



GRFC Bowls Club, Church Walk, Gravesend, Kent, DA12 2QU

Planning permission Application Ref No: 20221328

Pre-Commencement Conditions 8 & 9

Issue 1: 4th December 2024

1.0 Introduction

- 1.1 McCarthy & Stone retirement has appointed Infrastructure Design Ltd (IDL) to prepare a surface water detailed design for their proposed residential development site in order to satisfy the planning conditions imposed on the above planning consents.
- 1.2 Infrastructure Design Limited Drainage Strategy report IDL/1129/DS/001 RevP03 dated October 2022 and Amazi Flood Risk Assessment was granted on 12th January 2024.
- 1.3 This summary report supplies the information required to satisfy planning consent pre-commencement conditions 8 & 9.

2.0 Condition 8-Sustainable Surface Water Drainage Scheme and Infiltration.

Development shall not begin until a detailed sustainable surface water drainage scheme for the site has been submitted to (and approved in writing by) the local planning authority. The detailed drainage scheme shall demonstrate that due consideration has first been given to the possibility of utilising infiltration techniques and that the surface water generated by this development (for all rainfall durations and intensities up to and including the climate change adjusted critical 100 year storm) can be accommodated and disposed of within the curtilage of the site without increase to flood risk on or off-site. Should the use of infiltration prove to be beyond being reasonably practical then any surface water leaving site shall not exceed a discharge rate of 1.4l/s for all rainfall events. The drainage scheme shall also demonstrate that silt and pollutants resulting from the site use and construction can be adequately managed to ensure there is no pollution risk to receiving waters.

Reason: *To ensure the development is served by satisfactory arrangements for the disposal of surface water and to ensure that the development does not exacerbate the risk of on/off site flooding in accordance with policy CS18 of the Gravesham Core Strategy 2014.*

Condition 8 Response

A detailed drainage layout, levels, and drainage calculations have been prepared based on the principles set out in the approved drainage strategy and flood risk assessment.

In situ, soakaway tests were performed in trial pits TP1 and TP2. Based on soakaway test results, the infiltration technique is considered unsuitable for discharging surface water runoff from the proposed development to the ground.

The approved overall allowable discharge rate of 1.4 l/s (for all storm events) has been applied to the positively drained site catchments, thus ensuring compliance with the approved scheme. The outfalls discharge to the existing sewer (which runs south).

The total proposed impermeable area of the site is 0.3 Ha from the roof and the external paved areas.

The proposed residential development incorporates the use of SuDS techniques selected for their suitability given the site layout, topographical levels and geotechnical constraints.

The following SuDS features have been proposed in this development:

- **Permeable paving (Permeable Block paving):** Wherever surface gradients permit, permeable paving will be used in the construction of access roads and parking areas. These areas will have a minimum 350mm low-fines sub-base, lined with an impermeable membrane with onward connectivity to the pipe network via a perforated pipe.
- **Grass Swale:** Surface Water flooding conveyance swales.
- **Cellular crate storage:** Cellular crates storage have been proposed to capture the surface water runoff from the development.

The proposed drainage system has been checked using FEH2022 rainfall data for all storm events, including the 1 in 100 year + 45% climate change, critical storm. Please note that there is no flooding at any point on the drainage systems for all storm events, including the 1 in 100 years + 45% climate change event.

A detailed drainage layout complete with drainage pipe reference, pipe diameters, cover and invert levels, plus detailed drawings for the control manholes, catchpit manholes, cellular crate storage, permeable paving are included as Appendix A.

The overland flows and the exceedance routes have been shown in the drainage drawing. Refer to Appendix A for the proposed drainage drawing.

Refer to Appendix A for the construction details of the various component parts of the surface water drainage system.

Refer to Appendix B for the *Flow* drainage calculations.

The proposed drainage system will remain private and maintained by an in-house management company for McCarthy Stone for the lifetime of the development. In the event of the failure of the drainage element, McCarthy's House Maintenance and & Management Company will be responsible for carrying out remedial works. A maintenance and management regime of all drainage elements, including the SuDS features and control manhole, has been included in Appendix C.

A detailed surface water management plan has been prepared to maintain the surface water runoff, mitigate pollution and protect the permanent drainage system during construction. Refer to Appendix D for the SWMP plan for the scheme.

3.0 Condition 9-Foul and Surface Water Sewerage Disposal

Notwithstanding the details shown on the approved plans, submitted documents and application form, before any above ground works commence details of the proposed means of foul and surface

water sewerage disposal shall be submitted to, and approved in writing by, the Local Planning Authority in consultation with Southern Water. The development shall be carried out in accordance with the approved details.

Reason: *To ensure that the principles of sustainable drainage are incorporated into this proposal; to ensure that the development does not contribute to, or is not put at risk from, or adversely affected by, unacceptable levels of water pollution caused by mobilised contaminants and to ensure ongoing efficacy of the drainage provisions, in accordance with policies CS18 and CS19 of the Gravesham Local Plan Core Strategy (September 2014).*

