shortest Storm (mins)	15
Ratio R	0.356	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.039

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.013	4	8	0.013	8	12	0.013

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Model Details

Storage is Online Cover Level (m) 13.500

Cellular Storage Structure

Invert Level (m) 12.400 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	16.0	0.0	0.801	0.0	0.0
0.800	16.0	0.0			

Orifice Outflow Control

Diameter (m) 0.033 Discharge Coefficient 0.600 Invert Level (m) 12.400

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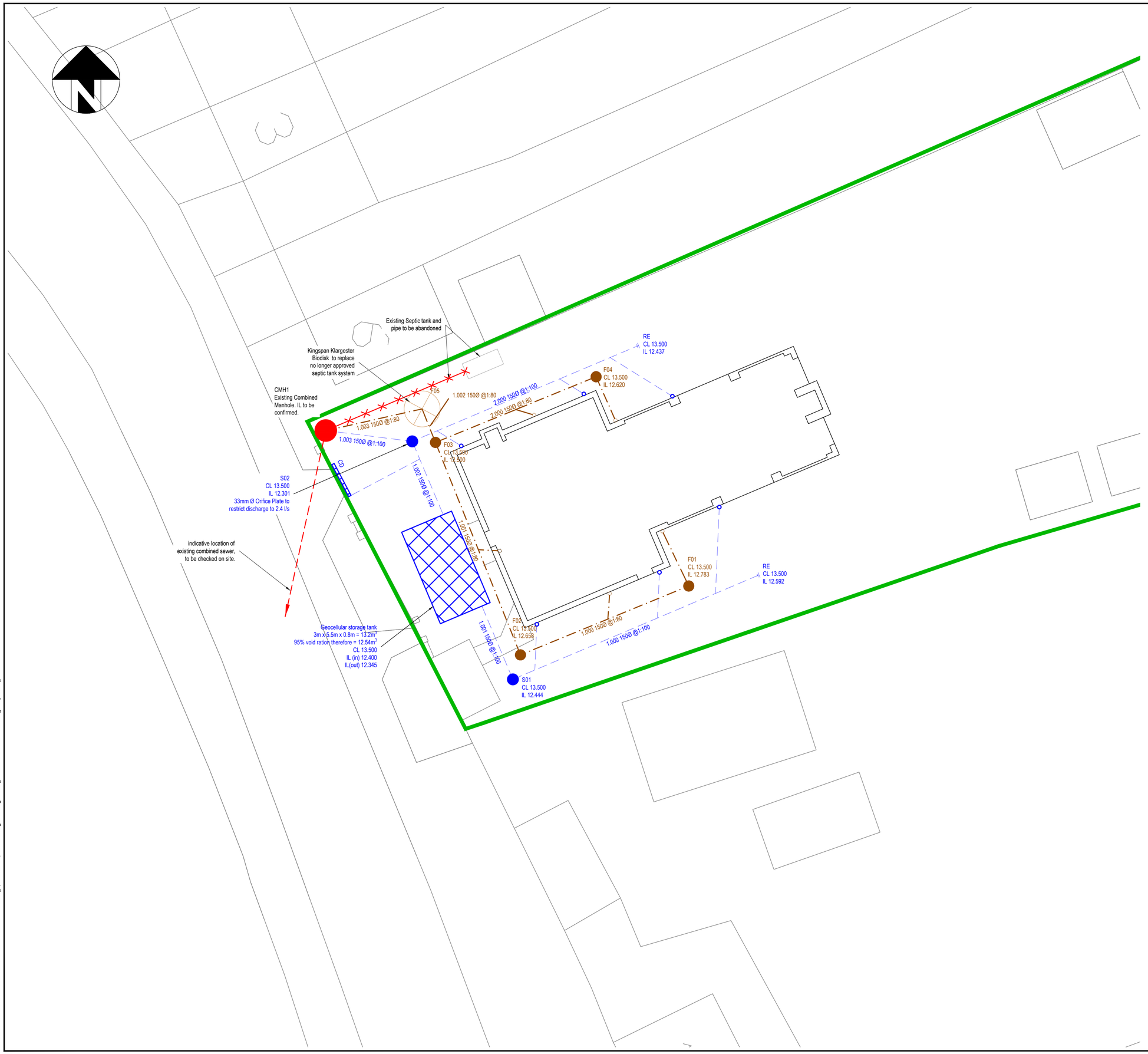
APPENDIX G

