29 Broadwater Road

Drainage Strategy

Ref: C13947-PER-ZZ-XX-RP-C-00001
Date: April 2024

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Contents

Appendices

Suitability Code	Revision/ Version	Date	Written by	Checked by	Description
S2	P1	12.04.24	Christopher James	David Ayris	Planning Issue

1. Executive summary

1.1 This drainage strategy has been prepared by Perega Ltd on behalf of their client, Hightown Housing Association, to support the discharge of planning Condition 5 associated with planning reference **6/2019/3024/MAJ**.

1.2 The application boundary covers an area approximately 0.67 hectares (ha) and is classified as brownfield as there is an existing development.

1.3 This surface water strategy is an update of the detail, rather than the strategy, of the original consented drainage strategy report '*C121885 Drainage Strategy 202615*'

1.4 This report, together with the supporting drawings and documents in the appendices will show that the proposals to discharge surface water is in accordance with the original consent.

1.5 This report and the drainage strategy described within it pertain only to the design of the storm water drainage system for the development. It does not provide details of how the site will be drained during the construction phase.

1.6 Details of the drainage system during the construction phase is outside the scope of this document and shall be provided by the main contractor as part of any Construction, Environmental Management Plan the authority may request.

1.7 Similarly, this report does not provide information on how the drainage infrastructure will be protected during the construction phase of the project. The provision of this information is, again, the responsibility of the appointed contractor.

1.8 This report is a drainage strategy only and does not assess current flood risk from external sources. Thus, this report is not a Flood Risk Assessment (FRA).

1.9 The report is the property of Perega and is produced for the exclusive use of our client, Hightown Housing Association. The contents may not be made use of by any third party without the express written consent of Perega. Without such consent Perega can accept no responsibility to any third party. By receiving this report and acting on it, the client, or any third party relying on it, accepts that no individual is personally liable in contract, tort, or breach of statutory duty (including negligence).

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2. Introduction to design guidance and principles

2.1 This drainage strategy has been produced to show the opportunities and constraints for managing surface water drainage on the site and to present the most suitable method of surface water disposal for the development.

2.2 This Drainage Strategy Report follows the guidance set out in the following documents, where applicable:

- National Planning Policy Framework (NPPF) 2019
- Technical Guidance to the National Planning Policy Framework
- CIRIA SuDS Manual 2015 (C753)
- Design and Construction Guidance (DCG)
- The London Plan (Policy 5.13 Sustainable Drainage)
- Defra/LASOO's Non-Statutory Technical Standards for Sustainable Drainage Systems (2015)
- Environment Agency Rainfall Runoff Management for Developments (2013)
- LLFA summary guidance for developers
- LFRMS2 (Hertfordshire)
- BS852 Code of Practice for Surface Water Management for Development Sites.

2.3 Furthermore, the technical design which underpins the drainage design is based on the following:

- BS EN 752: 2017 Drain and sewer systems outside buildings - Sewer System Management
- BS EN 16933-1:2017 Drain and sewer systems outside buildings - Layout Principles
- BS EN 16933-2:2017 Drain and sewer systems outside buildings – Design
- Technical Guidance to the National Planning Policy Framework
- CIRIA Report 156: Infiltration Drainage
- Sewerage Sector Guidance (Appendix D)
- Building Regulations 2010: Approved Documents H – Drainage and Waste Disposal
- Building Regulations 2010: Approved Documents M – Access to and Use of Buildings
- The London Plan 2021

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3. Existing consented design

3.1 The current design has prior approval from the Lead Local Flood Authority (LLFA), granted on 6th July 2020

3.2 The original drainage strategy drawings, report and approval from the LLFA are provided in **Appendix A.** The documents provided in Appendix A include:

- C12885 Drainage Strategy_200615
- C12885 Attenuation Tank
- C12885-ZZ-XX-C-0001_P3
- C12906-LT-002 2020-06-015
- Greenfield Run Off Rate
- Greenfield Run Off Volume
- Pre-dev letter for AL7 3BQ
- 620193024MAJ - LLFA 06.07.2020

4. Current consent and conditions

4.1 The current consent, approved by Welwyn Hatfield Borough Council dated 30th September 2021, notes the following condition, condition 5, which is a pre-commencement condition and must be discharged prior to works being undertaken on site.

4.2 The condition states:

No development shall take place until a detailed surface water drainage scheme for the site based on the approved drainage strategy and sustainable drainage principles has been submitted to and approved in writing by the Local Planning Authority. The drainage strategy should demonstrate that the surface water run-off generated up to and including 1 in 100 year + climate change critical storm will not exceed the run-off from the undeveloped site following the corresponding rainfall event. The scheme shall subsequently be implemented in accordance with the approved details before the development is completed.

The scheme shall include:

1. ***Detailed engineered drawings of all the proposed SuDS features including cross section drawings, their location, size, volume, depth and any inlet and outlet features including any connecting pipe runs.***

2. ***Inclusion of silt traps for the protection of residual tanked elements.***

3. ***Final detailed post-development calculations for all rainfall events up to and including the 1 in 100 year + 40% climate change storm, including half drain down times for attenuation features.***

4. ***Final detailed management plan to include arrangements for adoption and any other arrangements to secure the operation of the scheme throughout its lifetime.***

REASON: ***To prevent the increased risk of flooding, both on and off-site in accordance with Policy R7 of the Welwyn Hatfield District plan and the National Planning Policy Framework.***

5. Designers response to discharge of conditions

Condition 5; Part 1

5.1 The LLFA has requested detailed engineering drawings showing the proposed SuDs features including cross section drawings of their size, volume, depth and any inlet and outlet. These details have been provided and are shown on the following drawings, found in **Appendix B**:

- C13947-PER-ZZ-XX-DR-C-02001
- C13947-PER-ZZ-XX-DR-C-02002
- C13947-PER-ZZ-XX-DR-C-02006
- C13947-PER-ZZ-XX-DR-C-03001
- C13947-PER-ZZ-XX-DR-C-03002
- C13947-PER-ZZ-XX-DR-C-03003
- C13947-PER-ZZ-XX-DR-C-03004
- C13947-PER-ZZ-XX-DR-C-03005
- C13947-PER-ZZ-XX-DR-C-03006

Condition 5; Part 2

5.2 Sil traps and sump drains are shown on the following drawings, provided in **Appendix B**:

- C13947-PER-ZZ-XX-DR-C-02001
- C13947-PER-ZZ-XX-DR-C-02002
- C13947-PER-ZZ-XX-DR-C-03002
- C13947-PER-ZZ-XX-DR-C-03003
- C13947-PER-ZZ-XX-DR-C-03004

Condition 5; Part 3

5.3 Final detailed calculations for all rainfall events up to and including the 1% AEP + 40% climate change, as well as the half-drain time for the attenuated storage has been created using InfoDrainage and have been provided in **Appendix C**:

Condition 5; Part 4

5.4 A detailed maintenance and management plan has been included in **Appendix D**:

6. Conclusion

6.1 It is our assertion that all components of planning condition 5 have been satisfactorily met, as all necessary requirements and obligations that have been fulfilled.

6.2 Consequently, we trust that there are currently no foreseeable issues in proceeding with the removal of the planning condition allowing the development to proceed.

Appendix A

Director of Environment & Infrastructure:
Mark Kemp

Michael Robinson
Welwyn Hatfield Borough Council
The Campus
Welwyn Garden City
Al8 6AE

Lead Local Flood Authority
Post Point CHN 215
Hertfordshire County Council
County Hall, Pegs Lane
HERTFORD SG13 8DN

Contact David Uncle
Email [redacted]

Date 06 July 2020

RE: 6/2019/3024/MAJ – 29 Broadwater Road, Welwyn Garden City, AL7 3BQ

Dear Michael,

Thank you for re-consulting us on the proposed demolition of office building and erection of 128 flats with associated car parking, landscaping, amenity space, bin and cycle storage, with alterations to existing and formation of new access on Broadwater Road and alterations to the existing access on Broad Court at 29 Broadwater Road, Welwyn Garden City, AL7 3BQ.

We have reviewed the following documents submitted in support of this application.

- Flood Risk Assessment prepared by Thomasons, reference C12885-RP-0 – Rev A, dated 07 August 2019.
- Drainage Strategy Statement prepared by Thomasons.
- Drainage Strategy drawing prepared by Thomasons, reference C12885-ZZ-XX-C-0001-P3, issued June 2020.
- Exceedance Flow Paths drawing prepared by Thomasons reference C12885-ZZ-XX-C-0002-P1, dated February 2020.
- Phase 1 (Desk Study) Investigation Report prepared by Listers Geo, report number 18.11.010, dated December 2018.
- C12885 Drainage Strategy prepared by Perega.
- C12885 Surface Water Drainage System Management Strategy prepared by Perega.
- C12885 greenfield runoff rate/volume, surface water network and attenuation tank calculations.
- Response letter prepared by Perega reference C12906-LT-001 dated 15 June 2020.

We understand it is proposed to use an attenuation tank comprising approximately 170m^3 of storage before discharge to Thames Water surface water sewer at a restricted rate of 2l/s. We are pleased the applicant has now provided evidence of Thames Water pre-planning enquiry confirming they have sufficient capacity in their network, and that a small area of tanked permeable paving with subbase is proposed for the undercroft parking.

As the proposed scheme has yet to provide final details and in order to secure the principles of the proposals, we recommend the following planning conditions to the LPA should planning permission be granted:

Condition 1

The development permitted by this planning permission shall be carried out in accordance with the approved Drainage Strategy prepared by Perega and the Drainage Strategy prepared by Thomasons, reference C12885-ZZ-XX-C-0001-P3, issued June 2020 submitted in support of this application, and the following mitigation measures:

1. Limiting the surface water run-off generated by critical storm events to 2 l/s during the 1 in 100 year + 40% climate change event.
2. Providing storage to ensure no increase in surface water run-off volumes for all rainfall events up to and including the 1 in 100 year + climate change event providing a minimum of 170 m^3 (or such storage volume agreed with the LLFA) of storage volume in attenuation tank and permeable paving.
3. Discharge of surface water from the private network into the Thames Water public surface water network.

The mitigation measures shall be fully implemented prior to occupation and subsequently in accordance with the timing/phasing arrangements embodied within the scheme, or within any other period as may subsequently be agreed, in writing, by the local planning authority.

Reason

1. To prevent flooding by ensuring the satisfactory disposal and storage of surface water from the site.
2. To reduce the risk of flooding to the proposed development and future occupants.

Condition 2

No development shall take place until a detailed surface water drainage scheme for the site based on the approved drainage strategy and sustainable drainage principles has been submitted to and approved in writing by the Local Planning Authority. The drainage strategy should demonstrate that the surface water run-off generated up to and including 1 in 100 year + climate change critical storm will not exceed the run-off from the undeveloped site following the corresponding rainfall event. The scheme shall subsequently be implemented in accordance with the approved details before the development is completed. The scheme shall include:

1. Detailed engineered drawings of all the proposed SuDS features including cross section drawings, their location, size, volume, depth and any inlet and outlet features including any connecting pipe runs.
2. Inclusion of silt traps for the protection of residual tanked elements.
3. Final detailed post-development calculations for all rainfall events up to and including the 1 in 100 year + 40% climate change storm, including half drain down times for attenuation features.

4. Final detailed management plan to include arrangements for adoption and any other arrangements to secure the operation of the scheme throughout its lifetime.

Reason

1. To prevent the increased risk of flooding, both on and off-site.

Informative to the LPA

Please note that if the LPA decides to grant planning permission we wish to be notified for our records.

Yours sincerely,

David Uncle
SuDS Officer
Environmental Resource Planning

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

Half Drain Time : 753 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	82.003	0.403	0.0	1.6	1.6	65.1	O K
30 min Summer	82.123	0.523	0.0	1.7	1.7	84.5	O K
60 min Summer	82.240	0.640	0.0	1.7	1.7	103.3	O K
120 min Summer	82.343	0.743	0.0	1.7	1.7	120.0	O K
180 min Summer	82.389	0.789	0.0	1.7	1.7	127.4	O K
240 min Summer	82.411	0.811	0.0	1.8	1.8	130.9	O K
360 min Summer	82.423	0.823	0.0	1.8	1.8	132.9	O K
480 min Summer	82.416	0.816	0.0	1.8	1.8	131.8	O K
600 min Summer	82.398	0.798	0.0	1.8	1.8	128.8	O K
720 min Summer	82.376	0.776	0.0	1.7	1.7	125.4	O K
960 min Summer	82.339	0.739	0.0	1.7	1.7	119.3	O K
1440 min Summer	82.281	0.681	0.0	1.7	1.7	110.0	O K
2160 min Summer	82.208	0.608	0.0	1.7	1.7	98.3	O K
2880 min Summer	82.141	0.541	0.0	1.7	1.7	87.4	O K
4320 min Summer	82.020	0.420	0.0	1.6	1.6	67.8	O K
5760 min Summer	81.916	0.316	0.0	1.6	1.6	51.1	O K
7200 min Summer	81.829	0.229	0.0	1.5	1.5	37.0	O K
8640 min Summer	81.759	0.159	0.0	1.5	1.5	25.6	O K
10080 min Summer	81.702	0.102	0.0	1.5	1.5	16.6	O K
15 min Winter	82.053	0.453	0.0	1.6	1.6	73.2	O K
30 min Winter	82.189	0.589	0.0	1.7	1.7	95.1	O K
60 min Winter	82.322	0.722	0.0	1.7	1.7	116.6	O K
120 min Winter	82.442	0.842	0.0	1.8	1.8	136.0	O K
180 min Winter	82.499	0.899	0.0	1.8	1.8	145.1	O K
240 min Winter	82.527	0.927	0.0	1.8	1.8	149.8	O K
360 min Winter	82.551	0.951	0.0	1.8	1.8	153.6	O K
480 min Winter	82.553	0.953	0.0	1.8	1.8	153.9	O K
600 min Winter	82.542	0.942	0.0	1.8	1.8	152.2	O K
720 min Winter	82.524	0.924	0.0	1.8	1.8	149.3	O K
960 min Winter	82.476	0.876	0.0	1.8	1.8	141.5	O K
1440 min Winter	82.397	0.797	0.0	1.8	1.8	128.7	O K
2160 min Winter	82.293	0.693	0.0	1.7	1.7	111.9	O K
2880 min Winter	82.193	0.593	0.0	1.7	1.7	95.7	O K
4320 min Winter	82.013	0.413	0.0	1.6	1.6	66.7	O K
5760 min Winter	81.864	0.264	0.0	1.5	1.5	42.6	O K
7200 min Winter	81.746	0.146	0.0	1.5	1.5	23.5	O K
8640 min Winter	81.658	0.058	0.0	1.5	1.5	9.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	139.231	0.0	67.2	23
30 min Summer	91.066	0.0	88.0	38
60 min Summer	56.713	0.0	109.7	68
120 min Summer	34.120	0.0	131.9	126
180 min Summer	25.012	0.0	145.0	186
240 min Summer	19.949	0.0	154.4	244
360 min Summer	14.458	0.0	167.8	364
480 min Summer	11.506	0.0	178.0	482
600 min Summer	9.631	0.0	186.2	584
720 min Summer	8.325	0.0	193.3	628
960 min Summer	6.610	0.0	204.5	752
1440 min Summer	4.768	0.0	221.4	1012
2160 min Summer	3.433	0.0	239.0	1416
2880 min Summer	2.717	0.0	252.3	1820
4320 min Summer	1.952	0.0	271.9	2600
5760 min Summer	1.542	0.0	286.3	3352
7200 min Summer	1.284	0.0	298.0	4104
8640 min Summer	1.105	0.0	307.7	4760
10080 min Summer	0.973	0.0	316.0	5448
15 min Winter	139.231	0.0	75.4	24
30 min Winter	91.066	0.0	98.6	38
60 min Winter	56.713	0.0	122.9	66
120 min Winter	34.120	0.0	147.9	124
180 min Winter	25.012	0.0	162.6	182
240 min Winter	19.949	0.0	172.9	240
360 min Winter	14.458	0.0	188.0	356
480 min Winter	11.506	0.0	199.5	468
600 min Winter	9.631	0.0	208.7	578
720 min Winter	8.325	0.0	216.5	686
960 min Winter	6.610	0.0	229.1	806
1440 min Winter	4.768	0.0	247.9	1088
2160 min Winter	3.433	0.0	267.7	1540
2880 min Winter	2.717	0.0	282.7	1988
4320 min Winter	1.952	0.0	304.4	2808
5760 min Winter	1.542	0.0	320.8	3568
7200 min Winter	1.284	0.0	333.8	4248
8640 min Winter	1.105	0.0	344.6	4840

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

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
10080 min Winter	81.605	0.005	0.0	1.4	1.4	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
10080 min Winter	0.973	0.0	354.0	5248

Drainage Strategy

29 Broadwater Road, Welwyn

This document outlines the foul and surface water drainage strategy for the proposed development at 29 Broadwater Road, Welwyn Garden City.

Foul Drainage

Foul drainage is achieved by means of a private gravity network, discharging into a new demarcation chamber located (F15) on the drainage strategy. From there, a new 150mm diameter lateral connects to an existing manhole (ExF1) in Broadwater Road. This connection will be subject to a Section 106 agreement with Thames Water.

Foul water discharge = 5.93 l/s (Based on Sewers for Adoption domestic peak flow rate of 4000 l/d per dwelling)

Surface Water Drainage

The 'Draft National Standards & Specified Criteria for Sustainable Drainage' and 'The Building Regulations' require that surface water runoff not collected for re-use must be discharged to one or more of the following, listed in order of priority:

1) discharge into the ground (infiltration); or where not reasonably practicable,

2) discharge to a surface water body; or where not reasonably practicable,

3) discharge to a surface water sewer, highway drain or other drainage system; or where not reasonably practicable,

4) discharge to a combined sewer.

Argyll Environmental desktop study has identified 'Natural and Man-Made Mining Cavities' in the immediate vicinity of the site. A subsequent Peter Brett Associates (PBA) cavities databases search dated 11th December 2018 concluded that 'the hazard ratings for both natural cavities and mining cavities are HIGH and sinkholes have been recorded on site and in close proximity' Considering this, (Option 1) infiltration via soakaways will not be feasible.

There is no watercourse accessible by the site. It is therefore not possible to discharge to a surface water body (Option 2) hence this option is not feasible.

There is a surface water sewer in Broadwater Road which presumably serves the existing development but will need to be identified at detailed design stage.

Surface water drainage is hence achieved by means of a private gravity network, discharging into a new demarcation chamber (S9) located on the site boundary. From there, a new 150mm diameter lateral connects to an existing manhole (ExS1) in Broadwater Road.

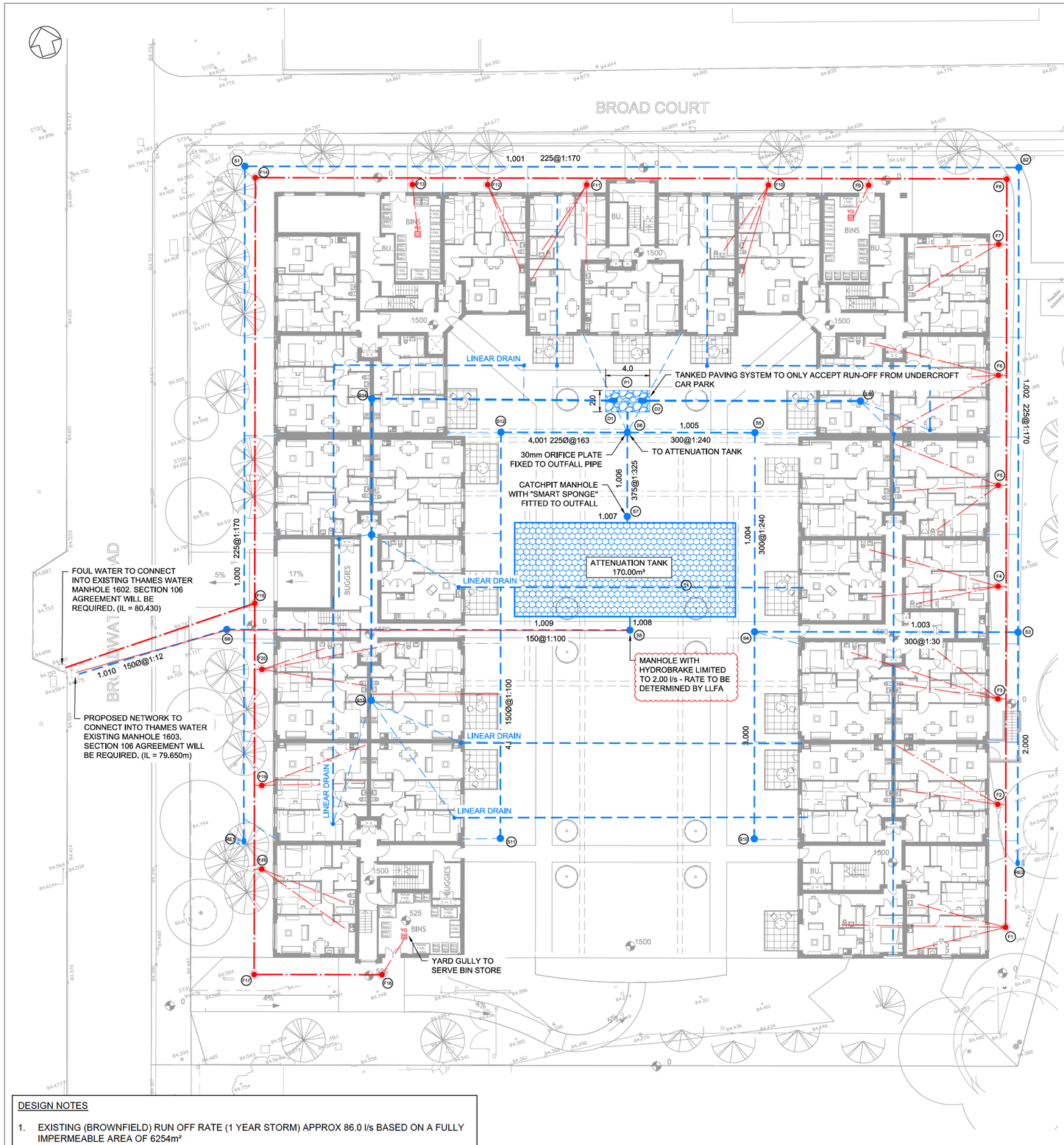
A greenfield run off rate of 0.25 l/s will prove impractical in terms of the flow control device diameter. A 50% "betterment" rate can be applied to the existing brownfield run-off rate of 95.0 l/s, reducing run-off to 47.5 l/s. This can be further reduced to 2.0l/s, which in practical terms is the lower limit for a flow control device of approx. 52mm diameter.