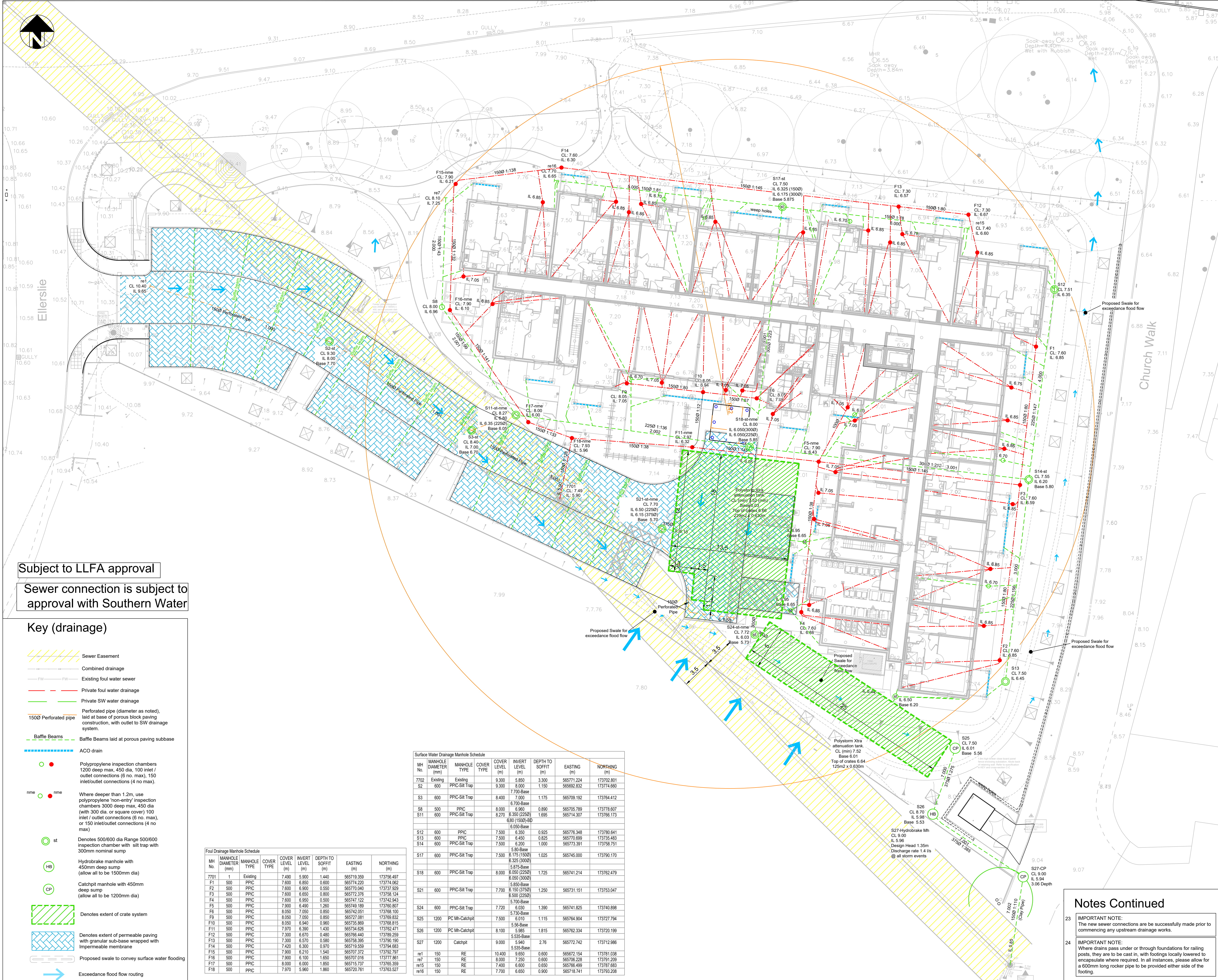
Condition 9 Response

Refer to Appendix E for the sewer connection approval letter from Southern Water in relation to the foul and surface water connection.

Appendix A

LEVELS LAYOUT, DRAINAGE LAYOUT AND CONSTRUCTION DETAILS





Subject to LLFA approval

Sewer connection is subject to approval with Southern Water

Key (drainage)

- Sewer Easement
- Combined drainage
- Existing foul water sewer
- Private foul water drainage
- Private SW water drainage
- Perforated pipe (diameter as noted), laid at base of porous block paving construction, with outlet to SW drainage system.
- Baffle Beams
- Baffle Beams laid at porous paving subbase
- ACO drain
- Polypropylene inspection chambers 1200 deep max, 450 dia, 100 inlet / outlet connections (6 no. max), or 150 inlet/outlet connections (4 no max).
- Where deeper than 1.2m, use polypropylene 'non-entry' inspection chambers 3000 deep max, 450 dia (with 300 dia. or square cover) 100 inlet / outlet connections (6 no. max), or 150 inlet/outlet connections (4 no max)
- Denotes 500/600 dia Range 500/600 inspection chamber with silt trap with 300mm nominal sump
- Hydrobrake manhole with 450mm deep sump (allow all to be 1500mm dia)
- Catchpit manhole with 450mm deep sump (allow all to be 1200mm dia)
- Denotes extent of grate system
- Denotes extent of permeable paving with granular sub-base wrapped with Impermeable membrane
- Proposed swale to convey surface water flooding
- Exceedance flood flow routing

Foul Drainage Manhole Schedule							
MH No.	MANHOLE DIAMETER (mm)	MANHOLE TYPE	COVER TYPE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO SOFFIT (m)	NORTHING (m)
7701	1	Existing		7.490	5.900	1.440	173756.497
F1	500	PPIC		7.600	6.850	0.800	173774.062
F2	500	PPIC		7.600	6.900	0.550	173737.309
F3	500	PPIC		7.600	6.650	0.800	173758.124
F4	500	PPIC		7.600	6.950	0.500	173742.943
F5	500	PPIC		7.600	6.490	1.260	173781.807
F9	500	PPIC		8.050	7.050	0.850	173786.259
F9	500	PPIC		8.050	7.050	0.850	173789.832
F10	500	PPIC		8.050	6.940	0.960	173788.815
F11	500	PPIC		7.970	6.290	1.430	173782.471
F12	500	PPIC		7.300	6.670	0.480	173786.259
F13	500	PPIC		7.300	6.570	0.580	173790.190
F14	500	PPIC		7.420	6.300	0.970	173794.683
F15	500	PPIC		7.800	6.210	1.540	173792.797
F16	500	PPIC		7.800	6.100	1.650	173777.851
F17	500	PPIC		8.000	6.000	1.850	173785.359
F18	500	PPIC		7.970	5.960	1.860	173783.527