Drainage Schematic Layout

Version 4.0



Drainage Notes

1. All private drainage works are to be constructed in accordance with the relevant provisions of BS EN 752 including by reference BS 8301, Building regulations part H and Sewers for Adoption 6th edition.
2. The Contractor MUST confirm invert levels of existing points of connection prior to commencement of drainage works.
3. Manhole invert levels relate to the downstream pipe. Pipes at manholes to be laid soffit to soffit level.
4. Unless otherwise shown, foul pipes to be 100mm Ø laid at 1 in 40 minimum gradient unless one w.c. connected where gradient may be 1 in 80 minimum.
5. Unless otherwise shown surface water pipes to be 150mm Ø laid at 1 in 100 minimum gradient.
6. Where cover to top of pipe barrel is less than 900mm in lightly trafficked areas and 600mm in non trafficked areas, pipe to have minimum 150mm ST4 concrete surround.
7. Where cover to pipe barrel located beneath highways is less than 1200mm, pipes are to be protected with concrete surround (bed type Z) Grade C20 in accordance with sewers for adoption 6th edition, table 2.4.
8. Manhole cover levels are where not shown are to be confirmed at later stage. Covers are to be fixed to a profile corresponding to the surrounding pavement surface and may be adjusted to suit actual site levels.
9. All pipework up to 300mm Ø to be standard strength vitrified clay to BS EN 295 (min crushing strength 40KN/m) or plastic to BS 4660:2000 and BS EN 1401-1:1998 and shall comply with the requirements of Sewers for Adoption 6th Edition.
10. Bedding to all pipework to be Class S granular bed & surround in accordance with BS882 or Class Z (see manhole schedule and/or details drawing).
11. All backfill above gravel surround in drainage trenches and under building slabs to be Type 1 stone compacted in layers not exceeding 225mm thick.
12. Manholes to be precast concrete to BS EN1917: 2002, Type B, in accordance with the requirements of Sewers for Adoption, 6th Edition unless noted otherwise.
13. Inspection chambers to be polypropylene, 450mm diameter, Hepworth range or similar & approved. Opening restricted to max 350mm where depth of chamber exceeds 1.2m.
14. All manholes covers and gully gratings located in trafficked areas to be ductile iron class D400. Covers located in non trafficked areas to be min class B125 unless noted otherwise on the drainage layout or manhole schedule.
15. Any external recessed cover required or internal manhole covers to be specified by the Architect.
16. Proprietary attenuation systems, cellular soakaways and petrol/oil interceptors to be installed in accordance with the manufacturers details and recommendations, including bedding and surround, membranes, protection and backfill requirements.
17. Position and details of rainwater pipes, and foul connections to be confirmed by Architect.
18. For above ground and internal drainage, vents, fittings and access points refer to Architects and/or M&E details.
19. Cover levels of private drainage chambers may be adjusted to suit actual site levels.
20. The contractor is responsible for identifying and locating all existing services and ensuring that the levels do not conflict with the proposed drainage system. If there are any such conflicts then the Engineer must be made aware immediately.
21. All existing redundant drainage systems are to be abandoned and grubbed up including redundant manholes and pipework. The voids are to be backfilled with as dug material or suitable fill material and compacted in layers.
22. Any live sewer connections found in any sewers that are to be abandoned are to be picked up and diverted.
23. The Contractor shall undertake a CCTV survey of the as constructed site drainage system on completion of the works. A copy shall be made available to Mason Clark Associates.