The main discharge flow is controlled by means of a 52mm diameter hydrobrake limited to 2.0 l/s in combination with a 170m^3 attenuation tank. These have been sized to accommodate the 1 in 100 year + 40% climate change critical storm without any flooding occurring on the site. A S106 connection consent will be required from Thames Water.

In addition to the above flow control device, an orifice plate sized at 30mm has been introduced to the manhole immediately upstream of the attenuation tank. This allows the network to achieve the acceptable discharge rate of 2.0l/s (previously 5.0 l/s).

Water quality is achieved by way of hydrocarbon sponges attached to the outfall of each downpipe from the roof and podium deck. The podium deck is also a green roof which will further enhance water quality before discharge into the wider storm water network. The car park, by its nature, is of a slightly greater risk of allowing hazardous pollutants into the surface water network and is treated before joining he main network. The flow, although close to zero as it is underground, first percolates though a tanked sub-base before entering the main system and discharging into the main attenuation tank.

For layout details, refer to Thomason Drg No C12885-ZZ-XX-C-0001_P2.



MANHOLE NOTES

1. BD = BACKDROP MANHOLE
   HB = HYDROBRAKE MANHOLE (SEE HYDROBRAKE SCHEDULE)
   CP = CATCHPIT MANHOLE (SEE NOTE 2 BELOW)
   RE = RODDING EYE
   RC = INSITU RC MANHOLE (CAST INTEGRAL WITH GF SLAB)
   SFA = SEWERS FOR ADOPTION MANHOLE TYPE
2. CATCHPIT INVERT LEVELS REFER TO OUTGOING PIPE - FOR SUMP LEVEL DEDUCT 300mm (TYPE 3 or 4 MH) OR 600mm (TYPE 5 MH)
3. COVER LEVELS ARE INDICATIVE ONLY - ACTUAL COVER LEVELS & INCLINATION SHALL MATCH THE FINISHED GROUND LEVEL
4. EXISTING MANHOLE COVERS SHALL BE RAISED / LOWERED & INCLINATION ADJUSTED TO SUIT THE FINISHED GROUND LEVEL
5. LEVELS SHOWN IN BOLD ITALICS ARE TAKEN FROM RECORD DRAWINGS OR INTERPOLATED FROM EXISTING LEVELS - TO BE CONFIRMED BY SITE SURVEY
6. WHERE REQUIRED EXISTING MANHOLE BENCHING SHALL BE BROKEN OUT & REFORMED TO SUIT NEW CONNECTIONS
7. ALL CIRCULAR GRADE B125 MANHOLE COVERS/FRAMES TO BE CAST IRON
8. 'R' SUFFIX TO COVER DETAILS DENOTES RECESSED COVER/FRAME SUITABLE TO ACCEPT SURFACE FINISHES (MANHOLE COVERS LTD B100 SERIES BLOCK PAVIOUR INFILL COVER FACTA AA LOAD RATING (5 tonne) OR SIMILAR APPROVED
9. 'DS' SUFFIX TO COVER DETAILS INDICATES BOLT-DOWN DOUBLE-SEAL RECESSED COVER SUITABLE TO ACCEPT FLOOR FINISHES (HOWE GREEN VISEDGE OR SIMILAR APPROVED)

MANHOLE SCHEDULE

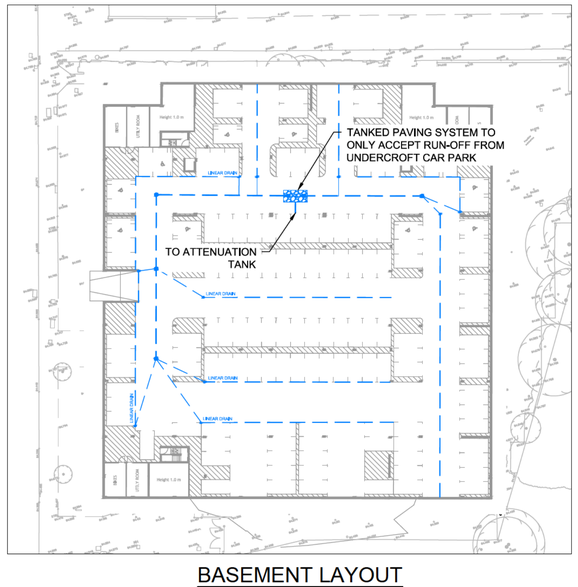
MH REF	COVER	INVERT	DEPTH	MH DIA	MH TYPE	COVER DETAILS
FOUL WATER DRAINAGE						
F1	84.409	82.830	1.579	450		
F2	84.501	83.751	0.750	450		
F3	84.606	83.856	0.750	450		
F4	84.533	83.783	0.750	450		
F5	84.339	83.589	0.750	450		
F6	84.610	83.860	0.750	450		
F7	84.520	83.770	0.750	450		
F8	84.646	83.896	0.750	450		
F9	84.642	83.892	0.750	450		
F10	84.743	83.993	0.750	450		
F11	84.674	83.924	0.750	450		
F12	84.684	83.934	0.750	450		
F13	84.780	84.030	0.750	450		
F14	84.887	84.137	0.750	450		
F15	84.778	80.631	4.147	450		
F16	84.351	83.601	0.750	450		
F17	84.562	83.044	1.518	450		
F18	84.608	83.858	0.750	450		
F19	84.708	83.958	0.750	450		
F20	84.694	83.944	0.750	450		

MANHOLE SCHEDULE

MH REF	COVER	INVERT	DEPTH	COVER DETAILS
EXISTING DRAINAGE				
ExF1	84.660	80.430	4.230	EXISTING MANHOLE
ExS1	84.575	79.650	4.925	EXISTING MANHOLE

MANHOLE SCHEDULE

MH REF	COVER	INVERT	DEPTH	MH DIA	MH TYPE	COVER DETAILS
STORM WATER DRAINAGE						
RE1	84.632	83.632	1.000			
RE2	84.520	83.170	1.350			
S1	84.897	83.267	1.630			
S2	84.644	82.788	1.856			
S3	84.580	82.616	1.964			
S4	83.600	81.781	1.819			
S5	83.600	81.706	1.894			
S6	83.600	81.583	2.017			30mm ORIFICE
S7	83.600	81.559	2.041			
S8	83.600	81.085	2.515			
S9	84.740	80.706	4.034			
S10	83.600	82.300	1.300			
S11	83.600	82.250	1.350			
S12	83.600	81.803	1.797			
S13	-	-	#####			
S14	-	-	#####			
S15	-	-	#####			
S16	-	-	#####			
D1	-	-	#####			DIFFUSER
D2	-	-	#####			DIFFUSER
P1	-	-	#####			PERMEABLE PAVING



BASEMENT LAYOUT
SCALE 1:500

DESIGN NOTES

1. EXISTING (BROWNFIELD) RUN OFF RATE (1 YEAR STORM) APPROX 86.0 l/s BASED ON A FULLY IMPERMEABLE AREA OF 6254m²
2. GREEN FIELD RUN OFF RATE (1 YEAR STORM) IS 0.10 l/s
3. ATTENUATION TANK HAS BEEN SIZED TO ACCOMMODATE A 1:100 YEAR STORM EVENT + 40% CLIMATE CHANGE
4. 1No. OUTFALL DISCHARGE CONTROLLED BY HYDROBRAKE LIMITED TO A RATE OF 2.0 l/s (RATE AGREED WITH LLFA)
5. ALL DOWN POINTS CONNECTING INTO THE BELOW GROUND NETWORK TO FILTER THROUGH NAYLOR "SMART SPONGES".
6. SuDS TREATMENT FOR UNDERCROFT CAR PARK HAS BEEN INCLUDED TO SATISFY LOCAL COUNCIL REQUIREMENTS.

T1 Revised 23/06/2016

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE BELOW GROUND DRAINAGE SPECIFICATION AND ALL RELEVANT ARCHITECTS, M&E CONSULTANTS, SERVICES & SPECIALIST CONTRACTOR'S DRAWINGS.
2. WHERE NOTES ON THIS DRAWING DIFFER FROM THE SPECIFICATION, CLARIFICATION SHALL BE SOUGHT FROM THE ENGINEER.
3. THE WORKS DESCRIBED AND SPECIFIED ON THIS & ASSOCIATED DRAWINGS SHALL BE UNDERTAKEN IN ACCORDANCE WITH CURRENT HEALTH & SAFETY LEGISLATION. REFERENCE SHALL ALSO BE MADE TO THE PRE-CONSTRUCTION INFORMATION PACK PREPARED BY THE CDM CO-ORDINATOR FOR THE PROJECT.
4. ALL PRIVATE DRAINAGE SHALL COMPLY WITH THE BUILDING REGULATIONS. WHERE DRAINAGE IS TO BE ADOPTED IT SHALL COMPLY WITH SEWERS FOR ADOPTION 6th EDITION.
5. PIPE BEDDINGS SHALL BE IN ACCORDANCE WITH THE PIPE MANUFACTURER'S RECOMMENDATIONS, TAKING ACCOUNT OF THE DEPTH & LOADING IN RELATION TO THE PIPE STRENGTH. THE CONTRACTOR SHALL ISSUE BEDDING PROPOSALS TO THOMASONS FOR APPROVAL.
6. ALL LEVELS RELATE TO ORDNANCE DATUM (NEWLYN) UNO.
7. PIPES ENTERING/EXITING MANHOLES SHALL HAVE LEVEL SOFFITS UNO.
8. DETAILS OF EXISTING SEWERS (LINE/LEVEL/PIPE SIZES ETC) SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE CONSTRUCTION OF ANY DRAINAGE WORKS. THE CONTRACTOR SHALL ESPECIALLY CHECK THE INVERT LEVELS OF ALL OUTFALLS IN RELATION TO EXISTING SEWERS TO ENSURE THE PROPOSED DESIGN CAN BE ACHIEVED. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER.
9. BEFORE DRAINAGE WORKS COMMENCE THE CONTRACTOR SHALL CONFIRM THE DEPTH, SIZE & LOCATION OF ALL EXISTING DRAINAGE/SERVICES TO BE CROSSED. ANY CONFLICT IN LEVELS BETWEEN EXISTING DRAINAGE/SERVICES & NEW DRAINAGE SHALL BE REPORTED TO THE ENGINEER.
10. FOR SETTING-OUT OF SOIL & VENT PIPES, STUB STACKS AND RAINWATER PIPES REFER TO ARCHITECT'S DRAWINGS.
11. ALL SVP/SS CONNECTIONS SHALL BE 100mm Ø LAID AT 1:40 MIN UNO.
12. ALL RWP CONNECTIONS SHALL BE 100mm Ø LAID AT 1:59 MIN UNO. ALL ROAD GULLY CONNECTIONS SHALL BE 150mm Ø.
13. RAINWATER PIPES NOT CONNECTED TO AN INSPECTION CHAMBER SHALL BE CONNECTED DIRECTLY TO DRAIN (NO ACCESS GULLY).
14. ADOPTED DRAINAGE PIPEWORK TO BE HEPWORTH SUPERSLEEVE VITRIFIED CLAY DRAINAGE SYSTEM TO BS EN 295 OR SIMILAR APPROVED. ALL JOINTS TO BE FLEXIBLE. PIPES TO BE LAID IN ACCORDANCE WITH MANUFACTURES RECOMMENDATIONS.
15. PRIVATE DRAINAGE PIPEWORK TO BE EITHER HEPWORTH SUPERSLEEVE VITRIFIED CLAY DRAINAGE SYSTEM TO BS EN 295 (OR SIMILAR APPROVED) OR HEPWORTH UPVC DRAINAGE SYSTEM TO BE EN 1401 (OR SIMILAR APPROVED). ALL JOINTS TO BE FLEXIBLE, PIPES TO BE LAID IN ACCORDANCE WITH MANUFACTURES'S RECOMMENDATIONS.
16. WHERE CROWN OF VC PIPE IS LESS THAN 1200mm BELOW FINISHED ROAD LEVEL OR CROWN OF UPVC PIPE IS LESS THAN 900 BELOW FINISHED ROAD LEVEL, PIPE SHALL BE PROTECTED WITH A CONCRETE BRIDGING SLAB.
17. WHERE CROWN OF UPVC OR VC PIPE IS LESS THAN 600mm BELOW FINISHED LANDSCAPE LEVEL, PIPE SHALL BE PROTECTED WITH A CONCRETE BRIDGING SLAB.
18. PCC MANHOLE COMPONENTS (INCLUDING BASE, MANHOLE RINGS, COVER SLABS & CONCRETE SURROUND) SHALL PROVIDE CLASS 3 SULPHATE RESISTANCE TO BRE SPECIAL DIGEST 1
19. ALL 90° CONNECTIONS SHALL BE MADE WITH A 45° BEND & 45° JUNCTION.
20. PIPES PASSING OVER FOUNDATIONS SHALL HAVE PCC LINTELS OVER. PIPES PASSING THROUGH FOUNDATIONS SHALL BE APPROPRIATELY SLEEVED.
21. ALL FLOWS FROM EXISTING BUILDINGS SHALL BE MAINTAINED DURING CONSTRUCTION.
22. ALL INTERNAL SVP/SS/RWP STACKS SHALL HAVE ACCESS FITTINGS AT 1.5M ABOVE GROUND FLOOR LEVEL
23. EXISTING PIPE RUNS FOR RE-USE SHALL BE CLEANED BY MEANS OF HIGH PRESSURE WATER JETTING & DEBRIS REMOVED
24. ADOPTED SEWERS / MANHOLES TO BE ABANDONED SHALL BE GROUTED TO WATER AUTHORITY REQUIREMENTS
25. PRIVATE SEWERS / MANHOLES TO BE ABANDONED SHALL BE GRUBBED OUT
26. THRESHOLD DRAINS SHALL BE PROVIDED AT EXTERNAL DOORS
27. ALL EXCAVATIONS WITHIN TREE ROOT ZONES TO BE CARRIED OUT BY HAND (NO MACHINERY TO BE USED)
28. REFER TO DRG No's C12885-xxx FOR DRAINAGE DETAILS.

Rev	Description	By	Date	Chkd
P3	ISSUE FOR PLANNING	CJC	03.06.20	DPA
P2	ISSUE FOR PLANNING	CJC	03.02.20	DPA
P1	ISSUE FOR PLANNING	CJC	19.08.19	DPA

THOMASONS
528 High Road, Leytonstone, London E11 3EE | Tel : 020 8988 5820

BROADWATER ROAD
WELWYN GARDEN CITY

DRAINAGE STRATEGY

Status
PLANNING

Project No.	Zone	Level	Role	Drawing No.	Revision
C12885	ZZ	XX	C	0001	P3

Scale	Drawn	Chkd	Passed	Date	Size
1:200	CC	-	-	19.08.19	A1

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David Uncle
Lead Local Flood Authority
Post Point CHN 215
Hertfordshire County Council
County Hall, Pegs Lane
HERTFORD SG13 8DN

Reference: C12906-LT-001
Date: 15.06.2020

perega.co.uk

Dear Mr Uncle

Re: 6/2019/3024MAJ – 29 Broadwater Road, Welwyn Garden City, AL7 3BQ

Further to our telephone conversation please consider this letter an update to accompany our drainage design drawing, C12885-ZZ-XX-X-0001 and Drainage Strategy Statement. Furthermore, I have addressed your concerns from the letter dated 20.01.20 that you sent to Mr Robinson. Please find attached the following documents.

- Greenfield runoff calculation for 1:100 year storm
- Greenfield volume calculation for 1:100 year, 6 hour storm
- Thames Water Pre-Development Enquiry – Confirmation of capacity
- Detailed attenuation calculation showing half drain time
- Surface water network calculation (2.0 l/s discharge)
- Revised drainage strategy document
- Revised drainage layout C12885-ZZ-XX-C-0001
- A rainwater harvesting tank, which has been designed by another consultancy, is included.

In response to your suggestion of utilising a permeable pavement system, we have included a relatively small area of permeable sub-base, localised only to accept discharge from the car park surface. The car park will remain dry as it is underground, thus a nominal rate of 0.2l/s has been used to size the sub-base.

We have not included a tanked sub-base system for the roof run-off as the volume required and depth of adjacent foundations were too great. Furthermore, the CIRIA SuDS manual advises that roof run-off is relatively low risk in terms of pollution hazard and therefore does not need to be part of the pollution management train, however, we propose to mitigate this risk further as the process's below outline.

- Hydrocarbon Sponges (upstream of the proposed catch-pit to reduce any pollution hazard from roof run-off)
- Intensive Green Roof

The inclusion of an intensive green roof, as specified by the landscape architect on drawing 19515.200, which I have included, further enhances the SUDS treatment process. Through a variety of physical, biological and chemical treatment processes, within the soil and root uptake zone, green roofs can reduce pollutants entrained within groundwater. This system provides the second process of treatment.

Further to this, the green roof also encourages biodiversity ensuring that it complies with BREEAM ecological requirements.

Birmingham
Guildford
Leeds
London
Southend-on-Sea

Registered office:
86 Epsom Road,
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Registered in England and Wales
No. 06376815

VAT Registration No. 211 8019 07

In the event of a greater than 1:100 year storm event all runoff directed as shown on drawing C12885-ZZ-XX-C-0002, which is included.

Please contact me directly if you require any further information.

Yours sincerely,

Christopher Collins
Civil Engineer
[redacted]

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 675 Urban 0.000
Area (ha) 0.258 Soil 0.150 Region Number Region 6

Results l/s

QBAR Rural 0.1
QBAR Urban 0.1

Q100 years 0.3

Q1 year 0.1
Q30 years 0.2
Q100 years 0.3

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	20.000
Ratio R	0.411
Areal Reduction Factor	1.00
Area (ha)	0.258
SAAR (mm)	683
CWI	101.940
Urban	0.000
SPR	10.000

Results

Percentage Runoff (%)	8.13
Greenfield Runoff Volume (m^3)	12.976

Mrs Christopher Collins

PEREGA
528 Leytonstowe High Road,
London,
Greater London,
E11 3EE

Wastewater pre-planning
Our ref **DS6073145**

07 May 2020

Pre-planning enquiry: Capacity Confirmation

Dear Mr Collins,

Thank you for providing information on your development.

Site: Land At 29 Broadwater Road, 29 Broadwater Road, Welwyn Garden City, Hertfordshire – AL7 3BQ

Existing site: Commercial unit (6,254m2).
Proposed site: Flats (125 units).
Proposed foul water discharge by gravity into manhole TL24121601.
Proposed surface water discharge at 2.0 l/s for all storm events up to and including 1:100yr+40%CC into manhole TL24121603.

We're pleased to confirm that there will be sufficient foul water and surface water capacity in our sewerage network to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient capacity.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

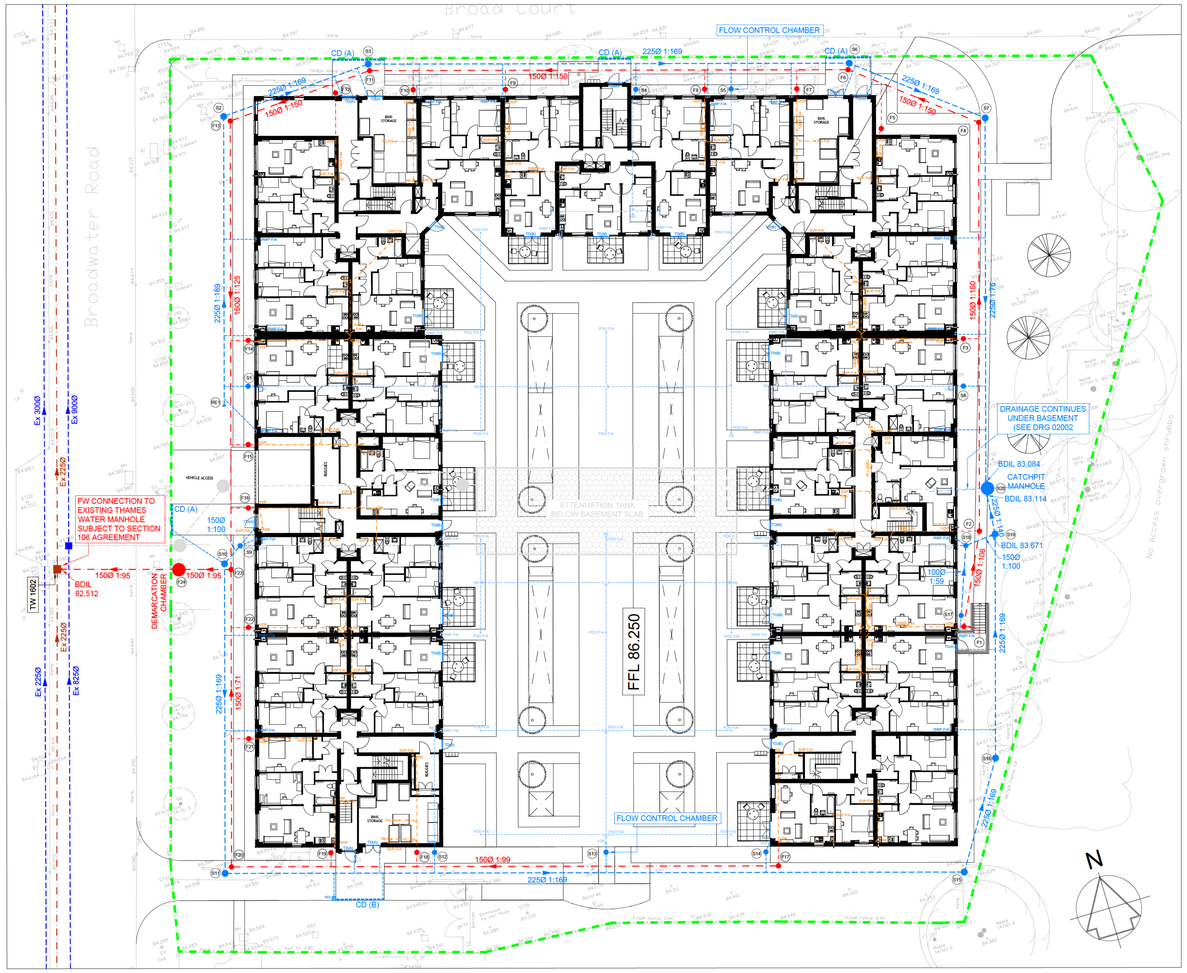
If you've any further questions, please contact me on 0800 009 3921.