Surface Water Drainage Manhole Schedule							
MH No.	MANHOLE DIAMETER (mm)	MANHOLE TYPE	COVER TYPE	COVER LEVEL (m)	INVERT LEVEL (m)	DEPTH TO SOFFIT (m)	NORTHING (m)
7702	Existing	Existing		8.300	5.800	3.300	173792.801
S2	600	PPIC-Silt Trap		8.300	8.000	1.150	173774.660
S3	600	PPIC-Silt Trap		8.400	7.000	1.175	173784.412
S8	500	PPIC		8.000	6.960	0.890	173778.607
S11	600	PPIC-Silt Trap		8.270	6.350 (2250)	1.695	173786.173
S12	600	PPIC		7.500	6.350	0.925	173780.641
S13	600	PPIC		7.500	6.450	0.825	173735.483
S14	600	PPIC-Silt Trap		7.500	6.200	1.000	173758.751
S17	600	PPIC-Silt Trap		7.500	6.175 (1500)	1.025	173790.170
S18	600	PPIC-Silt Trap		8.000	6.050 (2250)	1.725	173782.479
S21	600	PPIC-Silt Trap		7.700	6.150 (3750)	1.250	173753.047
S24	600	PPIC-Silt Trap		7.720	6.030	1.390	173740.898
S25	1200	PC Mh-Catchpit		7.500	6.110	1.115	173727.794
S26	1200	PC Mh-Catchpit		8.100	5.985	1.815	173720.196
S27	1200	Catchpit		9.000	5.340	2.76	173712.986
re1	150	RE		10.400	9.650	0.600	173781.038
re7	150	RE		8.000	7.250	0.600	173791.209
re15	150	RE		7.400	6.600	0.600	173787.683
re16	150	RE		7.700	6.650	0.900	173793.208

- Notes
- This drawing is to be read in conjunction with the private and drainage construction details.
 - All private drainage works to be carried out in accordance with the provisions laid down in BS EN 752 & The Building Regulations, Part H.
 - Levels shown in buildings are Finished Floor Level.
 - Drainage under adopted roads to be either:
a) Vitrified Clayware to BS EN 295
b) Concrete to BS 5911, Class M. Laterals to be formed of either vitrified clay, or "Extra Strength", concrete "Class M".
 - Before commencing any Sewer or drainage works, the Developer's Groundworker must satisfy themselves, the developer and the Local Authority of actual levels and conditions of existing sewers.
 - Buried concrete to satisfy the requirements of BRE Special Digest 1 as predetermined by the site's Geotechnical Report
 - All abandoned, buried obstructions encountered during the construction of Highway & Drainage Works are to be broken out to bed level of drains and sewers, and to the formation of carpark and drives etc., and to sufficient depth to allow for laying service company's mains and services.
 - Depth and Location of existing services to be traced prior to any excavation.
 - All private drainage to be laid to levels shown using flexibly jointed pipes, either uPVC to BS 4660 and BS 5481 or vitrified clayware to BS EN 295.
 - Generally pipes to have granular Bed & Surround in accordance with manufacturers recommendations, ensuring adequate protection with respect to depth and location. Where bedding material is placed at depths susceptible to ground water ingress, it is to be wrapped in a geotextile (Terram 700 or better).
 - Private precast concrete manholes and catchpits to be constructed using conc. box sections or circular rings to BS 5911-200, with 150mm conc. surround, size and construction to comply with Table 12 of Approved Document, Part H.
 - Rodding eyes, etc. are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.
 - Access panels are to be provided to all rainwater pipes, a max. 600 above finished ground level.
 - All pipework to be 100mmØ (1500 from road gullies) unless otherwise stated.
 - All levels in metres (m) unless specified otherwise.
 - All drain runs from Svp's, stub stacks or FW gullies to be laid at 1:40 gradient unless otherwise stated.
 - Svp's, stub stacks & RWP's are shown indicative only. Refer to CHBC drawings for accurate locations
 - House/Fiat drainage to be laid prior to erection of scaffold.
 - All cover and invert levels shown are in metres. All pipe diameters are in millimetres U.N.O.
 - All chambers located in trafficked areas to have concrete surround as detailed on drainage construction details
 - IMPORTANT NOTE:
At depths where groundwater ingress is encountered, consider the use of a sump / pump arrangement. Additional reference should be made to the Interpretative Geotechnical Report for supplementary measures in such instances
Where excavations are 1m deep, consider the use of full perimeter trench support.

REVISIONS			
Rev.	Note	Date	By
B	F13 location revised, manhole schedule corrected	04.12.24	BM
A	Stage 4 issue revised with speedcheck design and revised according to their comments	21.10.24	BM
-	Stage 4 issue	15.09.24	BM