Notes

1. This drawing is subject to copyright and must not be reproduced, stored or transmitted in any form without prior permission from Mason Clark Associates.
2. This drawing is not to be scaled. All dimensions are to be checked on site by the contractor. Any discrepancies are to be notified to Mason Clark Associates. Obtain instructions prior to works commencing.
3. This drawing is to be read in conjunction with the relevant contract drawings and documents, including the NBS specification.
4. All dimensions are in millimetres and all levels are in metres AOD unless noted otherwise.
5. All work shall be carried out in accordance with Local Authority, Statutory Authority and Health & Safety Regulations.
6. Mason Clark Associates are not responsible for determining the appropriate fire period, fire boundary conditions or the associated design of fire protection or inherent fire resistance to any elements of structure, including all frames, posts, beams, joists, roof members and secondary structural elements such as lintels. Refer to the Architect or Project Manager for this information.

Key

- Site Boundary
- Surface Water
- Foul Water
- CD — Channel Drain
- S01 — Surface Water Access Chamber
- Rain water pipe
- Foul Water Treatment Plant
- F01 — Foul Water Access Chamber
- Soil vent pipe
- Existing Combined Water Sewer

Rev	Details	By	Date
P1	Preliminary - Initial Issue	BW	16.10.2020

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Client: MLJ Architects

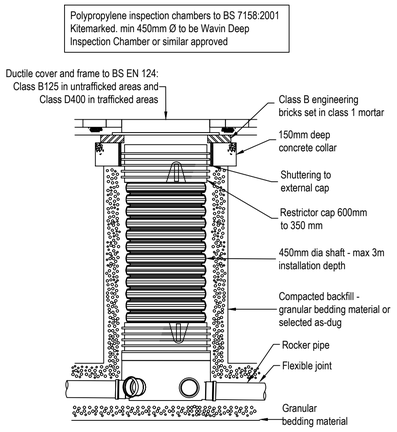
Project: The Cottage, Main Street
Kelk

Title: Proposed Drainage Layout

Drawn: BW	Checked: GS	Date: Oct 2020
Scale @ A1 : 1:100		
Drawing No : 18865-L-DR-200		Rev: P1

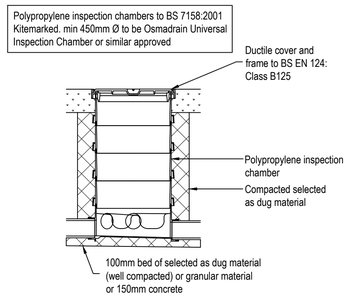
\\ds-dc01\masonclark\MCA Jobs\18800 to 18899\18865L - The Cottage, Main Street, Kelk\Drawings\Working Drawings\18865-L-DR-200-P1 Drainage Layout.dwg

Version 4.0



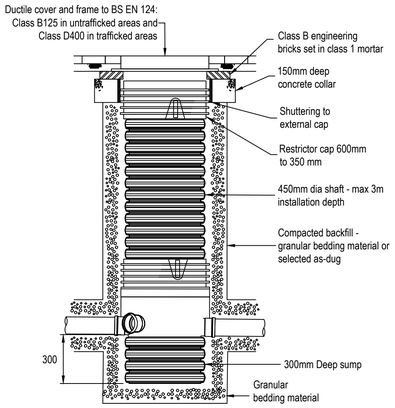
Polypropylene Inspection Chamber (Depth 1.2 - 3m)

Scale 1:20



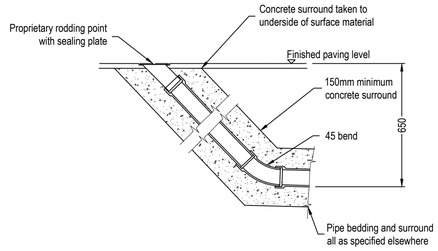
Polypropylene Inspection Chamber (Depth less than 1.2m) in Untrafficked Areas