Yours sincerely

Zaid Kazi

Development Engineer
Developer Services – Sewer Adoptions Team
Tel No: [redacted]

Appendix B



Scale Bar

0m 10m 20m

MANHOLE SCHEDULE

MH REF	COVER	INVERT	DEPTH	MH DIA	MH TYPE	COVER DETA LS
FOUL WATER DRAINAGE						
F1	84 570	83 820	0.750	450	2 V	450Ø A15
F2	84 600	83 736	0.864	450	2	450 X 450 R
F3	84 540	83 840	0.700	450	2	450Ø A15
F4	84 640	83 484	1.156	450	2	450 X 450 R
F5	84 540	83 840	0.700	450	2	450 X 450 R
F6	84 690	83 397	1.293	450**	2	450 X 450 R
F7	84 700	84 000	0.700	450	2	450Ø A15
F8	84 710	84 010	0.700	450	2	450Ø A15
F9	84 690	83 990	0.700	450	2	450Ø A15
F10	84 710	84 010	0.700	450	2	450 X 450 R
F11	84 830	83 103	1.727	450**	2	450 X 450 R
F12	84 830	84 130	0.700	450	2	450 X 450 R
F13	84 890	83 012	1.878	450**	2	450Ø A15
F14	84 880	84 180	0.700	450	2	450Ø A15
F15	84 860	84 160	0.700	450	2	450Ø A15
F16	84 710	84 010	0.700	450	2	450 X 450 R
F17	84 330	83 580	0.750	450	2V	450Ø A15
F18	84 430	83 730	0.700	450	2	450Ø A15
F19	84 370	83 670	0.700	450	2	450Ø A15
F20	84 570	83 070	1.500	450**	2	450 X 450 D400
F21	84 680	83 980	0.700	450	2	450Ø A15
F22	84 690	83 990	0.700	450	2	450Ø A15
F23	84 840	82.681	2.159	450**	2	450Ø A15
F24	84 720	82 627	2 093	1200	TYPE B [B10]	600 x 600 B125
TW1602	84 580	***80.440***	4.140	EXIST NG MANHOLE		

MANHOLE SCHEDULE

MH REF	COVER	NVERT	DEPTH	MH DIA	MH TYPE	COVER DETA LS
SURFACE WATER DRAINAGE						
RE1	84 910	84 085	0.825	225	R/EYE	450Ø A15
S1	84 830	84 130	0.700	450	2	450Ø A15
S2	84 960	83 931	1.029	600	2	600Ø A15
S3	84 890	83 847	1.043	600	2	600 x 600 R
S4	84 660	83 980	0.700	450	2	450Ø A15
S5	REFER TO FLOW CONTROL CHAMBER SCHEDULE					
S6	84 690	83.584	1.106	600	2	600 x 600 R
S7	84 550	83.534	1.016	600	2	600 x 600 R
S8	84 360	83 660	0.700	450	2	450Ø A15
S9	84 660	83 910	0.750	450	2	450 x 450 R
S10	84 680	83 813	0.867	600	2	600Ø A15
S11	84 540	83 644	0.896	600	2	600 x 600 D400
S12	84 430	83 730	0.700	450	2	450Ø A15
S13	REFER TO FLOW CONTROL CHAMBER SCHEDULE					
S14	84 320	83 620	0.700	450	2	450 x 450 R
S15	84 380	83 240	1.140	600	2	600Ø A15
S16	84 510	83.236	1.274	600**	2	600Ø A15
S17	84 560	83 860	0.700	450	2	450Ø A15
S18	84 590	83.700	0.890	450	2	450Ø A15
S19	84 510	83.114	1.396	600**	2 BD	600Ø A15
S20	84 490	80.653	3.837	1200	7 BD CP	600 x 600 R
S21	82.970	80.508	2.462	600**	2A	600 x 600 D400
S22	82.970	82.160	0.810	450	2A	450 x 450 D400
S23	82.970	81.993	0.977	450	2A	450 x 450 D400
S24	82.970	81.932	1.038	450	2A/B CP	450 x 450 D400
S25	82.970	***82.160***	0.810	450	2A	450 x 450 D400
S26	82.970	82.001	0.969	450	2A/B CP	450 x 450 D400
S27	82.970	81.414	1.556	450**	2A/B CP	450 x 450 D400
S28	82.970	80.490	2.480	1200	6 HB	600 x 600 D400
S29	84.790	80.269	4.521	1200	7	600 x 600 D400
S30	84.720	80.199	4.521	1200	TYPE A1 [B5] BD	600 x 600 B125
TW1603	84.500	***79.650****	4.850	EXISTING MANHOLE		

* SEE MANHOLE NOTE 05
** RESTRICTION CAP REQUIRED TO LIMIT ACCESS TO 350Ø (DEPTH > 1.2m)
B10 SEWERAGE SECTOR GUIDANCE APPENDIX C TYPE B (FIG B10)
B5 SEWERAGE SECTOR GUIDANCE APPENDIX C TYPE A1 (FIG B5

LEGEND

- NEW FW SEWER
- NEW FW SEWER UNDERSLUNG FROM SOFFIT OF PODIUM SLAB
- NEW SW SEWER
- NEW SW SEWER UNDERSLUNG FROM SOFFIT OF PODIUM SLAB
- NEW SW SEWER BELOW BASEMENT SLAB
- F1 NEW F/W MANHOLE OR INSPECTION CHAMBER
- S1 D1 NEW SW MANHOLE, INSPECTION CHAMBER OR FLOW CONTROL CHAMBER
- EXIST NG FOUL SEWER
- EXIST NG SURFACE WATER SEWER
- TW1602 EXIST NG F/W MANHOLE
- TW1603 EXIST NG SW MANHOLE
- RG PCC ROAD GULLY
- YG PAG YARD GULLY/PAVED AREA GULLY
- SVP: SS FG SG SOIL & VENT, STUB STACK, SHOWER GULLY OR FLOOR GULLY CONNECTION (SG & FG TO ARCHITECT SPECIFICATION)
- RWP: PDO RAIN WATER PIPE/ PODIUM DRAINAGE OUTLET CONNECTION
- TD (A) TD (B) THRESHOLD DRAIN - TYPE A or B (REFER TO DETA L DRAW NG FOR TYPES)
- CD (A) CD (B) LINEAR CHANNEL DRAIN - TYPE A or B (REFER TO DETA L DRAW NG FOR TYPES)
- ATTENUATION TANK

ALL EXISTING MANHOLE INVERT LEVELS TO BE CONFIRMED TO ENGINEER BEFORE START OF DRAINAGE WORKS

SVP CONNECTIONS (INCLUDING UNDERSLUNG DRAINAGE) TO BE 100Ø @ 1:40 MIN UNO

RWP CONNECTIONS (INCLUDING UNDERSLUNG DRAINAGE) TO BE 100Ø @ 1:100 MIN UNO

ROAD GULLY CONNECTIONS 150Ø @ 1:100 MIN UNO

SVP REST BEND INVERT LEVELS SET AS FOLLOWS UNLESS NOTED OTHERWISE:

UNDER PODIUM SLAB (BUILDING) 85.540
UNDER PODIUM SLAB (COURTYARD) 85.490

RWP/PDO REST BEND INVERT LEVELS SET AS FOLLOWS UNLESS NOTED OTHERWISE:

UNDER PODIUM SLAB (BUILDING) 85.540
UNDER PODIUM SLAB (COURTYARD) 85.490
TO EXTERNAL WALL 600mm BELOW FGL

NEW FW & SW CONNECTIONS SUBJECT TO S106 CONSENT FROM THAMES WATER

NO CONSTRUCTION PLANT TO BE TRAFFICKED OR MATERIALS PLACED OVER ATTENUATION TANK WITHOUT PRIOR APPROVAL OF THE ENGINEER

WHERE NEW DRAINAGE CONNECTIONS ARE WITHIN 300mm OF BASEMENT SLAB SOFFIT, PIPE TO BE ENCASED IN CONCRETE (REFER TO DRAINAGE DETAILS)

UNDERSLUNG PIPES IN BASEMENT TO BE CAST IRON (ST GOBAIN ENSIGN OSA). PIPES TO BE SLEEVED WHERE THEY PASS THROUGH WALLS AND/OR DOWNSTAND BEAMS.

VERTICAL CAST IRON DROP PIPES IN BASEMENT TO BE RESTRAINED AGAINST LATERAL MOVEMENT WITH BRACKETS BOLTED TO BASEMENT PERIMETER WALL AND/OR COLUMNS

PIPES PASSING THROUGH BASEMENT WALLS SHALL BE CAST IN USING PUDDLE FLANGES, WITH ROCKER PIPES EITHER SIDE

FINAL PROPOSED EXTERNAL LEVELS ASSUMED TO BE THE SAME AS EXISTING LEVELS FOR TENDER DRAINAGE STRATEGY - TBC DURING DETAILED DESIGN

THRESHOLD DRAINS TO BE PROVIDED TO ALL EXTERNAL DOORS WITH FLUSH THRESHOLDS (EXCEPT UNDER BUILDING CANOPIES)

ALL SURFACE WATER FROM PATHS, PATIOS, TERRACES ETC ASSUMED TO DRAIN TO SOFT LANDSCAPED AREAS, EXCEPT WHERE PAVED AREA GULLIES OR CHANNEL DRAINS ARE PROVIDED

A VENTILATION PIPE SHALL BE PROVIDED AT (OR NEAR) THE HEAD OF EACH MAIN FOUL DRAIN AS REQUIRED BY THE BUILDING REGULATIONS - MANHOLES REQUIRING A VENT PIPE ARE INDICATED IN THE MANHOLE SCHEDULE.

VENTILATION IS USUALLY ACHIEVED BY THE USE OF A VENTILATED DISCHARGE STACK - REFER TO M&E CONSULTANT'S DRAWINGS FOR FULL DETAILS

NOTES

1. THIS DRAW NG SHALL BE READ N CONJUNCTION WITH THE BELOW GROUND DRAINAGE SPECIFICATION AND ALL RELEVANT ARCHITECTS, M&E CONSULTANTS, SERVICES & SPECIALIST CONTRACTOR'S DRAWINGS.
2. WHERE NOTES ON THIS DRAWING D FFER FROM THE SPECIFICATION, CLAR FICATION SHALL BE SOUGHT FROM THE PROJECT MANAGER AND/OR SUPERVISOR.
3. THE WORKS DESCR BED AND SPECIFIED ON THIS & ASSOCIATED DRAWINGS SHALL BE UNDERTAKEN N ACCORDANCE WITH CURRENT HEALTH & SAFETY LEGISLATION. REFERENCE SHALL ALSO BE MADE TO THE PRE-CONSTRUCTION INFORMATION PACK PREPARED BY THE PRINCIPAL DESIGNER FOR THE PROJECT.
4. ALL PRIVATE DRAINAGE SHALL COMPLY WITH THE BU LD NG REGULATIONS. WHERE DRA NAGE IS TO BE ADOPTED IT SHALL COMPLY WITH THE CODE FOR ADOPTION - SEWERAGE SECTOR GUIDANCE (APPENDIX C).
5. PIPE BEDD NGS SHALL BE IN ACCORDANCE WITH THE P PE MANUFACTURER'S RECOMMENDATIONS, TAK NG ACCOUNT OF THE DEPTH & LOADING N RELATION TO THE P PE STRENGTH. THE CONTRACTOR SHALL ISSUE BEDD NG PROPOSALS TO THE PROJECT MANAGER AND/OR SUPERVISOR FOR APPROVAL.
6. ALL LEVELS RELATE TO ORDNANCE DATUM (NEWLYN) UNO.
7. PIPES ENTERING/EXITING MANHOLES SHALL HAVE LEVEL SOFFITS UNO.
8. DETAILS OF EXIST NG SEWERS (L NE,LEVEL/PIPE SIZES ETC) SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE CONSTRUCTION OF ANY DRAINAGE WORKS. THE CONTRACTOR SHALL ESPECIALLY CHECK THE INVERT LEVELS OF ALL OUTFALLS IN RELATION TO EXIST NG SEWERS TO ENSURE THE PROPOSED DESIGN CAN BE ACHIEVED. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE PROJECT MANAGER AND/OR SUPERVISOR.
9. BEFORE DRAINAGE WORKS COMMENCE THE CONTRACTOR SHALL CONF RM THE DEPTH, SIZE & LOCATION OF ALL EXISTING DRAINAGE/SERVICES TO BE CROSSED. ANY CONFLICT IN LEVELS BETWEEN EXISTING DRAINAGE/SERVICES & NEW DRA NAGE SHALL BE REPORTED TO THE PROJECT MANAGER AND/OR SUPERVISOR.
10. FOR SETTING OUT OF SOIL & VENT PIPES, STUB STACKS AND RA NWATER PIPES REFER TO ARCHITECTS' DRAW NGS.
11. ALL LATERAL FOUL CONNECTIONS SHALL BE 100mm Ø LA D AT 1:40 MIN UNO.
12. ALL SURFACE WATER DRA NS SHALL BE 100mm Ø LAID AT 1:59 MIN UNO. ALL ROAD GULLY CONNECTIONS SHALL BE 150mm Ø LAID AT 1:100 MIN UNO.
13. RAINWATER P PES NOT CONNECTED TO AN INSPECTION CHAMBER SHALL BE CONNECTED DIRECTLY TO DRA N (NO ACCESS GULLY).
14. ADOPTED DRA NAGE PIPEWORK TO BE HEPWORTH SUPERSLEEVE VITRIFIED CLAY DRA NAGE SYSTEM TO BS EN 295, ALL JO NTS TO BE FLEXIBLE. P PES TO BE LAID N ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
15. PRIVATE DRAINAGE PIPEWORK TO BE EITHER HEPWORTH SUPERSLEEVE VITRIFIED CLAY DRAINAGE SYSTEM TO BS EN 295 OR HEPWORTH UPVC DRAINAGE SYSTEM TO BE EN 1401. ALL JOINTS TO BE FLEXIBLE. PIPES TO BE LAID IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
16. WHERE CROWN OF VC PIPE IS LESS THAN 1200mm BELOW FINISHED ROAD LEVEL OR CROWN OF UPVC PIPE IS LESS THAN 900 BELOW F NISHED ROAD LEVEL, PIPE SHALL BE PROTECTED WITH A CONCRETE BED & SURROUND.
17. WHERE CROWN OF UPVC OR VC P PE IS LESS THAN 600mm BELOW FINISHED LANDSCAPE LEVEL, PIPE SHALL BE PROTECTED WITH A CONCRETE BED & SURROUND.
18. PCC MANHOLE COMPONENTS (NCLUD NG BASE, MANHOLE R NGS, COVER SLABS & CONCRETE SURROUND) SHALL PROVIDE CLASS 3 SULPHATE RESISTANCE TO BRE SPECIAL DIGEST 1.
19. ALL 90° CONNECTIONS SHALL BE MADE USING A 45° EQUAL JUNCTION + 45° BEND AS APPROPRIATE.
20. PIPES PASS NG OVER FOUNDATIONS SHALL HAVE PCC LINTELS OVER. PIPES PASSING THROUGH FOUNDATIONS SHALL BE APPROPRIATELY SLEEVED.
21. ALL FLOWS FROM EXISTING BUILD NGS SHALL BE MAINTAINED DUR NG CONSTRUCTION.
22. ALL INTERNAL SVP/SS/RWP STACKS SHALL HAVE ACCESS FITTINGS PROV DED ABOVE GROUND FLOOR LEVEL - REFER TO M&E CONSULTANT'S DRAWINGS FOR DETAILS.
23. ALL EXCAVATIONS WITHIN TREE ROOT ZONES TO BE CARR ED OUT BY HAND (NO MACHINERY TO BE USED).
24. FOR DRA NAGE DETA LS REFER TO DRG No's C13568-PER-ZZ-XX-DR-C-03001 to 03005.

FOR PODIUM DRAINAGE & RAINWATER HARVESTING DETAILS REFER TO MARKS HEALY DRAWING NUMBERS H13789-001-002-003

FOR LANDSCAPING DETAILS REFER TO ALBAN LANDSCAPE DRAWING NUMBER 19512.200

SAFETY NOTES

1. EXCAVATIONS TO BE INSPECTED BEFORE CONSTRUCTION OPERATIONS TAKE PLACE (e.g. PIPE LAY NG) BY A COMPETENT PERSON & A REGISTER TO BE MAINTAINED AS REQUIRED BY HEALTH AND SAFETY LEGISLATION.
2. ALL EXCAVATIONS TO BE ADEQUATELY SUPPORTED, CLOSE SHEETING REQU RED ON ALL EXCAVATIONS AS MIXED MAN MADE SOILS ARE PRESENT. GROUND WATER EXPECTED AT SHALLOW AND VARYING DEPTHS. - REFER TO SITE INVESTIGATION REPORT. MIXED SOILS AND GROUND CONDITIONS PRESENT.
3. INTERLOCK NG SHEETS OR TRENCH BOXES REQU RED N SAND/GRAVELS AND N HIGH WATER TABLE AREAS. PROTECTION REQUIRED FOR T MBER MAN AT ENDS OF TRENCH BY USE OF TRENCH BOX OR SIM LAR PROTECTION.
4. OPERATIVES TO USE PPE AND TAKE HYGIENE PRECAUTIONS AS SITE SO LS AND FLY T PPING ARE LIKELY TO BE CONTAM NATED. EXISTING DRAINS AND RATS ARE SOURCES OF NFECTION AND INDUSTRIAL POLLUTION MAY ALSO BE PRESENT - REFER TO SITE INVESTIGATION REPORT.
5. SITE SUPERVISION STAFF MUST ENSURE HEALTH AND SAFETY PRECAUTIONS ARE TAKEN AND ONLY TRA NED OPERATIVES ARE USED.
6. ONLY CONTRACTORS WHO ARE ON WATER COMPAN ES APPROVED LIST OR HAVE BEEN VETTED BY THEM SHOULD CARRY OUT SEWER CONNECTION WORK ON ADOPTED SEWERS.
7. CONFINED SPACE: SAFETY PRECAUTIONS REQUIRED i.e. VENT LATION, GAS DETECTION, HARNESSES AND A SAFE SYSTEM OF WORK. ALL DRAINAGE TRENCHES OVER 1.2m DEEP ARE DEFINED AS A CONFINED SPACE.

GENERAL NOTES

1. THIS DRAWING INDICATES THE PROPOSED TENDER DRA NAGE LAYOUT FOR THE SITE AND IS NOT INTENDED TO BE A FINAL DESIGN SOLUTION. ALL DETA LS ARE SUBJECT TO REVISION & AMENDMENT DURING THE DESIGN DEVELOPMENT PROCESS. PIPE SIZES, GRADIENTS & MANHOLE DETAILS ARE INDICATIVE ONLY.
2. F NAL DRAINAGE DESIGN SUBJECT TO CHANGE PENDING CONFIRMATION OF BU LDING LAYOUT, SVP/SS/RWP LOCATIONS, SITE LEVELS AND FOUNDATION DETA LS.
3. EXIST NG SITE LAYOUT, LEVELS & DRAINAGE BASED ON NORMAN STANGROOME ASSOCIATES TOPOGRAPHIC SURVEY DRG No 1263/1.
4. PROPOSED BUILDING LAYOUT & SVP/SS/RWP LOCATIONS BASED ON MCBA NS ARCHITECTS DRG No's BRW01-MCB-ZZ-GF-DR-A-0300 P2 & BRW01-MCB-ZZ-B1-DR-A-0303 P1.
5. PROPOSED EXTERNAL WORKS LAYOUT BASED ON MCBAINS ARCHITECTS DRG No BRW01-MCB-ZZ-ZZ-DR-A-0200 P1.