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working for

McCarthy Stone
Life, well lived

Project Title
Bowls Club, Gravesend
Kent
DA12 2QU

Drawing Title
Proposed Drainage Plan

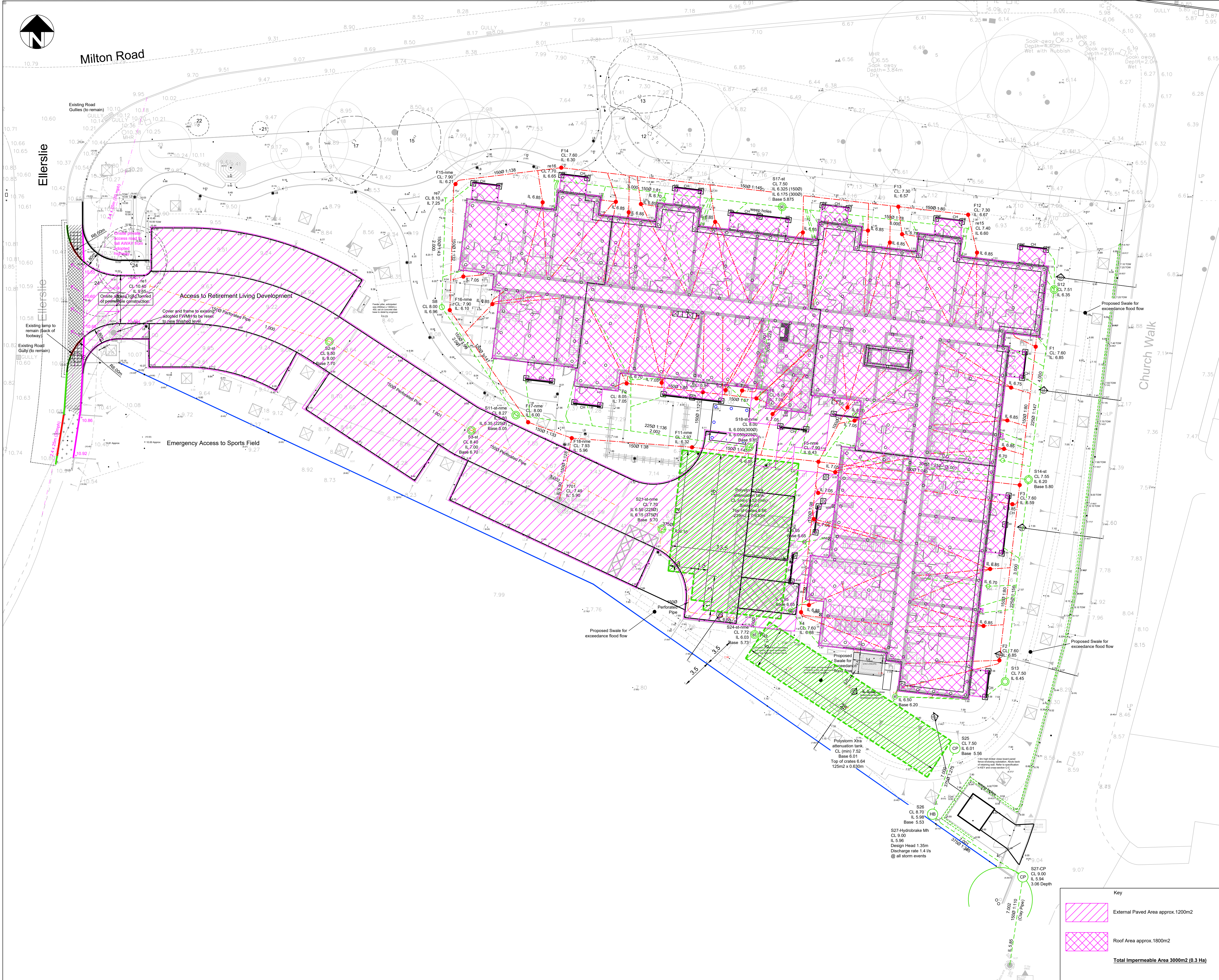
Scale 1:200 @ A1 Date 25.06.24
Drawn BM Checked PT
Drawing No. LSE-2821-04-DE-0101 B

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Notes Continued

- IMPORTANT NOTE:
The new sewer connections are to be successfully made prior to commencing any upstream drainage works.
- IMPORTANT NOTE:
Where drains pass under or through foundations for railing posts, they are to be cast in, with footings locally lowered to encapsulate where required. In all instances, please allow for a 600mm long rocker pipe to be provided either side of the footing.



Note

1 This drawing is to be read in conjunction with the private and drainage construction details.

A	Drainage and area updated	04.12.24	BM
-	Stage 4 Issue	28.06.24	BM
Rev.	Note	Date	By

REVISIONS

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working for

MCCARTHY STONE

Life, well lived

Project Title
Bowls Club,
Gravesend
Kent
DA12 2QU

Drawing Title
Proposed Drainage Area Plan

Scale 1:200 @ A1 Date XX.06.24
Drawn BM Checked PT
Drawing No.
LSE-2821-04-DE-0102 A

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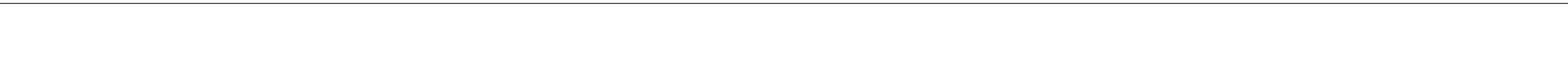
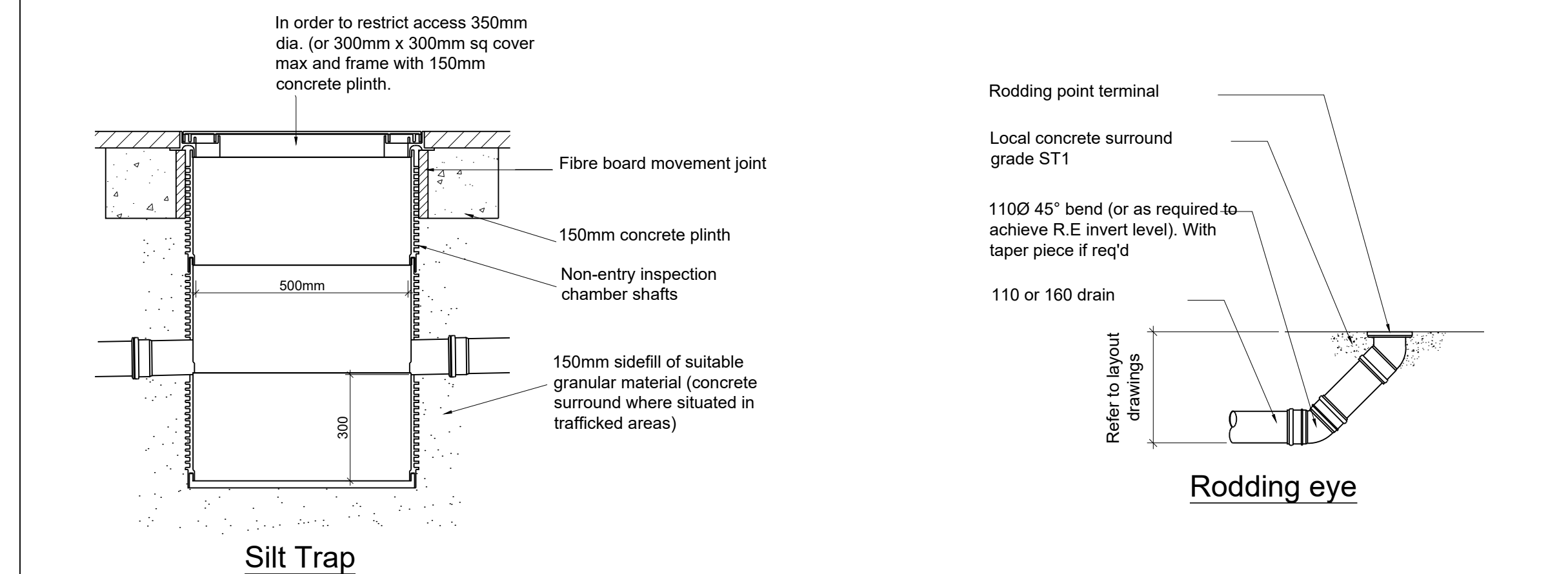
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Key