Scale 1:20



Polypropylene Inspection Chamber Catchpit

Scale 1:20



Typical Rodding Eye Detail

Scale 1:20

Drainage Notes

1. All private drainage works are to be constructed in accordance with the relevant provisions of BS EN 752 including by reference BS 8301, Building regulations part H and Sewers for Adoption 6th edition.
2. The Contractor MUST confirm invert levels of existing points of connection prior to commencement of drainage works.
3. Manhole invert levels relate to the downstream pipe. Pipes at manholes to be laid soffit to soffit level.
4. Unless otherwise shown, foul pipes to be 100mm Ø laid at 1 in 40 minimum gradient unless one w.c. connected where gradient may be 1 in 80 minimum.
5. Unless otherwise shown surface water pipes to be 150mm Ø laid at 1 in 100 minimum gradient.
6. Where cover to top of pipe barrel is less than 900mm in lightly trafficked areas and 600mm in non trafficked areas, pipe to have minimum 150mm ST4 concrete surround.
7. Where cover to pipe barrel located beneath highways is less than 1200mm, pipes are to be protected with concrete surround (bed type Z) Grade C20 in accordance with sewers for adoption 6th edition, table 2.4.
8. Manhole cover levels are where not shown are to be confirmed at later stage. Covers are to be fixed to a profile corresponding to the surrounding pavement surface and may be adjusted to suit actual site levels.
9. All pipework up to 300mm Ø to be standard strength vitrified clay to BS EN 295 (min crushing strength 40KN/m) or plastic to BS 4660:2000 and BS EN 1401-1:1998 and shall comply with the requirements of Sewers for Adoption 6th Edition.
10. Bedding to all pipework to be Class S granular bed & surround in accordance with BS882 or Class Z (see manhole schedule and/or details drawing).
11. All backfill above gravel surround in drainage trenches and under building slabs to be Type 1 stone compacted in layers not exceeding 225mm thick.
12. Manholes to be precast concrete to BS EN1917: 2002, Type B, in accordance with the requirements of Sewers for Adoption, 6th Edition unless noted otherwise.
13. Inspection chambers to be polypropylene, 450mm diameter, Hepworth range or similar & approved. Opening restricted to max 350mm where depth of chamber exceeds 1.2m.
14. All manholes covers and gully gratings located in trafficked areas to be ductile iron class D400. Covers located in non trafficked areas to be min class B125 unless noted otherwise on the drainage layout or manhole schedule.
15. Any external recessed cover required or internal manhole covers to be specified by the Architect.
16. Proprietary attenuation systems, cellular soakaways and petrol/oil interceptors to be installed in accordance with the manufacturers details and recommendations, including bedding and surround, membranes, protection and backfill requirements.
17. Position and details of rainwater pipes, and foul connections to be confirmed by Architect.
18. For above ground and internal drainage, vents, fittings and access points refer to Architects and/or M&E details.
19. Cover levels of private drainage chambers may be adjusted to suit actual site levels.
20. The contractor is responsible for identifying and locating all existing services and ensuring that the levels do not conflict with the proposed drainage system. If there are any such conflicts then the Engineer must be made aware immediately.
21. All existing redundant drainage systems are to be abandoned and grubbed up including redundant manholes and pipework. The voids are to be backfilled with as dug material or suitable fill material and compacted in layers.
22. Any live sewer connections found in any sewers that are to be abandoned are to be picked up and diverted.
23. The Contractor shall undertake a CCTV survey of the as constructed site drainage system on completion of the works. A copy shall be made available to Mason Clark Associates.

Notes

1. This drawing is subject to copyright and must not be reproduced, stored or transmitted in any form without prior permission from Mason Clark Associates.
2. This drawing is not to be scaled. All dimensions are to be checked on site by the contractor. Any discrepancies are to be notified to Mason Clark Associates. Obtain instructions prior to works commencing.
3. This drawing is to be read in conjunction with all the relevant contract drawings and specifications.
4. All dimensions are in millimetres and all levels are in metres AOD unless noted otherwise.
5. All work shall be carried out in accordance with Local Authority, Statutory Authority and Health & Safety Regulations.
6. Mason Clark Associates are not responsible for determining the appropriate fire period, fire boundary conditions or the associated design of fire protection or inherent fire resistance to any elements of structure, including all frames, posts, beams, joists, roof members and secondary structural elements such as lintels. Refer to the Architect or Project Manager for this information.