FLOW CONTROL CHAMBER SCHEDULE

MH REF	COVER	NVERT**	DEPTH	INLET IL	OUTLET IL	MH TYPE	OR FICE Ø	COVER DETAILS
S5	84.720	83.670	1 050	83 990	83.970	OFCP450-1*	40mm	450Ø A15
S13	84.270	83.220	1 050	83.540	83.520	OFCP450-1*	60mm	450 X 450 R

* ORIFLO 450Ø FLOW CONTROL CHAMBER WITH ORIFICE PLATE FITTED TO OUTLET PIPE
** INVERT LEVEL REFERS TO SUMP INVERT AND NOT INLET/OUTLET PIPE INVERTS

MANHOLE NOTES

1. BD = BACKDROP MANHOLE
   HB = HYDROBRAKE MANHOLE (SEE HYDROBRAKE SCHEDULE)
   CP = CATCHPIT MANHOLE (SEE NOTE 2 BELOW)
   RE = RODDING EYE
   RC = INSITU RC MANHOLE (CAST NTEGRAL WITH BASEMENT SLAB)
   SSG = CODE FOR ADOPTION (SSG APPX C) MANHOLE TYPE
   V = VENTED MANHOLE
2. CATCHPIT INVERT LEVELS REFER TO OUTGO NG PIPE - FOR SUMP LEVEL DEDUCT 300mm (TYPE 3 or 4 MH) OR 600mm (TYPE 5 MH)
3. COVER LEVELS ARE NDICATIVE ONLY - ACTUAL COVER LEVELS & NCL NATION SHALL MATCH THE F NISHED GROUND LEVEL
4. EXIST NG MANHOLE COVERS SHALL BE RAISED / LOWERED & INCLINATION ADJUSTED TO SUIT THE FINISHED GROUND LEVEL
5. LEVELS SHOWN N BOLD ITALICS ARE TAKEN FROM RECORD DRAWINGS OR INTERPOLATED FROM EXISTING LEVELS - TO BE CONFIRMED BY SITE SURVEY
6. WHERE REQU RED EXIST NG MANHOLE BENCHING SHALL BE BROKEN OUT & REFORMED TO SUIT NEW CONNECTIONS
7. ALL CIRCULAR GRADE A15 MANHOLE COVERS/FRAMES TO BE CAST RON
8. 'R' SUFF IX TO COVER DETA LS DENOTES RECESSED COVER/FRAME SUITABLE TO ACCEPT SURFACE F NISHES (MANHOLE COVERS LTD 6100 SERIES BLOCK PAVIOUR INFILL COVER FACTA AA LOAD RATING (5 tonne) OR SIM LAR APPROVED)
9. 'D/S' SUFFIX TO COVER DETAILS INDICATES BOLT-DOWN DOUBLE-SEAL RECESSED COVER SUITABLE TO ACCEPT FLOOR FINISHES (HOWE GREEN VISEDGE OR S MILAR APPROVED)

Rev	Description	By	Date	Chkd
T1	TENDER ISSUE	DPA		CJ

PEREGA
perega.co.uk 528 High Road, Leytonstone, London E11 3EE 020 8988 5828

Client
HIGHTOWN HOUSING ASSOCIATION

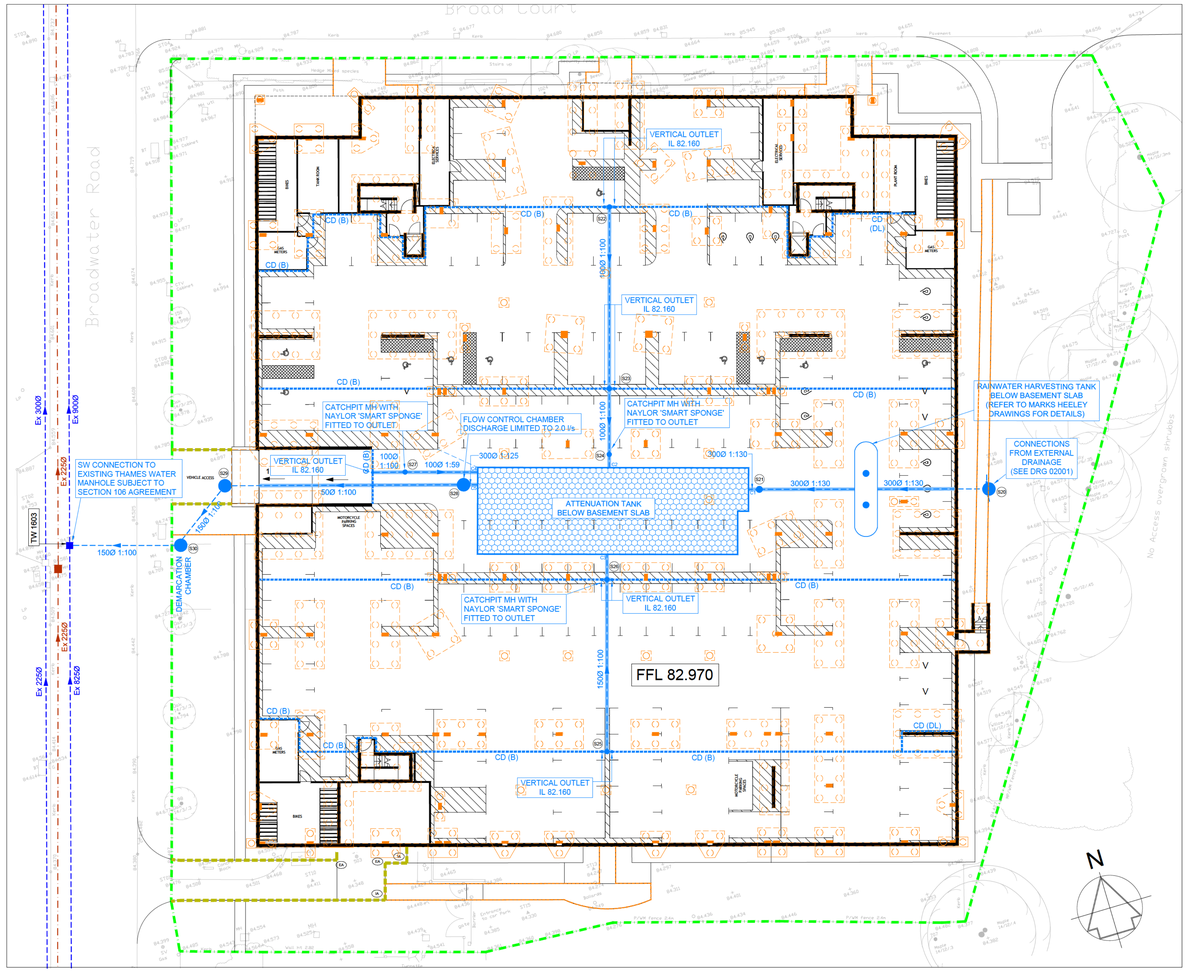
Project
BROADWATER ROAD
WELWYN GARDEN CITY

Title
DRAINAGE LAYOUT
PODIUM DECK LEVEL

Perega Project No.	Checked	Passed	Size	Scale
C13568	CJ	EA	A0	1:200

Project Code	Originator	Zone	Level	Type	Role	Drawing No.
C13568	PER	ZZ	XX	DR	C	02001

Suitability Code	Status	Revision
S2	PRELIMINARY	T1



MANHOLE SCHEDULE

MH REF	COVER	INVERT	DEPTH	MH DIA	MH TYPE	COVER DETA LS
FOUL WATER DRAINAGE						
F1	84 570	83 820	0.750	450	2 V	450Ø A15
F2	84 600	83 736	0.864	450	2	450 X 450 R
F3	84 540	83 840	0.700	450	2	450Ø A15
F4	84 640	83 484	1.156	450	2	450 X 450 R
F5	84 540	83 840	0.700	450	2	450 X 450 R
F6	84 690	83 397	1.293	450**	2	450 X 450 R
F7	84 700	84 000	0.700	450	2	450Ø A15
F8	84 710	84 010	0.700	450	2	450Ø A15
F9	84 690	83 990	0.700	450	2	450Ø A15
F10	84 710	84 010	0.700	450	2	450 X 450 R
F11	84 830	83 103	1.727	450**	2	450 X 450 R
F12	84 830	84 130	0.700	450	2	450 X 450 R
F13	84 890	83 012	1.878	450**	2	450Ø A15
F14	84 880	84 180	0.700	450	2	450Ø A15
F15	84 860	84 160	0.700	450	2	450Ø A15
F16	84 710	84 010	0.700	450	2	450 X 450 R
F17	84 330	83 580	0.750	450	2V	450Ø A15
F18	84 430	83 730	0.700	450	2	450Ø A15
F19	84 370	83 670	0.700	450	2	450Ø A15
F20	84 570	83 070	1.500	450**	2	450 X 450 D400
F21	84 680	83 980	0.700	450	2	450Ø A15
F22	84 690	83 990	0.700	450	2	450Ø A15
F23	84 840	82.681	2.159	450**	2	450Ø A15
F24	84 720	82 627	2 093	1200	TYPE B BSD	600 x 600 B125
TW1602	84 580	**80.440***	4 140	EXIST NG MANHOLE		

MANHOLE SCHEDULE

MH REF	COVER	NVERT	DEPTH	MH DIA	MH TYPE	COVER DETA LS
SURFACE WATER DRAINAGE						
RE1	84 910	84 085	0.825	225	R/EYE	450Ø A15
S1	84 830	84 130	0.700	450	2	450Ø A15
S2	84 960	83 931	1.029	600	2	600Ø A15
S3	84 890	83 847	1.043	600	2	600 x 600 R
S4	84 680	83 980	0.700	450	2	450Ø A15
S5	REFER TO FLOW CONTROL CHAMBER SCHEDULE					
S6	84 690	83.584	1.106	600	2	600 x 600 R
S7	84 550	83.534	1.016	600	2	600 x 600 R
S8	84 360	83 660	0.700	450	2	450Ø A15
S9	84 660	83 910	0.750	450	2	450 x 450 R
S10	84 680	83 813	0.867	600	2	600Ø A15
S11	84 540	83 644	0.896	600	2	600 x 600 D400
S12	84 430	83 730	0.700	450	2	450Ø A15
S13	REFER TO FLOW CONTROL CHAMBER SCHEDULE					
S14	84 320	83 620	0.700	450	2	450 x 450 R
S15	84 380	83 240	1.140	600	2	600Ø A15
S16	84 510	83.236	1.274	600**	2	600Ø A15
S17	84 560	83 860	0.700	450	2	450Ø A15
S18	84 590	83.700	0.890	450	2	450Ø A15
S19	84 510	83.114	1.396	600**	2 BD	600Ø A15
S20	84 490	80.653	3.837	1200	7 BD CP	600 x 600 R
S21	82.970	80.508	2.462	600**	2A	600 x 600 D400
S22	82.970	82.160	0.810	450	2A	450 x 450 D400
S23	82.970	81.993	0.977	450	2A	450 x 450 D400
S24	82.970	81.932	1.038	450	2A/B CP	450 x 450 D400
S25	82.970	***82.160***	0.810	450	2A	450 x 450 D400
S26	82.970	82.001	0.969	450	2A/B CP	450 x 450 D400
S27	82.970	81.414	1.556	450**	2A/B CP	450 x 450 D400
S28	82.970	80.490	2.480	1200	6 HB	600 x 600 D400
S29	84.790	80.269	4.521	1200	7	600 x 600 D400
S30	84.720	80.199	4.521	1200	TYPE A1 BS BD	600 x 600 B125
TW1603	84.500	**79.650***	4.850	EXISTING MANHOLE		

* SEE MANHOLE NOTE 05
** RESTRICTION CAP REQUIRED TO LIMIT ACCESS TO 350Ø (DEPTH > 1.2m)
BSD SEWERAGE SECTOR GUIDANCE APPENDIX C TYPE B (FIG B10)
BS SEWERAGE SECTOR GUIDANCE APPENDIX C TYPE A1 (FIG B5

LEGEND

- NEW FW SEWER
- NEW FW SEWER UNDERSLUNG FROM SOFFIT OF PODIUM SLAB
- NEW SW SEWER
- NEW SW SEWER UNDERSLUNG FROM SOFFIT OF PODIUM SLAB
- NEW SW SEWER BELOW BASEMENT SLAB
- F1 NEW FW MANHOLE OR INSPECTION CHAMBER
- S1 D1 NEW SW MANHOLE, INSPECTION CHAMBER OR FLOW CONTROL CHAMBER
- EXIST NG FOUL SEWER
- EXIST NG SURFACE WATER SEWER
- TW1602 / TW1603 EXIST NG FW MANHOLE
- EXIST NG SW MANHOLE
- RG PCC ROAD GULLY
- YG PAG YARD GULLY/PAVED AREA GULLY
- SVP: SS FG SG SOIL & VENT, STUB STACK, SHOWER GULLY OR FLOOR GULLY CONNECTION (SG & FG TO ARCHITECT SPECIFICATION)
- RWP: RWG RAIN WATER PIPE/ PODIUM DRAINAGE OUTLET CONNECTION
- TD (A) TD (B) THRESHOLD DRAIN - TYPE A or B (REFER TO DETA L DRAW NG FOR TYPES)
- CD (A) CD (B) LINEAR CHANNEL DRAIN - TYPE A or B (REFER TO DETA L DRAW NG FOR TYPES)
- ATTENUATION TANK

ALL EXISTING MANHOLE INVERT LEVELS TO BE CONFIRMED TO ENGINEER BEFORE START OF DRAINAGE WORKS

SVP CONNECTIONS (INCLUDING UNDERSLUNG DRAINAGE) TO BE 100Ø @ 1:40 MIN UNO

RWP CONNECTIONS (INCLUDING UNDERSLUNG DRAINAGE) TO BE 100Ø @ 1:100 MIN UNO

ROAD GULLY CONNECTIONS 150Ø @ 1:100 MIN UNO

SVP REST BEND INVERT LEVELS SET AS FOLLOWS UNLESS NOTED OTHERWISE:

UNDER PODIUM SLAB (BUILDING) 85.540
UNDER PODIUM SLAB (COURTYARD) 85.490

RWP/PDO REST BEND INVERT LEVELS SET AS FOLLOWS UNLESS NOTED OTHERWISE:

UNDER PODIUM SLAB (BUILDING) 85.540
UNDER PODIUM SLAB (COURTYARD) 85.490
TO EXTERNAL WALL 600mm BELOW FGL

NEW FW & SW CONNECTIONS SUBJECT TO S106 CONSENT FROM THAMES WATER

NO CONSTRUCTION PLANT TO BE TRAFFICKED OR MATERIALS PLACED OVER ATTENUATION TANK WITHOUT PRIOR APPROVAL OF THE ENGINEER

WHERE NEW DRAINAGE CONNECTIONS ARE WITHIN 300mm OF BASEMENT SLAB SOFFIT, PIPE TO BE ENCASED IN CONCRETE (REFER TO DRAINAGE DETAILS)

UNDERSLUNG PIPES IN BASEMENT TO BE CAST IRON (ST GOBAIN ENSIGN OSA). PIPES TO BE SLEEVED WHERE THEY PASS THROUGH WALLS AND/OR DOWNSTAND BEAMS.

VERTICAL CAST IRON DROP PIPES IN BASEMENT TO BE RESTRAINED AGAINST LATERAL MOVEMENT WITH BRACKETS BOLTED TO BASEMENT PERIMETER WALL AND/OR COLUMNS

PIPES PASSING THROUGH BASEMENT WALLS SHALL BE CAST IN USING PUDDLE FLANGES, WITH ROCKER PIPES EITHER SIDE

FINAL PROPOSED EXTERNAL LEVELS ASSUMED TO BE THE SAME AS EXISTING LEVELS FOR TENDER DRAINAGE STRATEGY - TBC DURING DETAILED DESIGN

THRESHOLD DRAINS TO BE PROVIDED TO ALL EXTERNAL DOORS WITH FLUSH THRESHOLDS (EXCEPT UNDER BUILDING CANOPIES)

ALL SURFACE WATER FROM PATHS, PATIOS, TERRACES ETC ASSUMED TO DRAIN TO SOFT LANDSCAPED AREAS, EXCEPT WHERE PAVED AREA GULLIES OR CHANNEL DRAINS ARE PROVIDED

A VENTILATION PIPE SHALL BE PROVIDED AT (OR NEAR) THE HEAD OF EACH MAIN FOUL DRAIN AS REQUIRED BY THE BUILDING REGULATIONS - MANHOLES REQUIRING A VENT PIPE ARE INDICATED IN THE MANHOLE SCHEDULE.

VENTILATION IS USUALLY ACHIEVED BY THE USE OF A VENTILATED DISCHARGE STACK - REFER TO M&E CONSULTANT'S DRAWINGS FOR FULL DETAILS

NOTES

1. THIS DRAW NG SHALL BE READ N CONJUNCTION WITH THE BELOW GROUND DRAINAGE SPECIFICATION AND ALL RELEVANT ARCHITECTS, M&E CONSULTANTS, SERVICES & SPECIALIST CONTRACTOR'S DRAWINGS.
2. WHERE NOTES ON THIS DRAWING D FFER FROM THE SPECIFICATION, CLAR FICATION SHALL BE SOUGHT FROM THE PROJECT MANAGER AND/OR SUPERVISOR.
3. THE WORKS DESCR BED AND SPECIFIED ON THIS & ASSOCIATED DRAWINGS SHALL BE UNDERTAKEN N ACCORDANCE WITH CURRENT HEALTH & SAFETY LEGISLATION. REFERENCE SHALL ALSO BE MADE TO THE PRE-CONSTRUCTION INFORMATION PACK PREPARED BY THE PRINCIPAL DESIGNER FOR THE PROJECT.
4. ALL PRIVATE DRAINAGE SHALL COMPLY WITH THE BU LD NG REGULATIONS. WHERE DRA NAGE IS TO BE ADOPTED IT SHALL COMPLY WITH THE CODE FOR ADOPTION - SEWERAGE SECTOR GUIDANCE (APPENDIX C).
5. PIPE BEDD NGS SHALL BE IN ACCORDANCE WITH THE P PE MANUFACTURER'S RECOMMENDATIONS, TAK NG ACCOUNT OF THE DEPTH & LOADING N RELATION TO THE P PE STRENGTH. THE CONTRACTOR SHALL ISSUE BEDD NG PROPOSALS TO THE PROJECT MANAGER AND/OR SUPERVISOR FOR APPROVAL.
6. ALL LEVELS RELATE TO ORDNANCE DATUM (NEWLYN) UNO.
7. PIPES ENTERING/EXITING MANHOLES SHALL HAVE LEVEL SOFFITS UNO.
8. DETAILS OF EXIST NG SEWERS (L NE/LEVEL/PIPE SIZES ETC) SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE CONSTRUCTION OF ANY DRAINAGE WORKS. THE CONTRACTOR SHALL ESPECIALLY CHECK THE INVERT LEVELS OF ALL OUTFALLS IN RELATION TO EXIST NG SEWERS TO ENSURE THE PROPOSED DESIGN CAN BE ACHIEVED. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE PROJECT MANAGER AND/OR SUPERVISOR.
9. BEFORE DRAINAGE WORKS COMMENCE THE CONTRACTOR SHALL CONF RM THE DEPTH, SIZE & LOCATION OF ALL EXISTING DRAINAGE/SERVICES TO BE CROSSED. ANY CONFLICT IN LEVELS BETWEEN EXISTING DRAINAGE/SERVICES & NEW DRA NAGE SHALL BE REPORTED TO THE PROJECT MANAGER AND/OR SUPERVISOR.
10. FOR SETTING OUT OF SOIL & VENT PIPES, STUB STACKS AND RA NWATER PIPES REFER TO ARCHITECTS' DRAW NGS.
11. ALL LATERAL FOUL CONNECTIONS SHALL BE 100mm Ø LA D AT 1:40 MIN UNO.
12. ALL SURFACE WATER DRA NS SHALL BE 100mm Ø LAID AT 1:59 MIN UNO. ALL ROAD GULLY CONNECTIONS SHALL BE 150mm Ø LAID AT 1:100 MIN UNO.
13. RAINWATER P PES NOT CONNECTED TO AN INSPECTION CHAMBER SHALL BE CONNECTED DIRECTLY TO DRA N (NO ACCESS GULLY).
14. ADOPTED DRA NAGE PIPEWORK TO BE HEPWORTH SUPERSLEEVE VITRIFIED CLAY DRA NAGE SYSTEM TO BS EN 295, ALL JO NTS TO BE FLEXIBLE. P PES TO BE LAID N ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
15. PRIVATE DRAINAGE PIPEWORK TO BE EITHER HEPWORTH SUPERSLEEVE VITRIFIED CLAY DRAINAGE SYSTEM TO BS EN 295 OR HEPWORTH UPVC DRAINAGE SYSTEM TO BE EN 1401. ALL JOINTS TO BE FLEXIBLE. PIPES TO BE LAID IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
16. WHERE CROWN OF VC PIPE IS LESS THAN 1200mm BELOW FINISHED ROAD LEVEL OR CROWN OF UPVC PIPE IS LESS THAN 900 BELOW F NISHED ROAD LEVEL, PIPE SHALL BE PROTECTED WITH A CONCRETE BED & SURROUND.
17. WHERE CROWN OF UPVC OR VC P PE IS LESS THAN 600mm BELOW FINISHED LANDSCAPE LEVEL, PIPE SHALL BE PROTECTED WITH A CONCRETE BED & SURROUND.
18. PCC MANHOLE COMPONENTS (NCLUD NG BASE, MANHOLE R NGS, COVER SLABS & CONCRETE SURROUND) SHALL PROVIDE CLASS 3 SULPHATE RESISTANCE TO BRE SPECIAL DIGEST 1.
19. ALL 90° CONNECTIONS SHALL BE MADE USING A 45° EQUAL JUNCTION + 45° BEND AS APPROPRIATE.
20. PIPES PASS NG OVER FOUNDATIONS SHALL HAVE PCC LINTELS OVER. PIPES PASSING THROUGH FOUNDATIONS SHALL BE APPROPRIATELY SLEEVED.
21. ALL FLOWS FROM EXISTING BUILD NGS SHALL BE MAINTAINED DUR NG CONSTRUCTION.
22. ALL INTERNAL SVP/SS/RWP STACKS SHALL HAVE ACCESS FITTINGS PROV DED ABOVE GROUND FLOOR LEVEL - REFER TO M&E CONSULTANT'S DRAWINGS FOR DETAILS.
23. ALL EXCAVATIONS WITHIN TREE ROOT ZONES TO BE CARR ED OUT BY HAND (NO MACHINERY TO BE USED).
24. FOR DRA NAGE DETA LS REFER TO DRG No's C13568-PER-ZZ-XX-DR-C-03001 to 03006.