External Paved Area approx. 1200m²

Roof Area approx. 1800m²

Total Impermeable Area 3000m² (0.3 Ha)



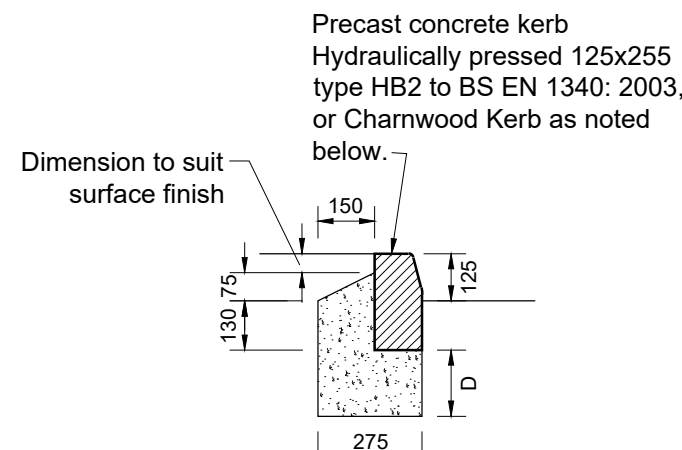
Notes:

- 1 This drawing is to be read in conjunction with the Drainage Layout.
- 2 All private drainage works to be constructed in accordance with the latest edition of the Building Regulations part H (Drainage & Waste Disposal) and to BS EN752.

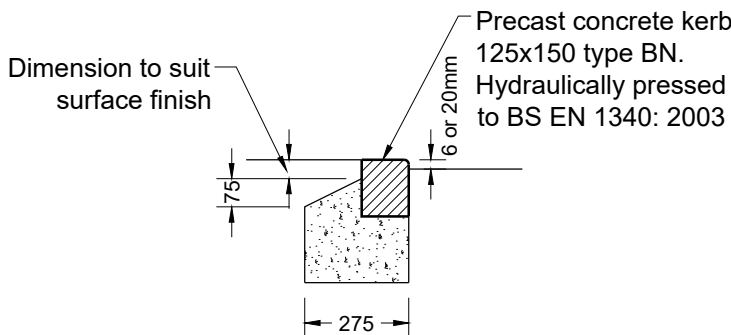
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<i>working for</i>															
MCCARTHY STONE <i>Life, we'll lived</i>															
Project Title Bowls Club, Gravesend Kent DA12 2QU															
Drawing Title Drainage Details-1															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Scale NTS</td> <td style="width: 50%;">Date 06.06.24</td> </tr> <tr> <td>Drawn BM</td> <td>Checked PT</td> </tr> <tr> <td colspan="2">Drawing No.</td> </tr> <tr> <td colspan="2" style="text-align: center; font-size: 1.2em;"> ESE-2821-04-DE-0104 - </td> </tr> <tr> <td style="text-align: center;">Issue</td> <td style="text-align: center;">Project No.</td> </tr> <tr> <td style="text-align: center;">Stage</td> <td style="text-align: center;">Number</td> </tr> <tr> <td style="text-align: center;">Description</td> <td style="text-align: center;">Revision</td> </tr> </table>		Scale NTS	Date 06.06.24	Drawn BM	Checked PT	Drawing No.		ESE-2821-04-DE-0104 -		Issue	Project No.	Stage	Number	Description	Revision
Scale NTS	Date 06.06.24														
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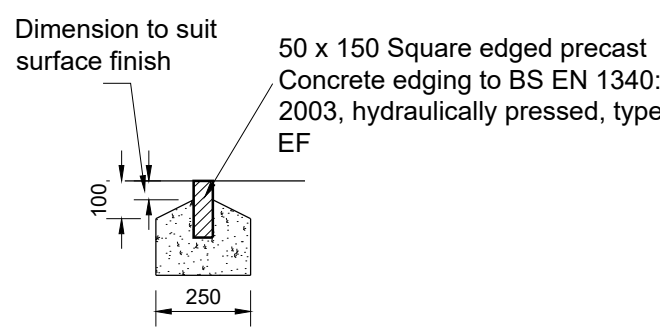
Concrete Kerbing Type HB2
(Half batter)
125 upstand



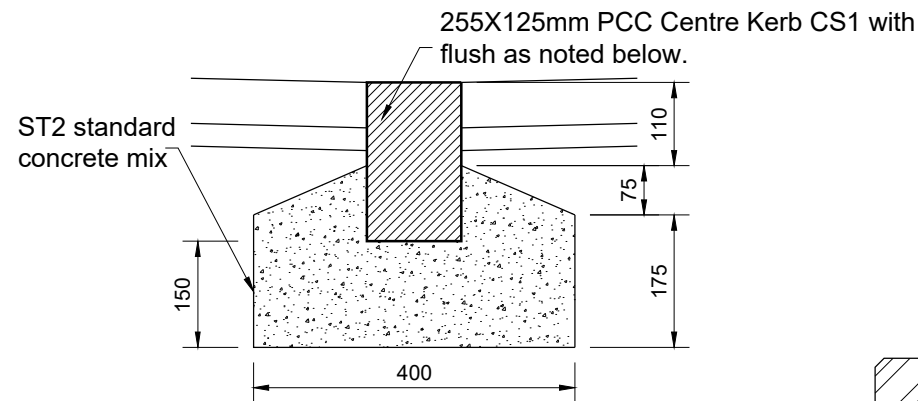
Concrete Kerbing Type BN2 (Bull nose)
0 or 25 upstand

NB: Where kerb abuts unpaved areas (i.e. grass verge) a polythene membrane should be wrapped around the concrete haunch to reduce the effects of clay shrinkage.