Drains with Flexible Bed & Surround

Type 'S'

Applicable under roads/service yards where drains have more than 1200 cover (if adopted) or more than 900 cover (if not adopted)

Type 'S'

Applicable under footpaths verges and other non-trafficked areas where drains have more than 900 cover (if adopted) or more than 600 cover (if not adopted)

Type Z Concrete Protection

Type 'Z'

Applicable under roads/service yards where drains have less than 1200 cover or footpaths verges and other non-trafficked areas where drains have less than 600 cover

Permitted Location Of Sewers And Lateral Drains In Proximity To Buildings

Scale 1:20

Bedding & Trench Details

Scale 1:20

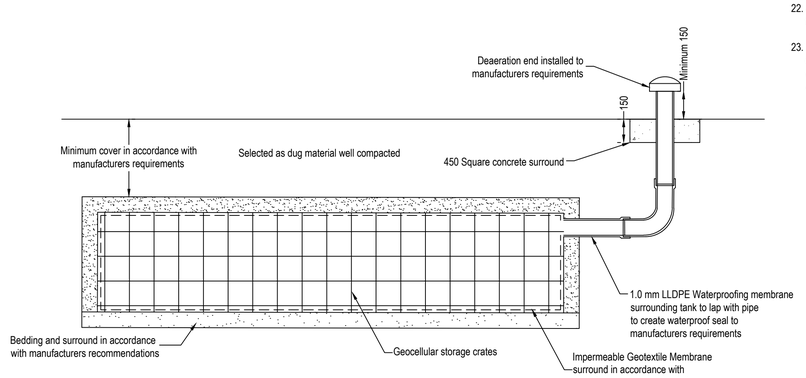
Key

BC	Outside diameter of pipe.
Y	BC/6 OR 100mm under barrels and 50mm min. under sockets whichever is greater (400mm max.)
	or
Y	BC/4 or 200mm under barrels and 150mm min. under sockets whichever is greater (400mm max.) For trenches in hard material.
	Earthworks outline.
	Granular material (see table)
	Selected clean excavated material to SfHW Clause 505 & 601. Class 1, 2, OR 3.
	Granular Type 1 material deposited in layers not exceeding 225mm unconsolidated thickness and then fully compacted.

Granular Material	
Dia. of Drain	Aggregate
100mm	10mm single size
150mm	10mm or 14mm single size or 5-20mm graded.
225mm-525mm	10mm or 14mm single size or 5-20mm graded.
Over 525mm	10, 14, 20 or 40mm single size or 5-20mm graded.
Note A No mechanical compaction within 300mm of crown of pipe. Note B Where drains are laid under buildings refer to engineer for further details.	

TRENCH WIDTHS

DIA OF DRAIN	WIDTH
100	550
150	600
225	700
300	750
375	1020
450	1150
525	1200
600	1350
675	1450
750	1500
825	1600
900	1900
975	2000
1050	2300
1200	2300
Over 1200	Dia+1000



Typical Cellular Storage Section Detail

1:20

Rev	Details	By	Date
P1	Preliminary - Initial Issue	BW	16.10.2020

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www.masonclark.co.uk

Client.
MLJ Architects

Project.
The Cottage, Main Street
Kelk

Title.
Drainage Details

Drawn: BW	Checked: GS	Date: Oct' 2020
Scale @ A1 : As Shown		
Drawing No : 18865-L-DR-201		Rev: P1

\\ds-dc01\masonclark\MCA Jobs\18800 to 18899\18865L - The Cottage, Main Street, Kelk\Drawings\Working Drawings\18865-L-DR-201-P1 Drainage Details.dwg

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