FOR PODIUM DRAINAGE & RAINWATER HARVESTING DETAILS REFER TO MARKS HEELY DRAWING NUMBERS H13789-001-002-003

FOR LANDSCAPING DETAILS REFER TO ALBAN LANDSCAPE DRAWING NUMBER 19512.200

FLOW CONTROL CHAMBER SCHEDULE

MH REF	COVER	NVERT**	DEPTH	INLET IL	OUTLET IL	MH TYPE	OR FICE Ø	COVER DETAILS
S5	84.720	83.670	1 050	83.990	83.970	OFCP450-1*	40mm	450Ø A15
S13	84.270	83.220	1 050	83.540	83.520	OFCP450-1*	60mm	450 X 450 R

* ORIFLO 450Ø FLOW CONTROL CHAMBER WITH ORIFICE PLATE FITTED TO OUTLET PIPE
** INVERT LEVEL REFERS TO SUMP INVERT AND NOT INLET/OUTLET PIPE INVERTS

MANHOLE NOTES

1. BD = BACKDROP MANHOLE
   HB = HYDROBRAKE MANHOLE (SEE HYDROBRAKE SCHEDULE)
   CP = CATCHPIT MANHOLE (SEE NOTE 2 BELOW)
   RE = RODDING EYE
   RC = INSITU RC MANHOLE (CAST NTEGRAL WITH BASEMENT SLAB)
   SSG = CODE FOR ADOPTION (SSG APPX C) MANHOLE TYPE
   V = VENTED MANHOLE
2. CATCHPIT INVERT LEVELS REFER TO OUTGO NG PIPE - FOR SUMP LEVEL DEDUCT 300mm (TYPE 3 or 4 MH) OR 600mm (TYPE 5 MH)
3. COVER LEVELS ARE NDICATIVE ONLY - ACTUAL COVER LEVELS & NCL NATION SHALL MATCH THE F NISHED GROUND LEVEL
4. EXIST NG MANHOLE COVERS SHALL BE RAISED / LOWERED & INCLINATION ADJUSTED TO SUIT THE FINISHED GROUND LEVEL
5. LEVELS SHOWN N BOLD ITALICS ARE TAKEN FROM RECORD DRAWINGS OR INTERPOLATED FROM EXISTING LEVELS - TO BE CONFIRMED BY SITE SURVEY
6. WHERE REQU RED EXIST NG MANHOLE BENCHING SHALL BE BROKEN OUT & REFORMED TO SUIT NEW CONNECTIONS
7. ALL CIRCULAR GRADE A15 MANHOLE COVERS/FRAMES TO BE CAST RON
8. 'R' SUFFIX TO COVER DETA LS DENOTES RECESSED COVER/FRAME SUITABLE TO ACCEPT SURFACE F NISHES (MANHOLE COVERS LTD 8100 SERIES BLOCK PAVIOUR INFILL COVER FACTA AA LOAD RATING (5 tonne) OR SIM LAR APPROVED
9. 'D/S' SUFFIX TO COVER DETAILS INDICATES BOLT-DOWN DOUBLE-SEAL RECESSED COVER SUITABLE TO ACCEPT FLOOR FINISHES (HOWE GREEN VISEDGE OR S MILAR APPROVED)

SAFETY NOTES

1. EXCAVATIONS TO BE INSPECTED BEFORE CONSTRUCTION OPERATIONS TAKE PLACE (e.g. PIPE LAY NG) BY A COMPETENT PERSON & A REGISTER TO BE MAINTAINED AS REQUIRED BY HEALTH AND SAFETY LEGISLATION.
2. ALL EXCAVATIONS TO BE ADEQUATELY SUPPORTED, CLOSE SHEETING REQU RED ON ALL EXCAVATIONS AS MIXED MAN MADE SOILS ARE PRESENT. GROUND WATER EXPECTED AT SHALLOW AND VARYING DEPTHS. - REFER TO SITE NVESTIGATION REPORT. MIXED SOILS AND GROUND CONDITIONS PRESENT.
3. INTERLOCK NG SHEETS OR TRENCH BOXES REQU RED N SAND/GRAVELS AND N HIGH WATER TABLE AREAS. PROTECTION REQUIRED FOR T MBER MAN AT ENDS OF TRENCH BY USE OF TRENCH BOX OR SIM LAR PROTECTION.
4. OPERATIVES TO USE PPE AND TAKE HYGIENE PRECAUTIONS AS SITE SO LS AND FLY T PPING ARE LIKELY TO BE CONTAM NATED. EXISTING DRAINS AND RATS ARE SOURCES OF NFECTION AND INDUSTRIAL POLLUTION MAY ALSO BE PRESENT - REFER TO SITE INVESTIGATION REPORT.
5. SITE SUPERVISION STAFF MUST ENSURE HEALTH AND SAFETY PRECAUTIONS ARE TAKEN AND ONLY TRA NED OPERATIVES ARE USED.
6. ONLY CONTRACTORS WHO ARE ON WATER COMPAN ES APPROVED LIST OR HAVE BEEN VETTED BY THEM SHOULD CARRY OUT SEWER CONNECTION WORK ON ADOPTED SEWERS.
7. CONFINED SPACE: SAFETY PRECAUTIONS REQUIRED i.e. VENT LATION, GAS DETECTION, HARNESSES AND A SAFE SYSTEM OF WORK. ALL DRAINAGE TRENCHES OVER 1.2m DEEP ARE DEFINED AS A CONFINED SPACE.

GENERAL NOTES

1. THIS DRAWING INDICATES THE PROPOSED TENDER DRA NAGE LAYOUT FOR THE SITE AND IS NOT INTENDED TO BE A FINAL DESIGN SOLUTION. ALL DETA LS ARE SUBJECT TO REVISION & AMENDMENT DURING THE DESIGN DEVELOPMENT PROCESS. PIPE SIZES, GRADIENTS & MANHOLE DETAILS ARE NDICATIVE ONLY.
2. F NAL DRAINAGE DESIGN SUBJECT TO CHANGE PENDING CONFIRMATION OF BU LDING LAYOUT, SVP/SS/RWP LOCATIONS, SITE LEVELS AND FOUNDATION DETA LS.
3. EXIST NG SITE LAYOUT, LEVELS & DRAINAGE BASED ON NORMAN STANGROOME ASSOCIATES TOPOGRAPHIC SURVEY DRG No 12631.
4. PROPOSED BUILDING LAYOUT & SVP/SS/RWP LOCATIONS BASED ON MCBA NS ARCHITECTS DRG No's BRW01-MCB-ZZ-GF-DR-A-0300 P2 & BRW01-MCB-ZZ-B1-DR-A-0303 P1.
5. PROPOSED EXTERNAL WORKS LAYOUT BASED ON MCBAINS ARCHITECTS DRG No BRW01-MCB-ZZ-ZZ-DR A-0200 P1.

Rev	Description	By	Date	Chkd
T1	TENDER ISSUE	DPA		CJ

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Client
HIGHTOWN HOUSING ASSOCIATION

Project
BROADWATER ROAD
WELWYN GARDEN CITY

Title
DRAINAGE LAYOUT
PODIUM DECK LEVEL

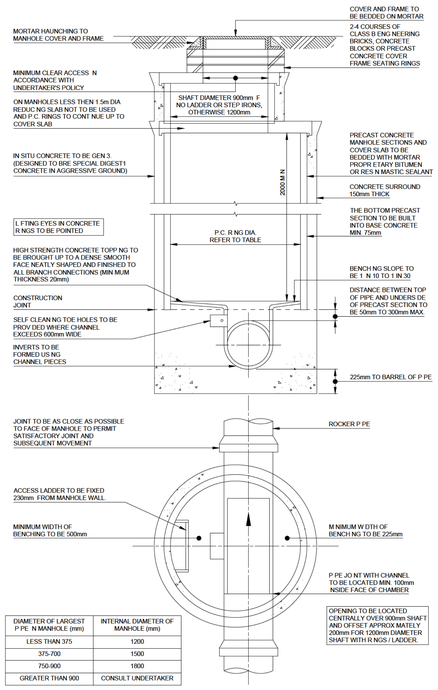
Perega Project No.	Checked	Passed	Size	Scale
C13568	CJ	EA	A0	1:200

Project Code	Originator	Zone	Level	Type	Role	Drawing No.
C13568	PER	ZZ	XX	DR	C	02001

Suitability Code	Status	Revision
S2	PRELIMINARY	T1

NOTES

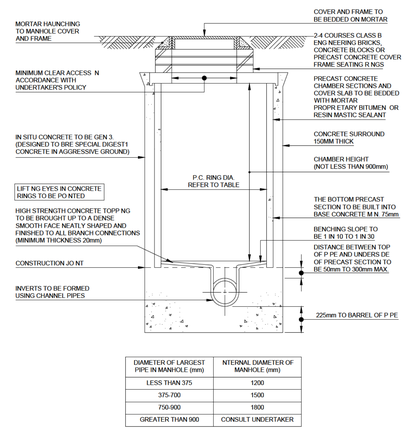
1. THIS DRG TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECT, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS.



DIAMETER OF LARGEST P.PE 'N MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375-700	1500
750-900	1800
GREATER THAN 900	CONSULT UNDERTAKER

TYPICAL MANHOLE DETAIL - TYPE A1 (SSG Fig B5)

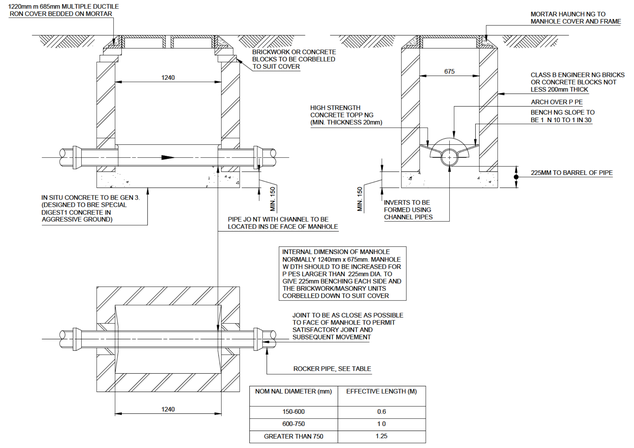
DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m TO 6m
STEPS AND ACCESS ARRANGEMENTS OR OTHERWISE TO BE FITTED AS REQUIRED BY UNDERTAKERS POLICY
(SCALE 1:20)



DIAMETER OF LARGEST PIPE IN MANHOLE (mm)	NTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375-700	1500
750-900	1800
GREATER THAN 900	CONSULT UNDERTAKER

TYPICAL MANHOLE DETAIL - TYPE B (SSG Fig B10)

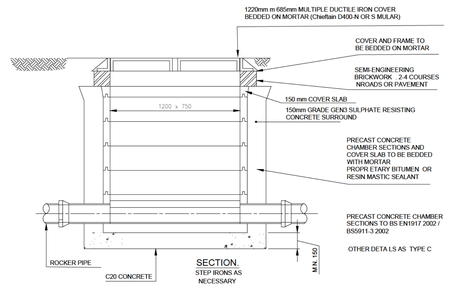
MAX. DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m
STEPS OR OTHERWISE TO BE FITTED AS REQUIRED BY UNDERTAKERS POLICY
(SCALE 1:20)



NOM'NAL DIAMETER (mm)	EFFECTIVE LENGTH (M)
150-600	0.6
600-750	1 0
GREATER THAN 750	1.25

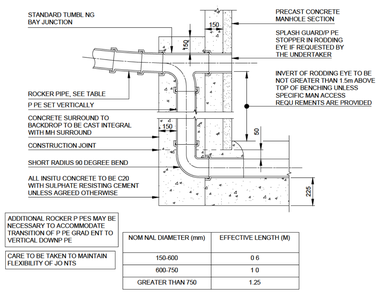
TYPICAL MANHOLE DETAIL - TYPE C (SSG Fig B14)

DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE LESS THAN 1.5m
(SCALE 1 20)



TYPICAL MANHOLE DETAIL - TYPE C (SSG Fig B15)

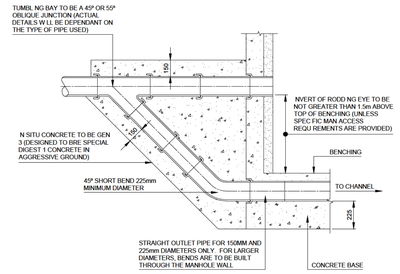
DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE LESS THAN 1.5m
(SCALE 1 20)



NOM'NAL DIAMETER (mm)	EFFECTIVE LENGTH (M)
150-600	0 6
600-750	1 0
GREATER THAN 750	1.25

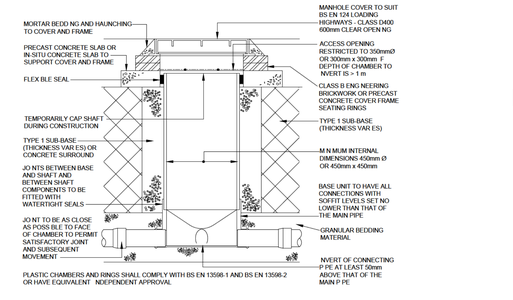
TYPICAL VERTICAL BACKDROP DETAIL (SSG Fig B16/B17)

(SCALE 1:20)
FOR USE ON MANHOLE TYPES A-D



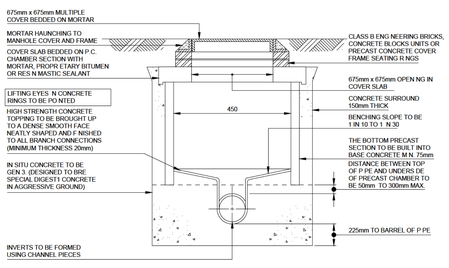
TYPICAL RAMPED BACKDROP DETAIL (SSG Fig B16/B17)

(SCALE 1:20)
FOR USE ON MANHOLE TYPES A-D
WHERE THE BACKDROP IS NOT EXCESSIVE A 45º DROP P.PE MAY BE USED



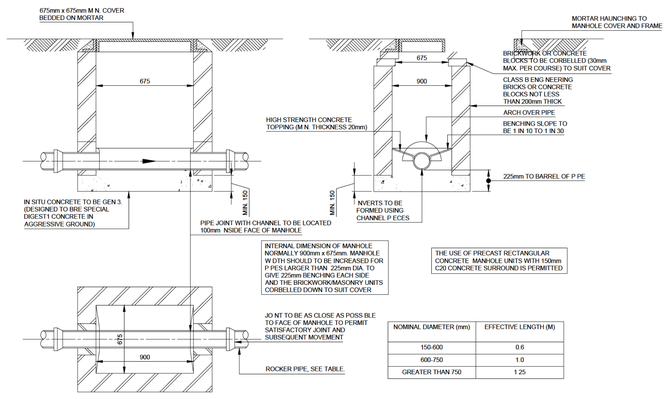
TYPICAL INSPECTION CHAMBER - TYPE D (SSG Fig B18)

DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE U TO 1.0m
(SCALE 1:20)



TYPICAL INSPECTION CHAMBER - TYPE D (SSG Fig B20)

DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE UP TO 3m
(SCALE 1:20)



NOMINAL DIAMETER (mm)	EFFECTIVE LENGTH (M)
150-600	0.6
600-750	1.0
GREATER THAN 750	1 25

TYPICAL INSPECTION CHAMBER - TYPE E (SSG Fig B24)

DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE U TO 1.0m
APPROVAL OF THE UNDERTAKER MUST BE GIVEN FOR INSTALLATION OF TYPE OF MANHOLE
(SCALE 1:20)

T1	TENDER ISSUE	DPA	CJ
Rev	Description	By	Date Chkd

PEREGA
perega.co.uk 529 High Road, Leytonstone, London E11 3EE 020 8988 5820

Client
HIGHTOWN HOUSING ASSOCIATION

Project
BROADWATER ROAD
WELWYN GARDEN CITY

Title
DRAINAGE DETAILS TO CODE FOR ADOPTION (SSG Appendix C)

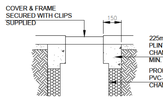
Perega Project No.	Checked	Passed	Size	Scale
C13568	CJ	EA	A0	1:200

Project Code	Originator	Zone	Level	Type	Role	Drawing No.
C13568	PER	ZZ	XX	DR	C	03001

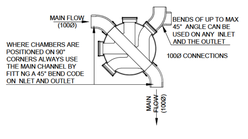
Suitability Code	Status	Revision
S2	PRELIMINARY	T1

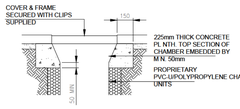
NOTES

1. THIS DRG TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECT, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS.

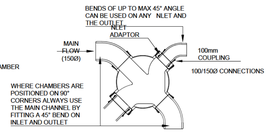


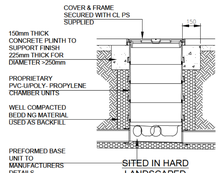
COVER SMALLER THAN CHAMBER



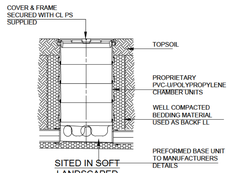


COVER LARGER THAN CHAMBER





SITED IN HARD LANDSCAPED AREAS

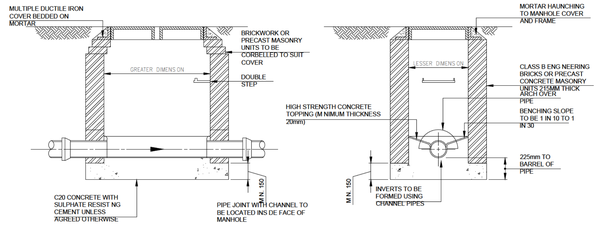


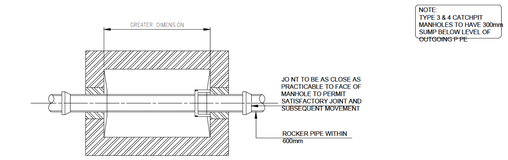
SITED IN SOFT LANDSCAPED AREAS

WHERE CHAMBER IS IN ROAD, REPLACE BEDD NG BACKF LL WITH GRADE 20 CONCRETE 150mm MIN THICK

PVC-U/POLYPROPYLENE INSPECTION CHAMBER DETAILS - TYPE 2

(DEPTH FROM COVER LEVEL TO INVERT 600mm - 3000mm)

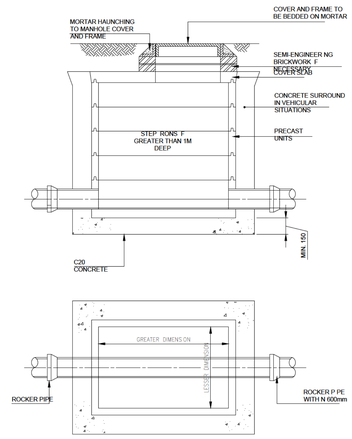




NOTE:
TYPE 3 & 4 CATCHPIT MANHOLES TO HAVE 300mm SUMP BELOW LEVEL OF OUTGOING P PE

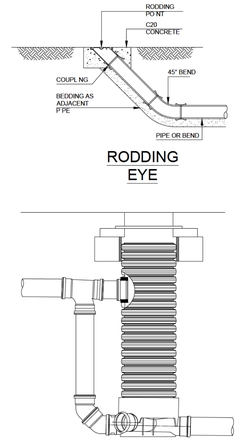
TYPICAL INSPECTION CHAMBER/MANHOLE DETAIL - TYPE 3

(DEPTH FROM COVER LEVEL TO INVERT 1200mm - 1500mm)



TYPICAL INSPECTION CHAMBER/MANHOLE DETAIL - TYPE 4

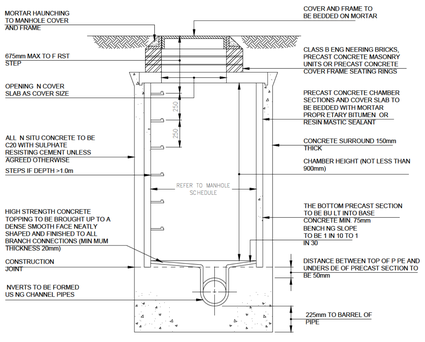
(DEPTH FROM COVER LEVEL TO NVERT 1200mm - 1500mm)

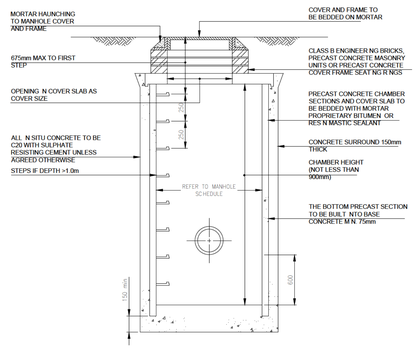


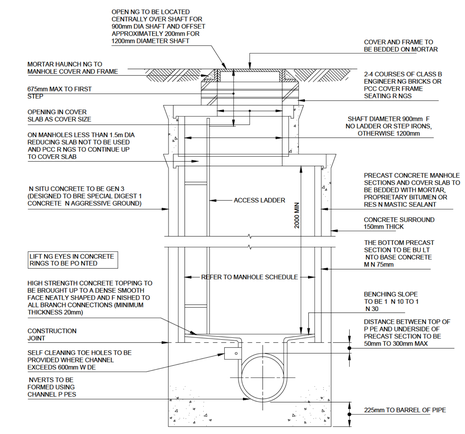
RODDING EYE

PVC-U/POLYPROPYLENE INSPECTION CHAMBER BACKDROP DETAILS

SCALE 1 20

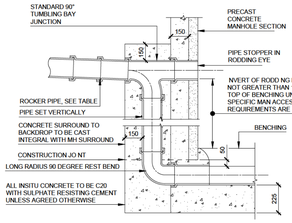






ADDITIONAL ROCKER P PES MAY BE NECESSARY TO ACCOMMODATE TRANSITION OF PIPE GRAD ENT TO VERTICAL DOWN PIPE

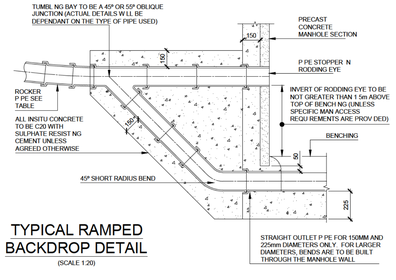
CARE TO BE TAKEN TO MAINTAIN FLEXIB LITY OF JO NTS



NOM NAL DIAMETER (mm)	EFFECTIVE LENGTH (M)
150-600	0 6
600-750	1 0
GREATER THAN 750	1 25

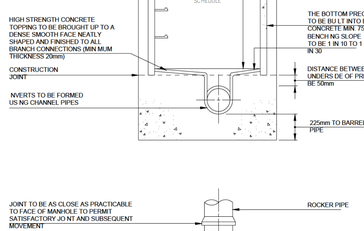
TYPICAL VERTICAL BACKDROP DETAIL

(SCALE 1 20)



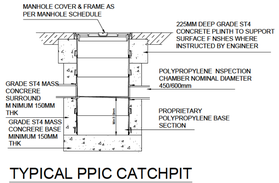
TYPICAL RAMPED BACKDROP DETAIL

(SCALE 1 20)



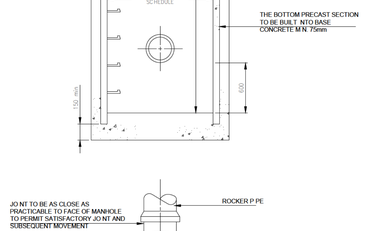
TYPICAL MANHOLE DETAIL - TYPE 5

(DEPTH FROM COVER LEVEL TO INVERT 1500mm - 3000mm)



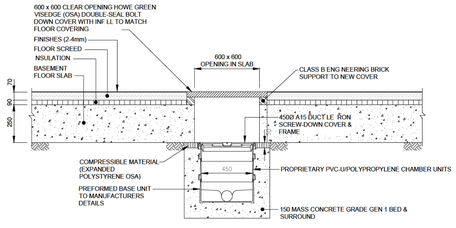
TYPICAL PPIC CATCHPIT MANHOLE DETAIL TYPE 8