Kerb foundation & backing concrete mix ST4
"D" is 150 or to top of sub base, whichever is greater

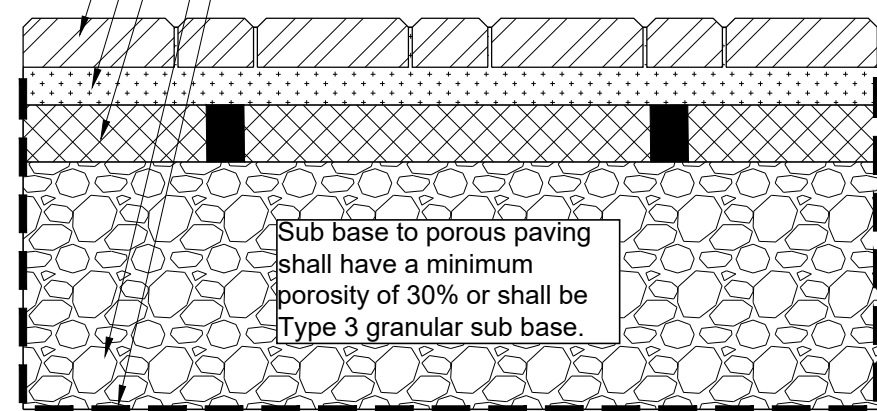


Concrete edging (Flush)



CS1 'Centre' Kerb Detail
laid flush

60mm thick porous block paving. Joints to be filled with bedding aggregate. Refer to Newleafstudio Landscaping drawings for colour, pattern and exact extent
50mm compacted thickness of bedding stone to BS EN13242:2002, Type 2/6.3 Gc 80/20
Base: 75mm Recipe mix AC 32 dense base 40/60 to EN13108-1 (to be core drilled on a 750x750mm grid using a 50mm drilled hole prior to laying bedding course and blocks. Holes to be filled with bedding aggregate.
350mm thickness of course aggregate subbase to BS EN 13242:2002 Type 4/20 (top 150mm) Type 4/40 (lower 200mm).
2000 gauge impermeable membrane to base and sides of sub-base at formation level.

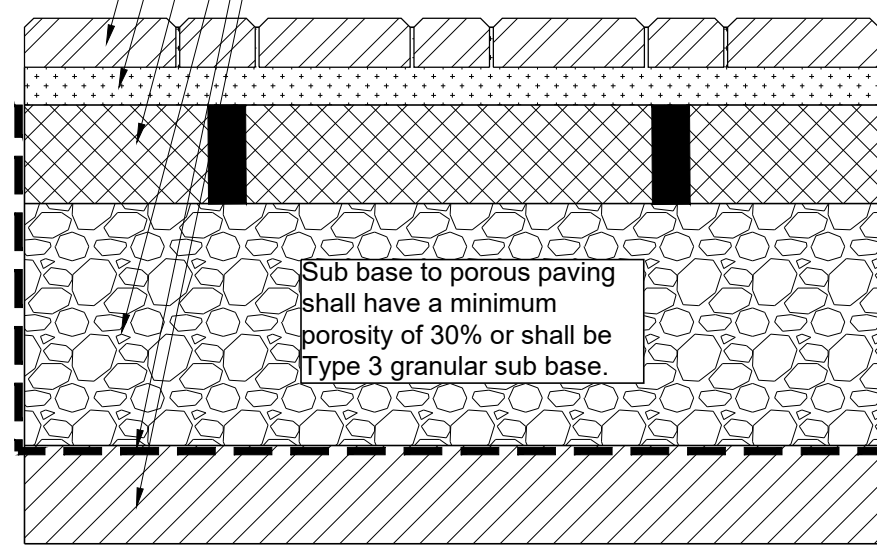


Permeable Block Paved Parking Bays

Refer to drainage plan and Newleafstudio landscaping proposal for extent of porous paving



80mm thick Porous block paving. Joints to be filled with bedding aggregate. Refer to Newleafstudio Landscaping drawings for colour, pattern and exact extent
50mm compacted thickness of bedding stone to BS EN13242:2002, Type 2/6.3 Gc 80/20
Base: 130mm Recipe mix AC 32 dense binder 40/60 to EN13108-1 (to be core drilled on a 750x750mm grid using a 50mm drilled hole prior to laying bedding course and blocks. Holes to be filled with bedding aggregate.
350mm thickness of course aggregate subbase to BS EN 13242:2002 Type 4/20 (top 150mm) Type 4/40 (lower 200mm).
2000 gauge impermeable membrane to base and sides of sub-base at formation level.
250mm minimum thickness of 6F2 capping material