SCALE 1 20



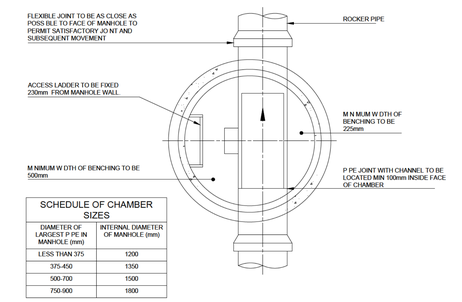
CATCHPIT MANHOLE - TYPE 6

(DEPTH FROM COVER LEVEL TO INVERT 1500mm - 3000mm)



TYPE 2A INTERNAL INSPECTION CHAMBER (DETAIL WITHIN BASEMENT SLAB)

SCALE 1:20



SCHEDULE OF CHAMBER SIZES	
DIAMETER OF LARGEST P PE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375-450	1350
500-700	1500
750-900	1800

TYPICAL MANHOLE DETAIL - TYPE 7

(DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m TO 6m)

SCALE 1:20

Rev	Description	By	Date	Chkd
T1	TENDER ISSUE	DPA		CJ

PEREGA

perega.co.uk 528 High Road, Leytonstone, London E11 3EE 020 8988 5828

Client
HIGHTOWN HOUSING ASSOCIATION

Project
BROADWATER ROAD
WELWYN GARDEN CITY

Title
DRAINAGE DETAILS TO BUILDING REGULATIONS

Perega Project No.	Checked	Passed	Size	Scale
C13568	CJ	EA	A0	1:200

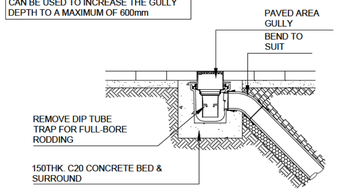
Project Code	Originator	Zone	Level	Type	Role	Drawing No.
C13568	PER	ZZ	XX	DR	C	03002

Suitability Code	Status	Revision
S2	PRELIMINARY	T1

NOTES

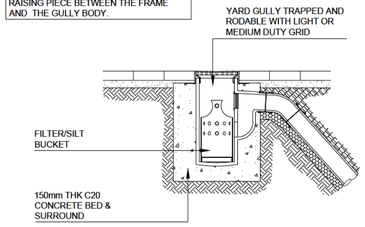
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECT, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS.
2. SELECTED AS-DUG MATERIAL SHALL CONSIST OF UNIFORM READILLY COMPACTIBLE MATERIAL FREE FROM VEGETABLE MATTER, BUILDING RUBBISH & FROZEN MATERIAL OR MATERIALS SUSCEPTIBLE TO SPONTANEOUS COMBUSTION. IT SHALL EXCLUDE CLAY OF LIQUID LIMIT >80 AND/OR PLASTIC LIMIT >55 AND MATERIALS OF EXCESSIVELY HIGH MOISTURE CONTENT. CLAY LUMPS AND STONES RETAINED ON 75mm AND 37.5mm SIEVES RESPECTIVELY SHALL BE EXCLUDED.
3. PIPE BEDDING & SIDEFILL MATERIALS SHALL BE PLACED IN 150mm THICK LAYERS AROUND PIPES & HAND-TAMPED UNTIL THE REQUIRED THICKNESSES ARE ACHIEVED. BACKFILLING SHALL THEN CONTINUE IN 225mm THICK LAYERS. MECHANICAL COMPACTION PLANT SHALL NOT BE USED WITHIN 450mm OF PIPE CROWN.
4. COMPRESSIBLE FILLER SHALL BE PROVIDED AT EACH PIPE JOINT. PRE-SHAPED TO PIPE DIA AND EXTENDING TO FULL THICKNESS OF CONCRETE. FILLER SHALL BE 18mm THICK BITUMEN IMPREGNATED INSULATING BOARD OR EXPANDED POLYSTYRENE.

NOTE: A CUT LENGTH OF 150mm CLAY PIPE AND A 150mm COUPLING INSERTED BETWEEN THE HOPPER AND THE BASE CAN BE USED TO INCREASE THE GULLY DEPTH TO A MAXIMUM OF 600mm

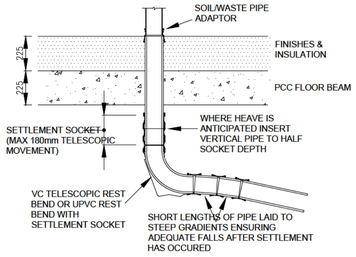


PAVED AREA GULLY CONNECTION (SCALE: 1:20)

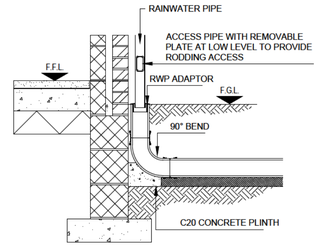
NOTE: THE DEPTH OF THE GULLY CAN BE INCREASED BY UP TO 300mm BY FITTING A 225mm COUPLING AND A 300mm HIGH RAISING PIECE BETWEEN THE FRAME AND THE GULLY BODY.



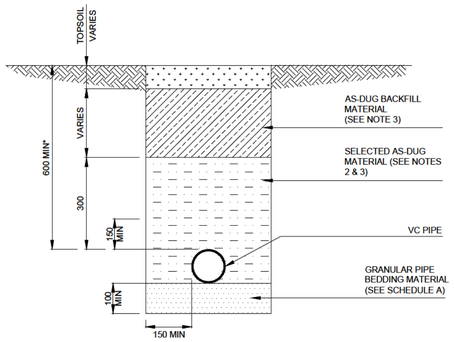
YARD GULLY CONNECTION (SCALE: 1.20)



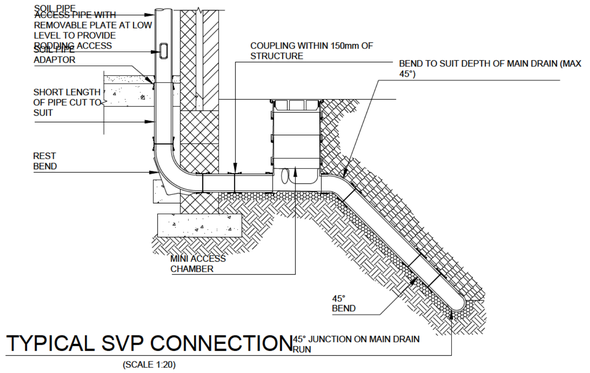
TYPICAL TELESCOPIC REST BEND DETAIL (SCALE 1:20)



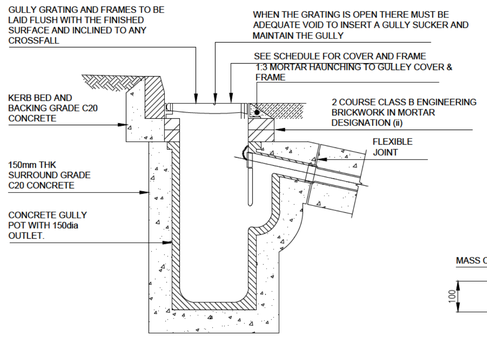
TYPICAL RAINWATER PIPE CONNECTION (SCALE 1:20)



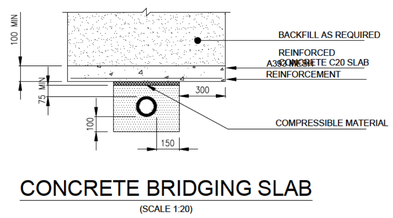
VC PIPES UNDER LANDSCAPED AREAS CLASS F GRANULAR BED



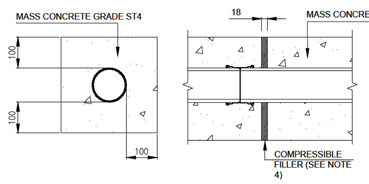
TYPICAL SVP CONNECTION (SCALE 1:20)



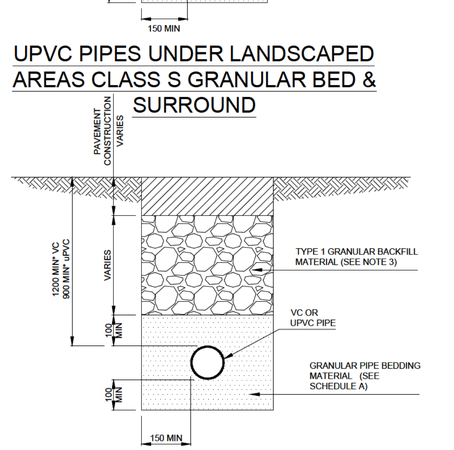
TYPICAL ROAD GULLY DETAIL (SCALE 1:20)



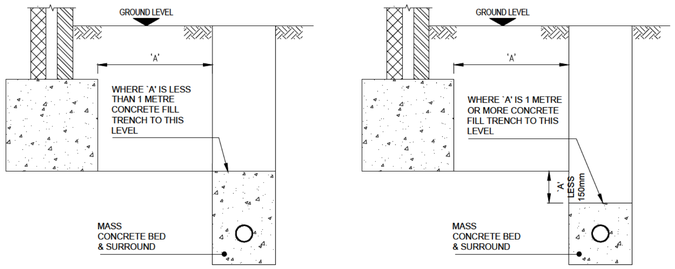
CONCRETE BRIDGING SLAB (SCALE 1:20)



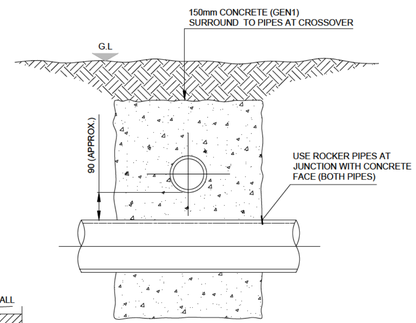
MASS CONCRETE BED & SURROUND (SCALE 1:10)



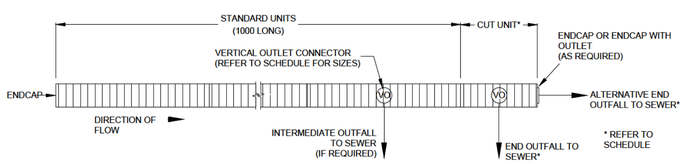
UPVC PIPES UNDER LANDSCAPED AREAS CLASS S GRANULAR BED & SURROUND



PIPE RUNS NEAR BUILDINGS (SCALE 1:20)

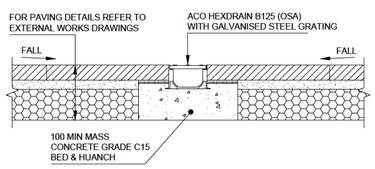


CROSS-OVER DETAIL SCALE 1:10

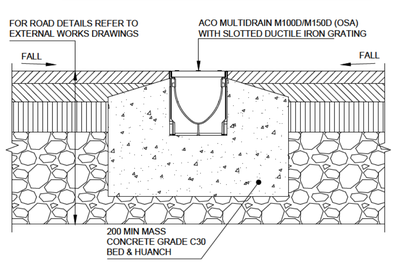


TYPICAL CHANNEL DRAIN LAYOUT

(SCALE 1:20)
REFER TO DRAINAGE LAYOUT FOR DETAILED INDIVIDUAL CHANNEL DRAIN CONFIGURATIONS
(* STANDARD UNITS MAY NEED BE CUT IN ORDER ACHEIVE REQUIRED LAYOUT)



TYPE A - PEDESTRIAN AREAS



TYPE B & C - ROADS/CAR PARKS etc

TYPICAL CHANNEL DRAIN SECTIONS

(SCALE 1:10)

CHANNEL DRAIN SCHEDULE

DRAIN TYPE	DESCRIPTION	CHANNEL DIMENSIONS			OUTLET		DETAILS
		LENGTH (mm)	DEPTH (mm)	WIDTH (mm)	Ø (mm)	TYPE	
A	ACO HEXDRAIN B125	1000	75	100	100	VERTICAL	CONSTANT DEPTH UNIT WITH GALVANISED STEEL GRATING
B	ACO MULTIDRAIN M100D	1000	130	100	100	VERTICAL	CONSTANT DEPTH UNIT WITH SLOTTED DUCTILE IRON GRATING
C	ACO MULTIDRAIN M150D	1000	185	150	150	ENDCAP	CONSTANT DEPTH UNIT WITH SLOTTED DUCTILE IRON GRATING

*WHERE MINIMUM DEPTH OF COVER TO PIPE IS NOT ACHIEVED PIPES SHALL BE PROTECTED WITH A CONCRETE BRIDGING SLAB or MASS CONCRETE BED & SURROUN AS NOTED ON DRAINAGE LAYOUT

GRANULAR PIPE BEDDING MATERIAL*		
PIPE DIA (mm)	SIZE (mm)	
	SINGLE SIZED	GRADED
100	10	-
150	10 or 14	14 to 5
225 300	10, 14 or 20	14 to 5 or 20 to 5
375 450	14 or 20	14 to 5 or 20 to 5
>500	14, 20 or 40	14 to 5 or 20 to 5 or 40 to 5

* IN ACCORDANCE WITH BS EN1610

SCHEDULE A

SEE ALSO NOTE 3

VC OR UPVC PIPES UNDER TRAFICKED AREAS CLASS S GRANULAR BED & SURROUND PIPE BEDDING DETAILS

SCALE 1:10

Rev	Description	By	Date	Chkd
T1	TENDER ISSUE	DPA		CJ

PEREGA

perega.co.uk 528 High Road, Leytonstone, London E11 3EE 020 8988 5820

Client
HIGHTOWN HOUSING ASSOCIATION

Project
BROADWATER ROAD
WELWYN GARDEN CITY

Title
SUPPLMENTARY DRAINAGE DETAILS 1 of 4

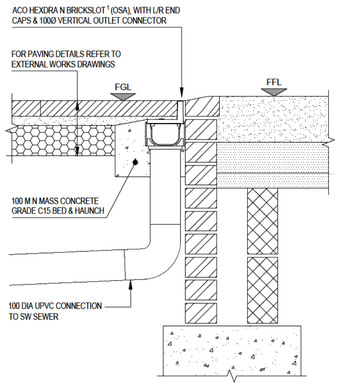
Perega Project No.	Checked	Passed	Size	Scale
C13568	CJ	EA	A1	AS SHOWN

Project Code	Originator	Zone	Level	Type	Role	Drawing No.
C13568	PER	ZZ	XX	DR	C	03003

Suitability Code	Status	Revision
S2	PRELIMINARY	T1

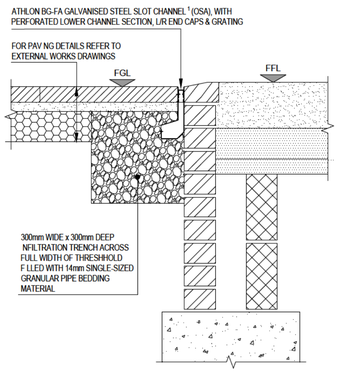
NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECT, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS.



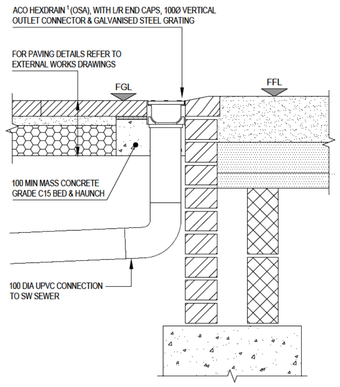
THRESHOLD DRAIN DETAIL TYPE A

(SCALE 1:10)



THRESHOLD DRAIN DETAIL TYPE B

(SCALE 1:10)



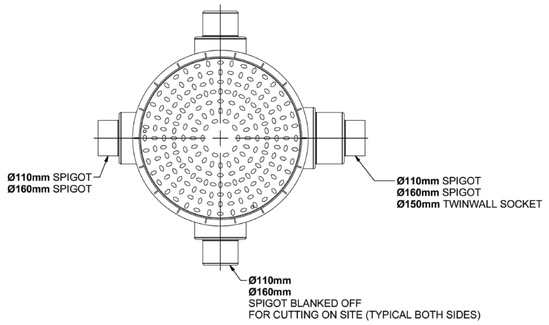
THRESHOLD DRAIN DETAIL TYPE C

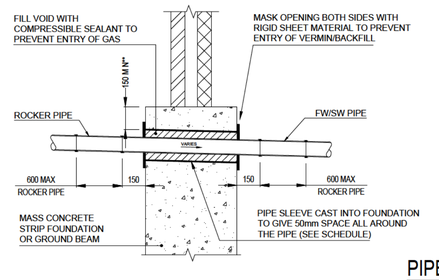
(SCALE 1:10)

NEW DESIGN & CONSTRUCTION GUIDANCE (DCG) - THIS HAS EFFECTIVELY SUPERCEDED SFA7 AND STATES THAT ACCESS MUST BE RESTRICTED TO A MAXIMUM OF Ø350mm, ON ANY TYPE D OR E INSPECTION CHAMBER, DEEPER THAN 1000mm FROM COVER LEVEL TO PIPE SOFFIT.

PLEASE NOTE: ALL OFCP450 MODELS ARE SUPPLIED WITH A 450ACCRA - CIRCULAR SECTION ACCESS COVER, WHICH HAS A RESTRICTED INTERNAL OPENING OF 350mm, TO COMPLY WITH DCG.

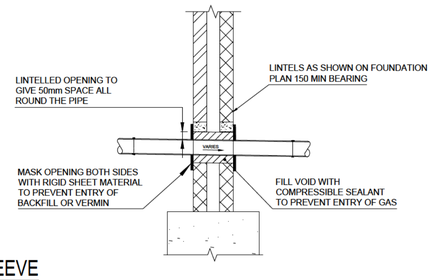
DCG ALSO STATES, THAT A SUITABLE **TEMPORARY COVER** MUST BE INSTALLED TO PREVENT SITE RUBBLE AND DEBRIS ENTERING THE CHAMBER DURING CONSTRUCTION. SO AS THE UNITS ARE SUPPLIED TO SITE WITH COVERS INSTALLED, WE SUGGEST THEY ARE LEFT IN SITU DURING CONSTRUCTION.





CONCRETE FOUNDATION

** TO AVOID REBAR IN REINFORCED FOUNDATIONS (GROUND BEAM ETC)



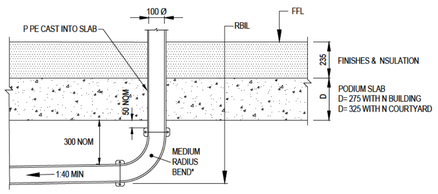
SUB-STRUCTURE WALL

PIPE SLEEVE SCHEDULE

NOM PIPE Ø	SLEEVE ID (MIN)
1000mm	200mm
150mm	250mm
225mm	325mm

TYPICAL PIPE SLEEVING DETAILS

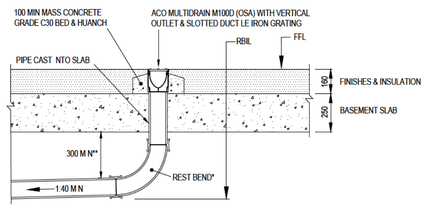
SCALE 1:20



TYPICAL UNDERSLUNG REST BEND DETAIL BELOW PODIUM SLAB

SCALE 1:20

* DIMS BASED ON ST GOBAIN ENSIGN MEDIUM RADIUS

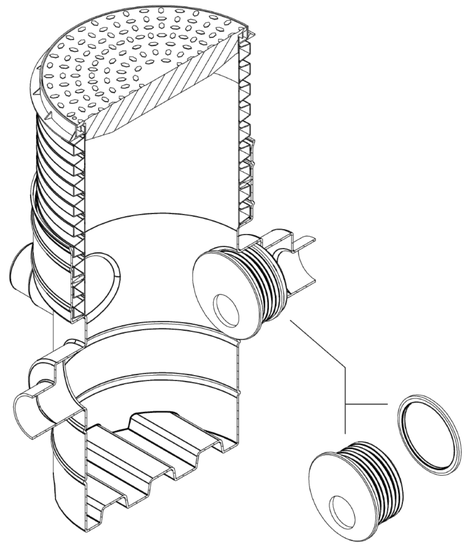


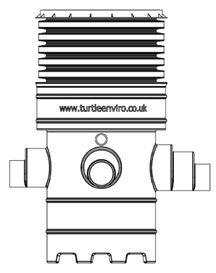
TYPICAL ACO CHANNEL DETAIL IN BASEMENT SLAB

SCALE 1:20

* DIMS BASED ON HEPWORTH 100Ø UPVC REST BEND (R = 275mm)

** TO AVOID CAST NG PIPES INTO SLAB





PRODUCT CODE: OFCP450/1

A	OVERALL HEIGHT	1050
B	INLET PIPE INVERT	730
C	DEPTH TO INLET PIPE SOFFIT	580

FLOW CONTROL CHAMBER DETAILS

SCALE NTS

Rev	Description	By	Date	Chkd
T1	TENDER ISSUE	DPA		CJ

PEREGA

perega.co.uk 528 High Road, Leytonstone, London E11 3EE 020 8988 5820

Client
HIGHTOWN HOUSING ASSOCIATION

Project
BROADWATER ROAD
WELWYN GARDEN CITY

Title
SUPPLMENTARY DRAINAGE DETAILS 2 of 4

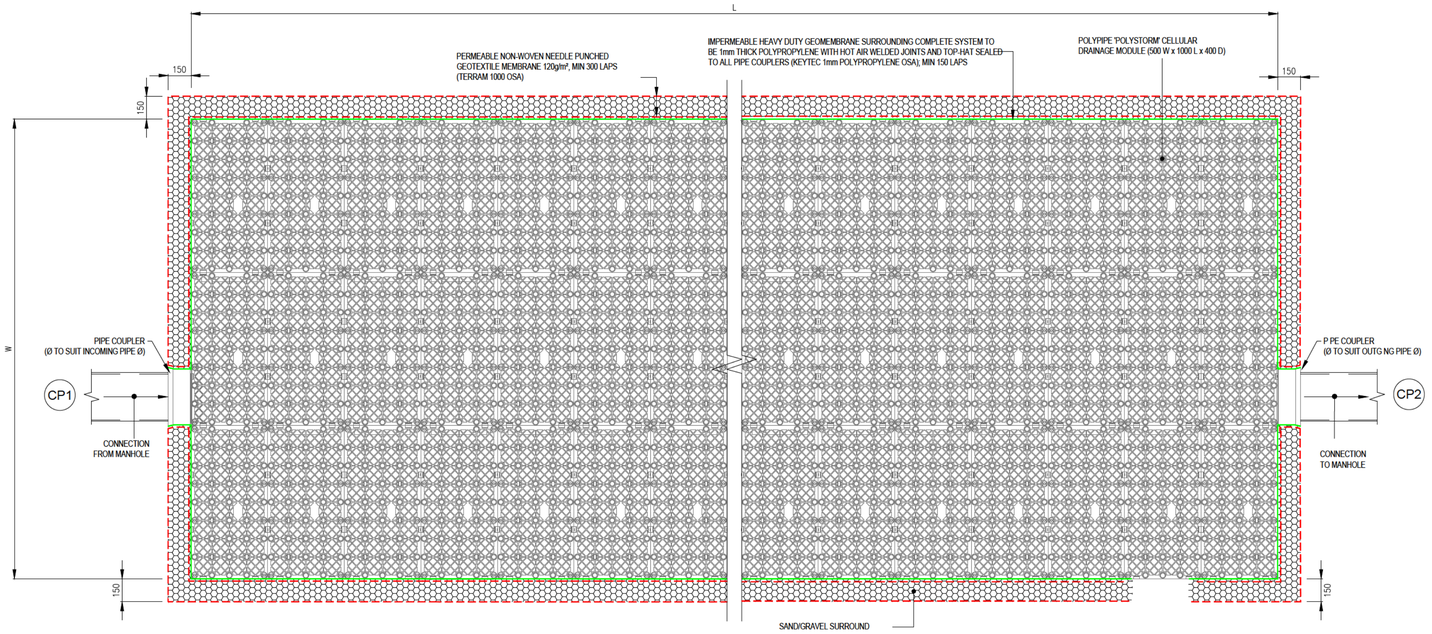
Perega Project No.	Checked	Passed	Size	Scale
C13568	CJ	EA	A1	AS SHOWN

Project Code	Originator	Zone	Level	Type	Role	Drawing No.
C13568	PER	ZZ	XX	DR	C	03004

Suitability Code	Status	Revision
S2	PRELIMINARY	T1

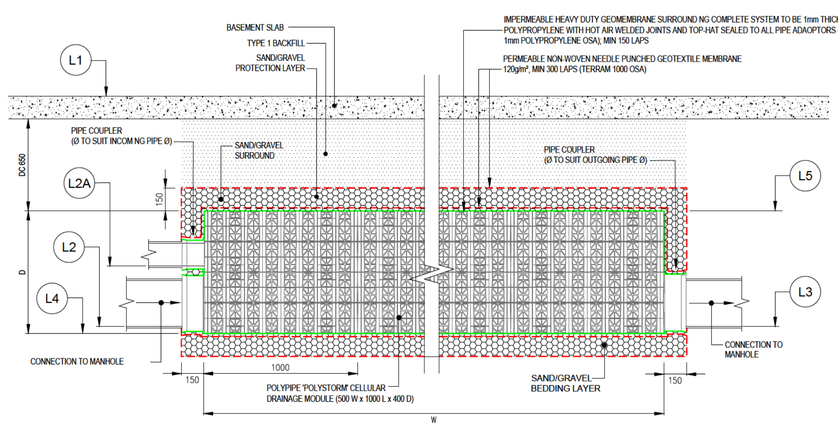
NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECT, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS.



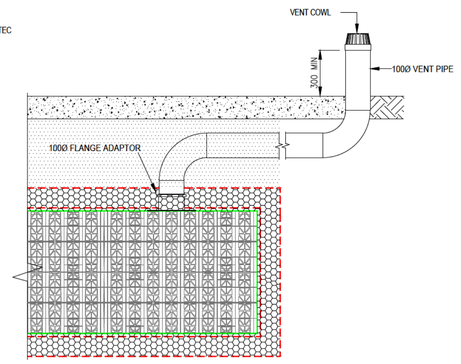
PLAN VIEW

(INSPECTION SHAFT NOT SHOWN)



TYPICAL SECTION

(INSPECTION SHAFT NOT SHOWN)



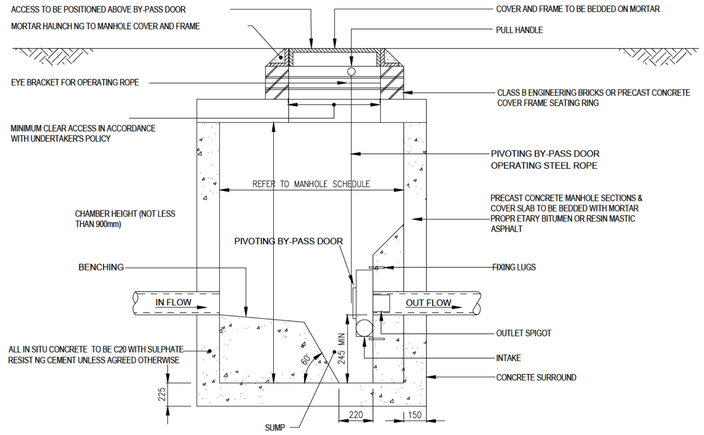
VENT PIPE DETAIL

TYPICAL ATTENUATION TANK DETAILS

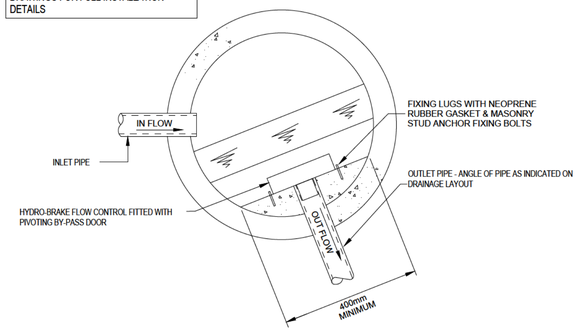
SCALE 1:20

REFER TO DRAINAGE LAYOUT FOR SITE SPECIFIC TANK LAYOUT/CONNECTION LOCATIONS

REFER TO SCHEDULE FOR SITE SPECIFIC D MENSIONS



REFER TO HYDRO INTERNATIONAL DRAWINGS FOR FULL INSTALLATION DETAILS



TYPICAL HYDROBRAKE CHAMBER DETAIL

SCALE 1:20

HYDROBRAKE SCHEDULE

MANHOLE No	MANUFACTURER	HYDRO INTERNATIONAL
S28	TYPE	MD-SHE-0064-2000-1200-2000
	DIA (mm)	64
	DESIGN HEAD (m)	1.20
	DESIGN FLOW (l/s)	2.0

ATTENUATION TANK SCHEDULE

TANK REF	MAKE	TYPE	LENGTH L (m)	WIDTH W (m)	DEPTH D (m)	GROSS STORAGE VOLUME (m^3)	CONNECTIONS						FGL L1 (mAOD)		TANK INVERT LEVEL L4 (mAOD)	TANK SOFFIT LEVEL L5 (mAOD)	DEPTH OF COVER DC (m)		VENTING DETAILS
							No*	TYPE	Ø (mm)	LEVEL L2 (mAOD)	LEVEL L2A (mAOD)	LEVEL L3 (mAOD)	Min	Max			Min	Max	
AT1	POLYPIPE	POLYSTORM-R 1.0 x 0.5 x 0.4	25.00 max	8.00	1.20	235.2 min	C1	INLET	300	80.500			82.97	82.97	80.455	81.655	1.315	1.315	100Ø UPVC PIPE & COWL
							C2	INLET	100		81.300								
							C3	INLET	100		81.300								
							C4	INLET	100		81.300								
							C5	OUTLET	300			80.500							

* FOR CONNECTION LOCATIONS REFER TO DRAINAGE LAYOUT

** INSPECTION SHAFT NOT SHOWN ON PLAN/SECTION

Rev	Description	By	Date	Chkd
T1	TENDER ISSUE	DPA		CJ

PEREGA
perega.co.uk 528 High Road, Leytonstone, London E11 3EE 020 8988 5820

Client
HIGHTOWN HOUSING ASSOCIATION

Project
BROADWATER ROAD
WELWYN GARDEN CITY

Title
SUPPLMENTARY DRAINAGE DETAILS 3 of 4

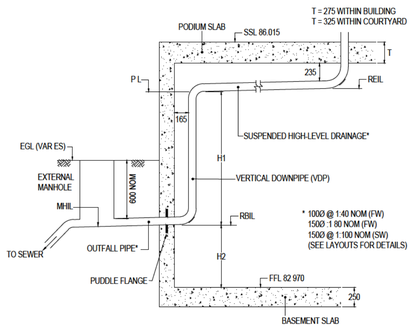
Perega Project No.	Checked	Passed	Size	Scale
C13568	CJ	EA	A1	AS SHOWN

Project Code	Originator	Zone	Level	Type	Role	Drawing No.
C13568	PER	ZZ	XX	DR	C	03005

Suitability Code	Status	Revision
S2	PRELIMINARY	T1

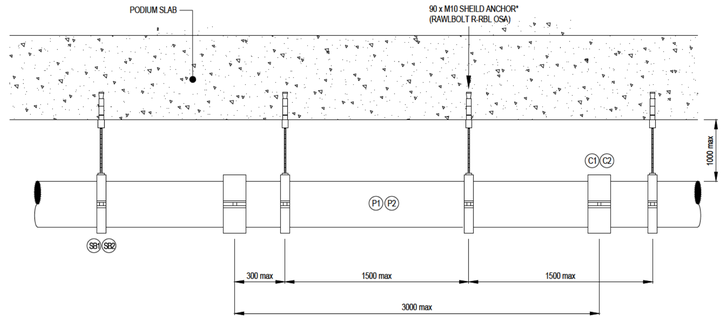
NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECT, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS.

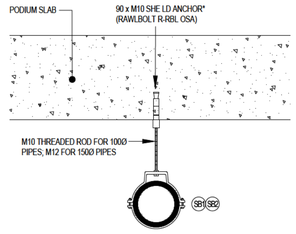


TYPICAL BASEMENT FW & SW CONNECTION DETAILS

SCALE 1:25



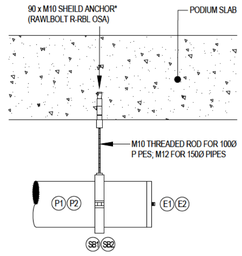
ELEVATION



END VIEW

TYPICAL HORIZONTAL PIPE SUPPORT DETAILS

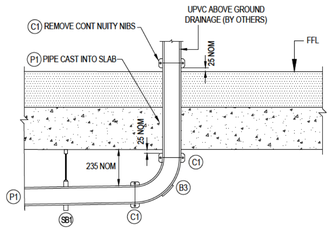
SCALE 1:10



DETAIL A - RODDING EYE

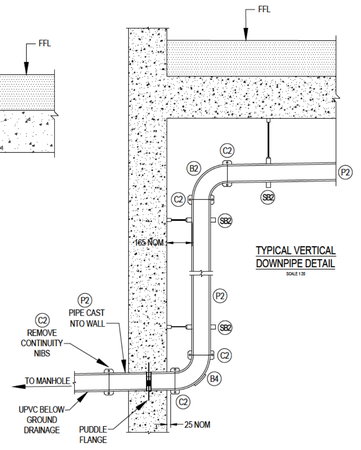
SCALE 1:10

CONNECTION SCHEDULE						
MH REF	REIL	PIL	MHIL	RBIL	H1	H2
F1	85.340	85.012	83.820	83.870	1.142	0.900
F2						
F3						
F5						
F7						
F8						
F9						
F10						
F12						
F14						
F15						
F16						
F17						
F18						
F19						
F21						
F22						
S1						
S4						
S5						
S8						
S9						
S12						
S13						
S14						
S18						



TYPICAL UNDERSLUNG REST BEND DETAIL

SCALE 1:20



TYPICAL VERTICAL DOWNPIPE DETAIL

SCALE 1:20

SUSPENDED PIPEWORK NOTES

PIPEWORK & FITTINGS TO BE 100/150 Ø ST GOBAIN ENSIGN SOIL (OSA) CAST IRON AS INDICATED ON DRAINAGE LAYOUT (EP000 = ST GOBAIN COMPONENT REFERENCE NUMBER)

SUSPENDED PIPEWORK TO HAVE TWO BRACKET SUPPORTS PER 3m LENGTH

POSITIONING OF BRACKETS AS FOLLOWS - 1st BRACKET 300 max FROM PIPE JOINT (COUPLING) WITH 2nd BRACKET POSITIONED AT APPROX CENTRE OF 3m PIPE (1500 max FROM FIRST BRACKET)

FURTHER BRACKETS MAY BE NECESSARY ADJACENT TO FITTINGS (BENDS, BRANCHES etc)

* ANCHOR BOLT DETAILS INDICATIVE ONLY (TBC)

KEY TO COMPONENTS

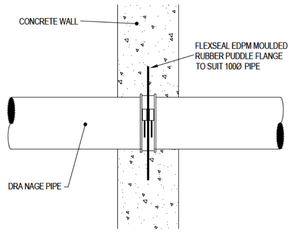
- P1 100 Ø DOUBLE SPIGOT PIPE EP000 (CUT TO LENGTH AS REQUIRED)
- P2 150 Ø DOUBLE SPIGOT PIPE EP000 (CUT TO LENGTH AS REQUIRED)
- C1 100 Ø TWO-PIECE IRON COUPLING EC002
- C2 150 Ø TWO-PIECE IRON COUPLING EC002
- BR1 100 x 100 45° EQUAL BRANCH EF006
- BR2 150 x 100 45° UNEQUAL BRANCH EF006
- B1 100 Ø 45° SHORT RADIUS BEND EF002
- B2 150 Ø 88° SHORT RADIUS BEND EF002
- B3 100 Ø 88° MEDIUM RADIUS BEND WITH DOOR BACK EF05L
- B4 150 Ø 88° SHORT RADIUS BEND WITH DOOR BACK EF005
- E1 100 Ø EXPANSION PLUG EF074
- E2 150 Ø EXPANSION PLUG EF074
- SB1 100 Ø DUCTILE IRON BRACKET EF048
- SB2 150 Ø DUCTILE IRON BRACKET EF048

ELEVATION

PLAN VIEW

TYPICAL VERTICAL PIPE SUPPORT DETAILS

SCALE 1:10



PUDDLE FLANGE DETAIL

SCALE 1:10

Rev	Description	By	Date	Chkd
T1	TENDER ISSUE	DPA		CJ

PEREGA

perega.co.uk 528 High Road, Leytonstone, London E11 3EE 020 8988 5820

Client
HIGHTOWN HOUSING ASSOCIATION

Project
BROADWATER ROAD
WELWYN GARDEN CITY

Title
SUPPLMENTARY DRAINAGE DETAILS 4 of 4

Perega Project No.	Checked	Passed	Size	Scale
C13568	CJ	EA	A1	AS SHOWN

Project Code	Originator	Zone	Level	Type	Role	Drawing No.
C13568	PER	ZZ	XX	DR	C	03006

Suitability Code	Status	Revision
S2	PRELIMINARY	T1

Appendix C

C13568 Broadwater Road: SW Network	Date: 10/04/2024		
	Designed by: DPA	Checked by: CJ	Approved By:
Report Details: Type: Inflows Storm Phase: Storm	528 High Road Leytonstone: E11 3EE		

PEREGA
528 High Road, Leytonstone, London E11 3EE

RE1 - TOC

Type : Catchment Area

Area (ha)	0.051

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

S3 - TAD 1

Type : Catchment Area

Area (ha)	0.069

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	0.750
Winter Volumetric Runoff Coefficient	0.840
Depression Storage (mm)	5
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120

Rainwater Tank

Number of Tanks	1

Detention

Volume (m³)	41.500
Initial Percentage Used (%)	0
Initial Volume Used (m³)	0.000
Outflow Limit (L/s)	2.0

S6 - TOC

Type : Catchment Area

Area (ha)	0.001

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

S7 - TOC

Type : Catchment Area

Area (ha)	0.051

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

S9 - TOC

Type : Catchment Area

Area (ha)	0.024

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

S11 - TAD 1

Type : Catchment Area

Area (ha)	0.095

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Green Roof
Summer Volumetric Runoff Coefficient	0.750
Winter Volumetric Runoff Coefficient	0.840
Depression Storage (mm)	4
Evapotranspiration (mm/day)	3.0
Decay Coefficiency	0.050
Time Delay (mins)	120

Rainwater Tank

Number of Tanks	1

Detention

Volume (m³)	57.000
Initial Percentage Used (%)	0
Initial Volume Used (m³)	0.000
Outflow Limit (L/s)	2.0

S10 - TOC

Type : Catchment Area

Area (ha)	0.023

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

S16 - TOC

Type : Catchment Area

Area (ha)	0.013

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

S17 - TOC

Type : Catchment Area

Area (ha)	0.008

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

S18 - TOC

Type : Catchment Area

Area (ha)	0.024

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

S27 - TOC

Type : Catchment Area

Area (ha)	0.005

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	100
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

C13568 Broadwater Road: SW Network	Date: 10/04/2024		
	Designed by: DPA	Checked by: CJ	Approved By:
Report Details: Type: Junctions Storm Phase: Storm	528 High Road Leytonstone: E11 3EE		

PEREGA
528 High Road, Leytonstone, London E11 3EE

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
RE1	Manhole	-116.868	812.120	84.910	0.825	84.085	Circular	0.600
S2	Manhole	-90.808	812.120	84.960	1.029	83.931	Circular	0.600
S3	Manhole	-76.608	812.120	84.890	1.043	83.847	Circular	0.600
S6	Manhole	-32.218	812.120	84.690	1.106	83.584	Circular	0.600
S7	Manhole	-18.698	812.120	84.550	1.046	83.504	Circular	0.600
S20	Manhole	15.542	812.120	84.490	3.837	80.653	Circular	1.200
S9	Manhole	15.542	946.970	84.660	0.750	83.910	Circular	0.450
S10	Manhole	15.542	944.770	84.680	0.867	83.813	Circular	0.600
S11	Manhole	15.542	916.190	84.540	0.896	83.644	Circular	0.600
S15	Manhole	15.542	847.970	84.380	1.140	83.240	Circular	0.600
S16	Manhole	15.542	837.060	84.510	1.334	83.176	Circular	0.600
S19	Manhole	15.542	816.380	84.510	1.396	83.114	Circular	0.600
S17	Manhole	24.922	816.380	84.560	0.700	83.860	Circular	0.450
S18	Manhole	18.452	816.380	84.590	0.890	83.700	Circular	0.450
RWH	Manhole	25.632	812.120	82.970	2.395	80.575	Circular	0.600
S21	Manhole	34.422	812.120	82.970	2.462	80.508	Circular	0.600
S27	Manhole	35.422	818.820	82.970	1.556	81.414	Circular	0.450
S28	Manhole	36.722	812.120	82.970	2.480	80.490	Circular	1.200
S29	Manhole	58.752	812.120	84.790	4.521	80.269	Circular	1.200
S30	Manhole	65.802	812.120	84.720	4.521	80.199	Circular	1.200
TW 1603	Manhole	75.762	812.120	84.500	4.400	80.100	Circular	1.200

Name	Access Required	Intersection Easting (m)	Intersection Northing (m)	Lock
RE1	☑	-116.868	812.120	None
S2	☑	-90.808	812.120	None
S3	☑	-76.608	812.120	None
S6	☑	-32.218	812.120	None
S7	☑	-18.698	812.120	None
S20	☑	15.542	812.120	None
S9	☑	15.542	946.970	None
S10	☑	15.542	944.770	None
S11	☑	15.542	916.190	None
S15	☑	15.542	847.970	None
S16	☑	15.542	837.060	None
S19	☑	15.542	816.380	None
S17	☑	24.922	816.380	None
S18	☑	18.452	816.380	None
RWH	☑	25.632	812.120	None
S21	☑	34.422	812.120	None
S27	☑	35.422	818.820	None
S28	☑	36.722	812.120	All
S29	☑	58.752	812.120	None
S30	☑	65.802	812.120	None
TW 1603	☐			None

C13568 Broadwater Road: SW Network	Date: 10/04/2024		
	Designed by: DPA	Checked by: CJ	Approved By:
Report Details: Type: Junctions Storm Phase: Storm	528 High Road Leytonstone: E11 3EE		

PEREGA
528 High Road, Leytonstone, London E11 3EE

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
RE1	Inlet	RE1 - TOC	(None)	No Restriction
S2	Inlet	1.000	(None)	No Restriction
S3	Inlet	S3 - TAD 1 1.001	(None)	No Restriction
S6	Inlet	1.002 S6 - TOC	(None)	No Restriction
S7	Inlet	1.003 S7 - TOC	(None)	No Restriction
S20	Inlet	1.004 2.005	(None)	No Restriction
S9	Inlet	S9 - TOC	(None)	No Restriction
S10	Inlet	2.000 S10 - TOC	(None)	No Restriction
S11	Inlet	S11 - TAD 1 2.001	(None)	No Restriction
S15	Inlet	2.002	(None)	No Restriction
S16	Inlet	2.003 S16 - TOC	(None)	No Restriction
S19	Inlet	2.004 3.001	(None)	No Restriction
S17	Inlet	S17 - TOC	(None)	No Restriction
S18	Inlet	3.000 S18 - TOC	(None)	No Restriction
RWH	Inlet	1.005	(None)	No Restriction
S21	Inlet	1.006	(None)	No Restriction
S27	Inlet	S27 - TOC	(None)	No Restriction
S28	Inlet	1.008	(None)	No Restriction
S29	Inlet	1.009	(None)	No Restriction
S30	Inlet	1.010	(None)	No Restriction
TW 1603	Inlet	1.011	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
RE1	Outlet	1.000	Free Discharge
S2	Outlet	1.001	Free Discharge
S3	Outlet	1.002	Free Discharge
S6	Outlet	1.003	Free Discharge
S7	Outlet	1.004	Free Discharge
S20	Outlet	1.005	Free Discharge
S9	Outlet	2.000	Free Discharge
S10	Outlet	2.001	Free Discharge
S11	Outlet	2.002	Free Discharge
S15	Outlet	2.003	Free Discharge
S16	Outlet	2.004	Free Discharge
S19	Outlet	2.005	Free Discharge
S17	Outlet	3.000	Free Discharge
S18	Outlet	3.001	Free Discharge
RWH	Outlet	1.006	Free Discharge
S21	Outlet	1.007	Free Discharge
S27	Outlet	4.000	Free Discharge
S28	Outlet	1.009	Free Discharge
S29	Outlet	1.010	Free Discharge
S30	Outlet	1.011	Free Discharge

AT1

Type : Pond

Dimensions

Exceedance Level (m)	82.970
Depth (m)	2.515
Base Level (m)	80.455
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	95
Average Slope (1:X)	-6.53
Total Volume (m³)	223.515

Depth (m)	Area (m²)	Volume (m³)
0.000	196.00	0.000
1.200	196.00	223.440
1.201	0.01	223.503

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	1.007 4.000
Bypass Destination	(None)
Capacity Type	No Restriction

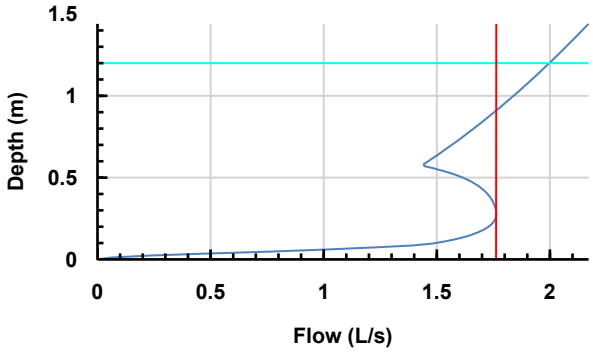
Outlets

Outlet

Outgoing Connection	1.008
Outlet Type	Hydro-Brake®

Invert Level (m)	80.500
Design Depth (m)	1.200
Design Flow (L/s)	2.0
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☑

Unit Reference	SHE-0064-2000-1200-2000



Advanced

Perimeter	Circular
Length (m)	25.000
Friction Scheme	Colebrook-White Roughness
Roughness (mm)	0.001

Flow Options

Peak Flow Calculation	Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Level	Level Inverts
Min. Slope (1:X)	1000.00
Max. Slope (1:X)	40.00
Use Flow Restriction	☑
Reduce Channel Depths	☑

Pipe Size Library

Add. Increment (mm)	0

Manhole Options

Apply Offset	☐
An error has occurred while processing TextBox 'txtSynchroniseManholeInvertLevelsHeader': The expression contains object 'SynchroniseManholeInvertLevelsTitle' that is not defined in the current context.	