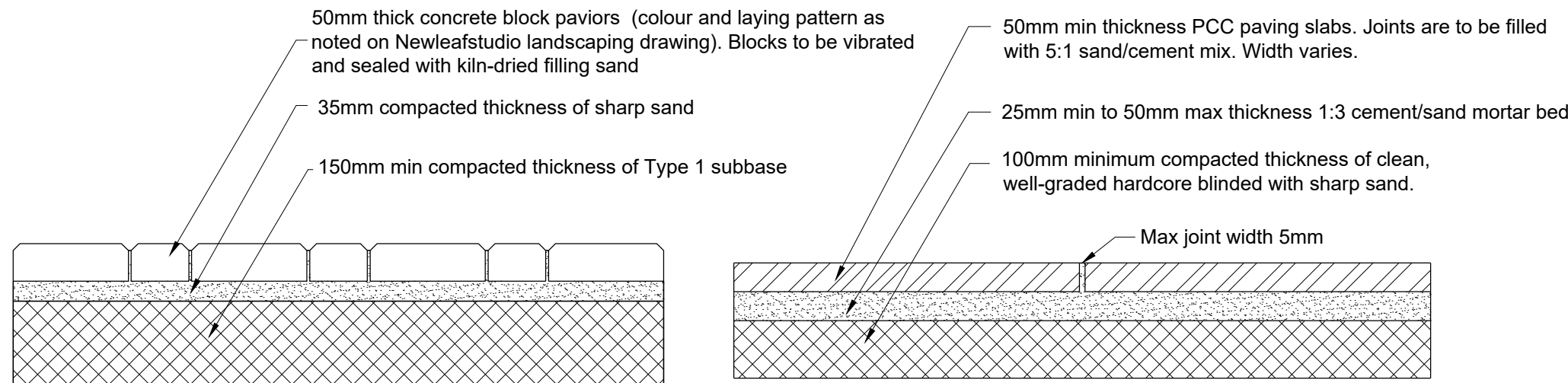


Permeable Block Paved Private Roads & Parking aisle

Refer to drainage plan and Newleafstudio landscaping proposal for extent of porous paving



Design based upon Design CBR of 3%. Where insitu CBRs are greater than 5%, capping layer can be omitted.

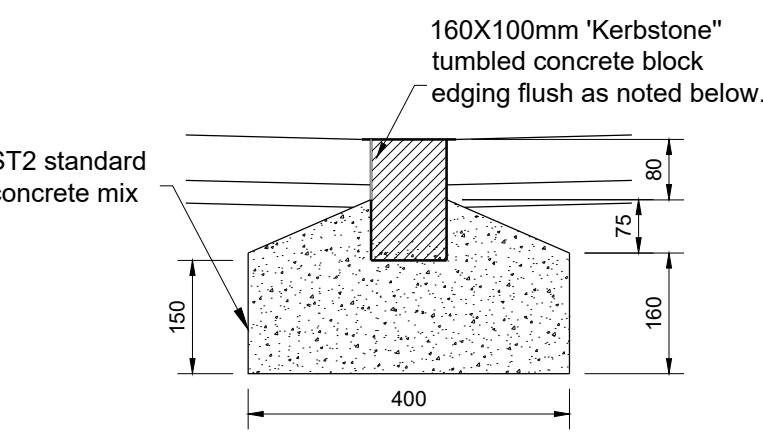


Block Paved Pedestrian Areas

Refer to Newleafstudio Landscaping drawings for the extent, colour, pattern and type of surface.

Proposed Slab paving

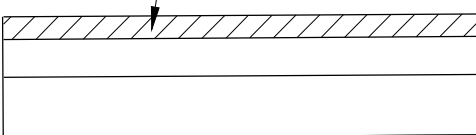
Refer to Newleafstudio Landscaping drawings for the extent, colour, pattern and type of surface.



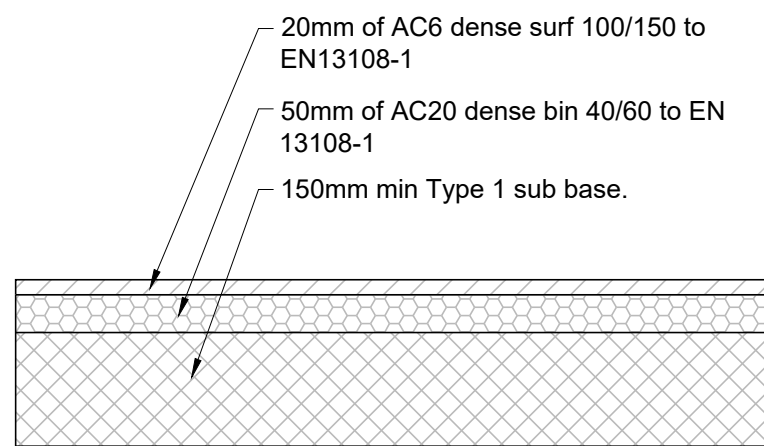
KS 'Kerbstone' Detail
laid flush

Surface course:
20mm thickness of BSEN13108-1 AC14 closesurf 100/150 psv55

Preparation
Carry out all repairs and clean existing surface. Weed treatment to be applied. Horizontal faces to be sprayed with bitumen emulsion grade C40B4 of BS EN 13808, at a rate of spread of 0.5 litres/m² and vertical faces to be coated with bitumen emulsion grade C69B3 to BS EN 13808