Manhole Size Library

Benching Requirements

Landing Width (mm)	0
Benching Width (mm)	0

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
TW 1603	Free Discharge		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	0
Perform No Discharge Analysis	☐

Rainfall

Sim Criteria FSR

Type: FSR

Region	England And Wales
M5-60 (mm)	20.0
Ratio R	0.442
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	0.000
100.0	40.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Sim Criteria FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
RE1 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.05	7.4	3.426
S3 - TAD 1	Sim Criteria FSR: 1 years: +0 %: 30 mins: Winter	0.07	2.0	2.475
S6 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.00	0.1	0.069
S7 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.05	7.4	3.426
S9 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.02	3.5	1.613
S11 - TAD 1	Sim Criteria FSR: 1 years: +0 %: 15 mins: Summer	0.09	2.0	0.899
S10 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.02	3.3	1.544
S16 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.01	1.9	0.872
S17 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.01	1.2	0.537
S18 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.02	3.5	1.613
S27 - TOC	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	0.01	0.7	0.339

Sim Criteria FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
RE1 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.05	18.2	8.417
S3 - TAD 1	Sim Criteria FSR: 30 years: +0 %: 15 mins: Summer	0.07	2.0	1.500
S6 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.00	0.4	0.168
S7 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.05	18.2	8.417
S9 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.02	8.6	3.961
S11 - TAD 1	Sim Criteria FSR: 30 years: +0 %: 15 mins: Summer	0.09	2.0	2.100
S10 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.02	8.2	3.799
S16 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.01	4.6	2.144
S17 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.01	2.9	1.319
S18 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.02	8.6	3.961
S27 - TOC	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	0.01	1.8	0.825

Sim Criteria FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
RE1 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.05	33.2	15.319
S3 - TAD 1	Sim Criteria FSR: 100 years: +40 %: 15 mins: Summer	0.07	2.0	2.100
S6 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.00	0.6	0.303
S7 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.05	33.2	15.319
S9 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.02	15.6	7.210
S11 - TAD 1	Sim Criteria FSR: 100 years: +40 %: 15 mins: Summer	0.09	2.0	2.100
S10 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.02	15.0	6.907
S16 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.01	8.5	3.905
S17 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.01	5.2	2.402
S18 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.02	15.6	7.210
S27 - TOC	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	0.01	3.2	1.502

Sim Criteria FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
RE1	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.910	84.085	84.152	0.067	7.4	0.019	0.000	7.2	3.428	OK
S2	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.960	83.931	83.996	0.066	7.2	0.019	0.000	6.7	3.423	OK
S3	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.890	83.847	83.908	0.062	6.7	0.017	0.000	6.2	3.424	OK
S6	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.690	83.584	83.641	0.057	6.3	0.016	0.000	5.7	3.472	OK
S7	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.550	83.504	83.605	0.101	13.1	0.028	0.000	12.0	6.846	OK
S20	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.490	80.653	80.758	0.105	21.8	0.118	0.000	21.2	13.258	OK
S9	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.660	83.910	83.960	0.050	3.5	0.008	0.000	3.4	1.611	OK
S10	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.680	83.813	83.877	0.064	6.8	0.018	0.000	6.5	3.159	OK
S11	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.540	83.644	83.701	0.057	6.5	0.016	0.000	5.7	3.880	OK
S15	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.380	83.240	83.305	0.065	5.7	0.018	0.000	4.5	3.671	OK
S16	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.510	83.176	83.294	0.118	6.4	0.033	0.000	5.9	4.380	OK
S19	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.510	83.114	83.194	0.080	10.4	0.023	0.000	9.8	6.464	OK
S17	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.560	83.860	83.887	0.027	1.2	0.004	0.000	1.1	0.535	OK
S18	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	84.590	83.700	83.758	0.058	4.6	0.009	0.000	4.5	2.145	OK
RWH	Sim Criteria FSR: 1 years: +0 %: 480 mins: Winter	82.970	80.575	80.675	0.100	5.6	0.028	0.000	5.7	60.618	OK
S21	Sim Criteria FSR: 1 years: +0 %: 480 mins: Winter	82.970	80.508	80.674	0.167	5.7	0.047	0.000	5.7	60.594	OK
S27	Sim Criteria FSR: 1 years: +0 %: 15 mins: Winter	82.970	81.414	81.435	0.021	0.7	0.003	0.000	0.7	0.337	OK

S28	Sim Criteria FSR: 1 years: +0 %: 480 mins: Winter	82.970	80.490	80.521	0.031	1.6	0.035	0.000	1.6	46.625	OK
S29	Sim Criteria FSR: 1 years: +0 %: 480 mins: Winter	84.790	80.269	80.301	0.032	1.6	0.036	0.000	1.6	46.601	OK
S30	Sim Criteria FSR: 1 years: +0 %: 480 mins: Winter	84.720	80.199	80.231	0.032	1.6	0.036	0.000	1.6	46.582	OK
TW 1603	Sim Criteria FSR: 1 years: +0 %: 480 mins: Winter	84.500	80.100	80.131	0.031	1.6	0.000	0.000	1.6	46.582	OK

Sim Criteria FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
RE1	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.910	84.085	84.196	0.111	18.2	0.031	0.000	17.7	8.420	OK
S2	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.960	83.931	84.041	0.110	17.7	0.031	0.000	16.9	8.414	OK
S3	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.890	83.847	83.949	0.102	16.9	0.029	0.000	15.7	9.797	OK
S6	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.690	83.584	83.686	0.102	16.1	0.029	0.000	14.4	9.826	OK
S7	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.550	83.504	83.655	0.150	32.6	0.043	0.000	30.5	18.070	OK
S20	Sim Criteria FSR: 30 years: +0 %: 480 mins: Winter	84.490	80.653	81.043	0.390	11.0	0.442	0.000	10.9	140.766	Surcharged
S9	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.660	83.910	83.994	0.084	8.6	0.013	0.000	8.4	3.959	OK
S10	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.680	83.813	83.918	0.105	16.7	0.030	0.000	16.1	7.770	OK
S11	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.540	83.644	83.738	0.094	16.1	0.027	0.000	14.5	9.685	OK
S15	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.380	83.240	83.350	0.109	14.5	0.031	0.000	12.4	9.468	OK
S16	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.510	83.176	83.338	0.163	17.1	0.046	0.000	16.2	11.444	OK
S19	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.510	83.114	83.257	0.144	27.4	0.041	0.000	26.4	16.658	OK
S17	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.560	83.860	83.903	0.043	2.9	0.007	0.000	2.8	1.317	OK
S18	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	84.590	83.700	83.800	0.099	11.4	0.016	0.000	11.2	5.275	OK
RWH	Sim Criteria FSR: 30 years: +0 %: 480 mins: Winter	82.970	80.575	81.044	0.468	10.9	0.133	0.000	10.8	140.193	Surcharged
S21	Sim Criteria FSR: 30 years: +0 %: 480 mins: Winter	82.970	80.508	81.043	0.535	10.8	0.152	0.000	10.7	139.751	Surcharged
S27	Sim Criteria FSR: 30 years: +0 %: 15 mins: Winter	82.970	81.414	81.447	0.033	1.8	0.005	0.000	1.7	0.823	OK

S28	Sim Criteria FSR: 30 years: +0 %: 360 mins: Winter	82.970	80.490	80.522	0.032	1.8	0.036	0.000	1.8	58.934	OK
S29	Sim Criteria FSR: 30 years: +0 %: 480 mins: Summer	84.790	80.269	80.302	0.033	1.8	0.038	0.000	1.8	78.893	OK
S30	Sim Criteria FSR: 30 years: +0 %: 480 mins: Summer	84.720	80.199	80.232	0.033	1.8	0.037	0.000	1.8	78.833	OK
TW 1603	Sim Criteria FSR: 30 years: +0 %: 480 mins: Summer	84.500	80.100	80.132	0.032	1.8	0.000	0.000	1.8	78.833	OK

Sim Criteria FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
RE1	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.910	84.085	84.253	0.168	33.2	0.047	0.000	32.2	15.323	OK
S2	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.960	83.931	84.095	0.164	32.2	0.047	0.000	30.8	15.317	OK
S3	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.890	83.847	83.994	0.147	30.8	0.042	0.000	29.3	17.294	OK
S6	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.690	83.584	83.759	0.175	29.9	0.050	0.000	26.0	17.466	OK
S7	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.550	83.504	83.724	0.220	59.1	0.062	0.000	55.4	32.606	OK
S20	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	84.490	80.653	81.650	0.997	11.3	1.127	0.000	11.2	296.509	Surcharged
S9	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.660	83.910	84.036	0.126	15.6	0.020	0.000	15.3	7.207	OK
S10	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.680	83.813	83.966	0.153	30.2	0.043	0.000	29.3	14.129	OK
S11	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.540	83.644	83.779	0.135	29.3	0.038	0.000	26.8	16.022	OK
S15	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.380	83.240	83.422	0.181	26.8	0.051	0.000	21.2	15.825	OK
S16	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.510	83.176	83.402	0.226	29.7	0.064	0.000	27.8	19.570	OK
S19	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.510	83.114	83.348	0.235	47.9	0.066	0.000	47.1	29.107	Surcharged
S17	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.560	83.860	83.919	0.059	5.2	0.009	0.000	4.9	2.400	OK
S18	Sim Criteria FSR: 100 years: +40 %: 15 mins: Winter	84.590	83.700	83.884	0.184	20.5	0.029	0.000	20.1	9.607	Surcharged
RWH	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	82.970	80.575	81.650	1.075	11.2	0.304	0.000	11.1	295.457	Surcharged
S21	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	82.970	80.508	81.649	1.142	11.1	0.323	0.000	11.1	294.653	Surcharged
S27	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	82.970	81.414	81.650	0.236	0.2	0.037	0.000	0.2	4.218	Surcharged

S28	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	82.970	80.490	80.523	0.034	1.9	0.038	0.000	1.9	172.573	OK
S29	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	84.790	80.269	80.304	0.035	1.9	0.039	0.000	1.9	172.502	OK
S30	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	84.720	80.199	80.234	0.035	1.9	0.039	0.000	1.9	172.446	OK
TW 1603	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	84.500	80.100	80.133	0.033	1.9	0.000	0.000	1.9	172.446	OK

Sim Criteria FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. US Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
AT1	Sim Criteria FSR: 1 years: +0 %: 480 mins: Winter	80.675	80.675	0.220	0.220	5.8	40.888	0.000	0.000	1.6	46.660	81.707	OK

Sim Criteria FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. US Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
AT1	Sim Criteria FSR: 30 years: +0 %: 480 mins: Winter	81.043	81.043	0.588	0.588	10.9	109.562	0.000	0.000	1.8	79.337	50.982	OK

Sim Criteria FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. US Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
AT1	Sim Criteria FSR: 100 years: +40 %: 960 mins: Winter	81.650	81.650	1.195	1.195	11.3	222.453	0.000	0.000	1.9	172.669	0.475	OK

Appendix D

29 Broadwater Road

Drainage Maintenance Strategy

Ref: C13947-PER-ZZ-XX-RP-C-00002
Date: April 2024

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Contents

Suitability Code	Revision/ Version	Date	Written by	Checked by	Description
S2	P1	12.04.24	Christopher James	David Ayris	Planning Issue

1. Introduction

1.1 This document sets out the principles for the long-term management and maintenance of the proposed surface water drainage system for the development at 29 Broadwater Road.

1.2 The purpose of this document is to ensure that the adopting site management company has a robust inspection and maintenance plan going forwards. This ensures the optimum operation of the surface water drainage system and that it will be continually maintained for the lifetime of the development. This will contribute to reducing the risk of surface water flooding both on- and off-site.

1.3 All those responsible for maintenance should follow relevant health and safety legislation for all activities listed within this report (including lone working, if relevant). Method statements and risk assessments should always be undertaken.

1.4 This document has been produced by Perega on behalf of their client, Hightown Housing Association. This document describes the typical management and maintenance tasks that are known at the design stage (maintenance frequencies and typical tasks, for example). These have been drawn from industry guidance such as CIRIA C753 - The SuDS Manual – and manufacturer's own guidance.

1.5 Maintenance is considered as a construction activity under the CDM Regulations 2015. Under the CDM Regulations, it is a requirement that a competent person be appointed to carry out a required role. They must have sufficient knowledge of the specific tasks to be undertaken, as well as sufficient experience and ability to carry out their duties in relation to the task in a way that secures health and safety on site.

1.6 In recognition of the requirements of the CDM Regulations 2015, this surface water management and maintenance plan expects that the maintenance work will be carried out by a competent person who must have prior knowledge of the drainage components and SuDS systems on site.

1.7 There are limitations on what this document can prescribe at this time. At this stage this document cannot name the specific individuals who will carry out the maintenance and what equipment is to be used. Related to this, this document is unable to provide method statements for exactly how maintenance practices will be carried out. These can only be determined at the time of the maintenance being carried out and the exact maintenance need. Therefore, this is to be the responsibility of the site management company and/or the individuals carrying out the work. We urge those who are carrying out the maintenance to record this information and make it available to the Local Planning Authority (LPA), if required to do so. This needs to be a living document that is owned and maintained by the adopting site management company

2. Maintenance Categories

2.1 There are three categories of maintenance activities referred to in this report. These are:

Regular maintenance (including inspections and monitoring)

Regular maintenance consists of basic tasks done on a frequent and predictable schedule, including inspections, vegetation management, and litter, silt and debris removal.

Occasional maintenance

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).

Remedial maintenance

Remedial maintenance comprises of intermittent tasks that may be required to rectify faults associated with the system. The likelihood of faults can be minimised by correct installation, regular inspection and timely maintenance. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events and, as such, timings are difficult to predict.

2.2 This document should be read in conjunction with the design drawings of the drainage system, so that the location and type of each feature can be recognised and understood.

3. The Surface Water Drainage System

3.1 The proposed surface water drainage system is made up of a number of components. These include:

- Permeable paving
- Catchpit manholes/silt traps
- Geocellular storage crates
- Hydrobrake
- Manholes
- Pipes.

3.2 All components should be installed and maintained in accordance with the manufacturer's instructions and to the levels/arrangement as defined on the designer's drawings. Not doing so will invalidate any warranty provided by the manufacturer. The designer's drawings have been appended to this document for information.

3.3 All maintenance and cleaning must be carried out in accordance with manufacturer's recommendations and by suitably qualified staff.

4. General Maintenance Principles

4.1 All surface water drainage systems, whether piped gravity systems, Sustainable Drainage Systems (SuDS), or flow control devices, require regular maintenance to keep them working at optimum efficiency and capacity.

4.2 Timely and adequate maintenance will increase the lifespan of all the drainage components. Inadequate maintenance will do the reverse. Therefore, the projected lifespan and anticipated replacement date of each drainage component cannot be forecast at the time of this document being produced.

4.3 The site management company (or their agents) are responsible for the maintenance of the surface water drainage system.

4.4 Construction activities can create and discharge significant quantities of sediment that will quickly clog the surface water drainage system. Therefore, construction-stage sediment removal is required immediately post-construction. This may require several cleans of the system during the first year after installation. The site manager should assess this and carry out cleaning as necessary.

4.5 Catchpit manholes/silt traps have been specified upstream of the geocellular tank. They will remove gross solids and the majority of silts. It is important that any debris build-up in the catchpit manholes/silt traps is removed at regular intervals. This will reduce the risk of the geocellular tank becoming silted up. It will maintain its design capacity and function.

4.6 Cleaning should also take place after large storms when there have been increased surface water flows and visible entrainment and deposition of debris.

4.7 An increased frequency of inspection and maintenance should be programmed into the autumn and winter months in acknowledgement that:

- Leaf fall from deciduous trees in autumn will result in an increased amount of leaf litter and an elevated blockage risk of drainage infrastructure.
- Increased rainfall during winter months will result in greater quantities of water moving through the drainage system and a greater input of silt and other debris.

4.8 Table 4.1, below, gives an overview of typical maintenance tasks and the frequency with which they need to be undertaken. Section 5 – Inspection and Maintenance Frequency of Components – will ascribe typical maintenance frequencies and tasks to the specific components used within the surface water drainage system.

Table 4.1: Typical maintenance tasks and frequencies

Activity	Indicative Frequency	Typical Tasks
Routine/regular maintenance	Monthly to annually	• Litter picking • Silt removal • Inspection of all inlets, outlets and control structures • Weed removal and invasive plant control
Occasional maintenance	Annually up to 25 years	• Silt control around components • Vegetation management around components • Sweeping of pavement areas to remove surface silt • Silt removal from catchpits, cellular storage structures.
Remedial maintenance	As required	• Inlet/outlet repair • Erosion repairs • Reinstatement of edgings • Reinstatement following pollution • Removal of silt build-up and leaf litter after storms • Repair of vandalism • Replacement of any blocked filter membranes/materials

5. Inspection and Maintenance Frequency of Components

5.1 Table 5.1 on the next page lists each of the components used within the site's surface water drainage system. It suggests an indicative maintenance frequency for each component and ascribes typical maintenance tasks to them.

5.2 This list is not exhaustive, nor is it prescriptive. As mentioned in Section 3, additional, unscheduled maintenance may be required following adverse weather conditions or after autumn leaf falls. Additional maintenance tasks may be required to adequately clean and maintain individual components.

5.3 The list of components should be cross-referenced with the designers drawings (appended to this document) so that the location of each component can be identified.

5.4 It is the responsibility of the site management company (or their agents) to ensure that all necessary maintenance activities are carried out in a timely manner and that the design performance of each drainage component is preserved.

5.5 If there is any uncertainty regarding the correct and safe methods of cleaning, or what equipment should be used, the manufacturer should be consulted.

Table 5.1: Typical maintenance tasks and frequencies

Activity	Indicative Frequency	Anticipated Tasks
Catchpit Manholes/Silt Traps	Annually	• Inspect/identify any damage or areas that are not operating correctly • Remove silt, litter, leaves and other detritus. • Inspect once clean.
Pipes	As required	• Identify any pipes that may not be operating properly and employ a competent, qualified contractor to inspect using CCTV. • If the pipe is blocked with silt or debris, the pipe should be jetted clean from an upstream access point. All silt and debris should be captured and removed at a downsteam access point. • Inspect once clean. • If any other defects are encounteted (cracks, displaced joints, root ingress), appropriate solutions should be discussed with a competent and qualified contractor. These services are usually provided by the same companies that offer CCTV surveys and pipe jetting services.
Manholes	Annually	• Inspect/identify any damage or areas that are not operating correctly • Remove silt, litter, leaves and other detritus. • Inspect once clean.
Geocellular Storage Crates	Every three months for the first year, then annually thereafter	• Contact manufacturer for instruction on approved and safe inspection and maintenance practices • Inspect/identify any areas that are not operating correctly • Remove debris from catchment surface • Remove sediment from pre-treatment structures • Check for silt build-up and flush and remove as required. • Inspect once clean. • See Table 21.3 of CIRIA C753 for more information.
Hydrobrake chamber	Every three months for the first year, then annually thereafter	• Contact manufacturer for instruction on approved and safe inspection and maintenance practices. • Inspect Hydrobrake and check functionality. Remove any detritus as required. • Inspect once clean.

		• Refer to appended Hydrobrake maintenance and safety sheet.

5.6 Upon completion of maintenance activities, a record should be kept of the work carried out. This should be retained and an annual maintenance report should be compiled, which should include the following:

- Observations resulting from inspections
- Maintenance and operation activities undertaken during the year
- Recommendations for inspections and maintenance programmes for the following year

5.7 On the next page is a table with suggested information should be recorded and included with the maintenance plan. As mentioned in the introduction to this document, this should be a living document and regularly updated, as required.

5.8 The Local Planning Authority may request to check and sign off any maintenance activities. Therefore, it is the recommendation that the LPA is contacted prior to any scheduled routine maintenance. The table mentioned above and on the next page, as well as the annual maintenance report, should be offered to the LPA for their records and approval.

Table 5.2: Suggested Maintenance Record

Date	Component requiring maintenance	Issues prompting maintenance	Scheduled maintenance (Y/N)	Maintenance carried out	Additional works required (Y/N). If yes, please detail	Next scheduled date of inspection and maintenance

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