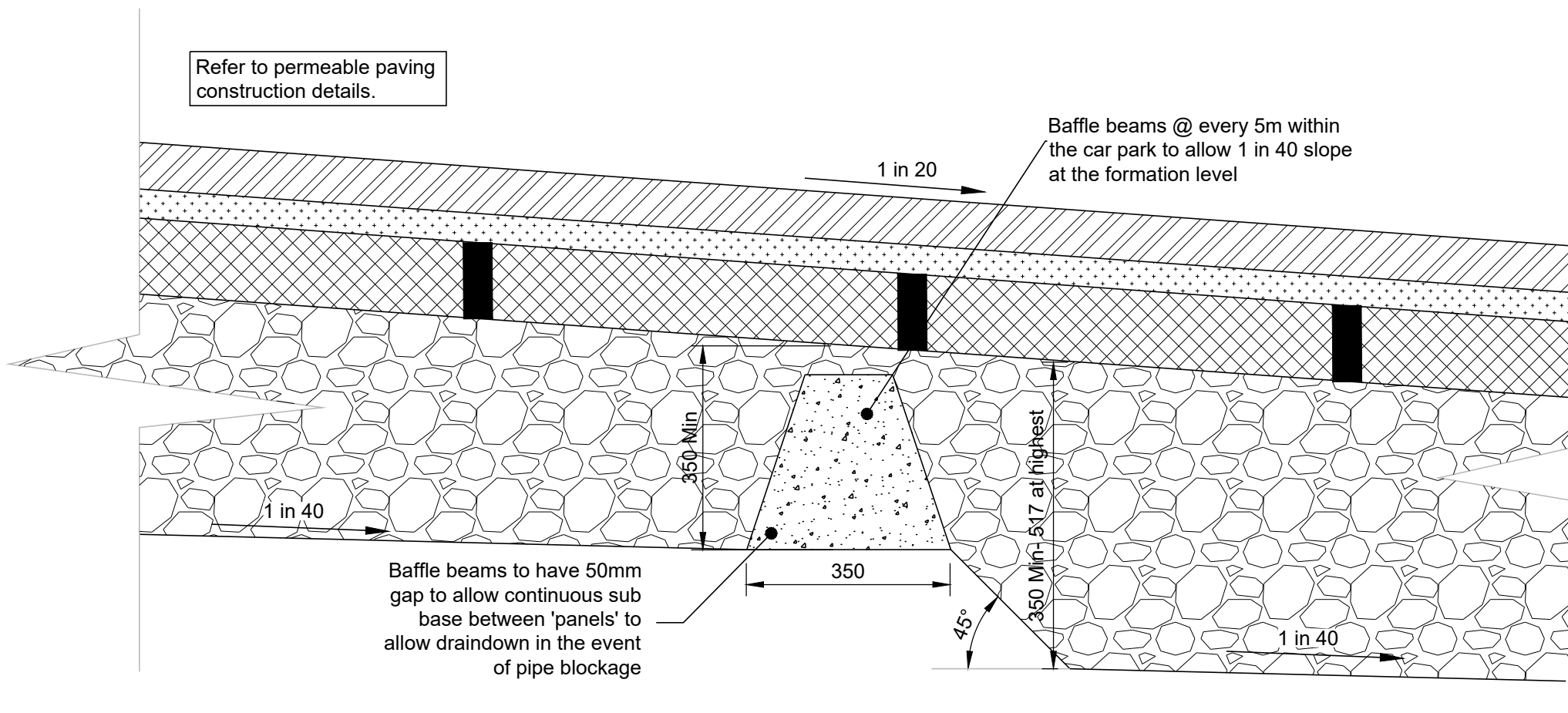
Plane & Resurfacing
Existing tarmac access



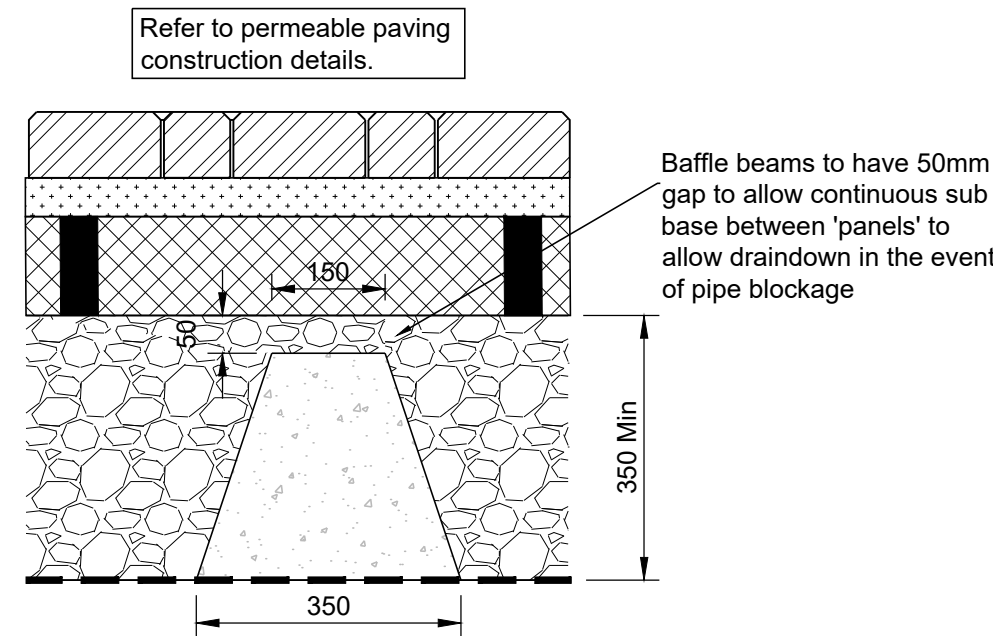
Private Bituminous macadam footpath

This detail to be read in conjunction with the latest Newleafstudio Landscaping proposal.

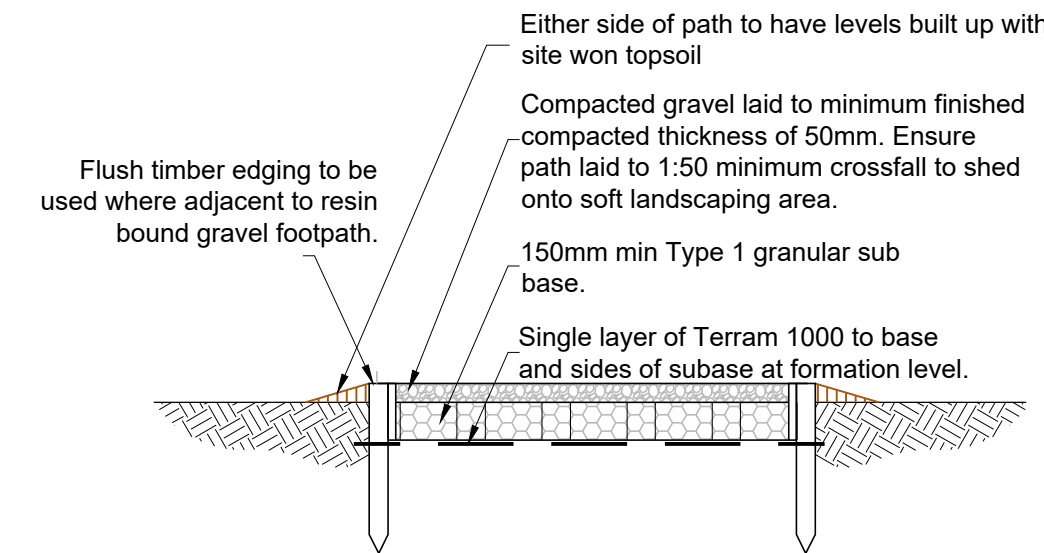
Some area are within the no dig construction therefore follow Newleafstudio Landscaping drawing for details.



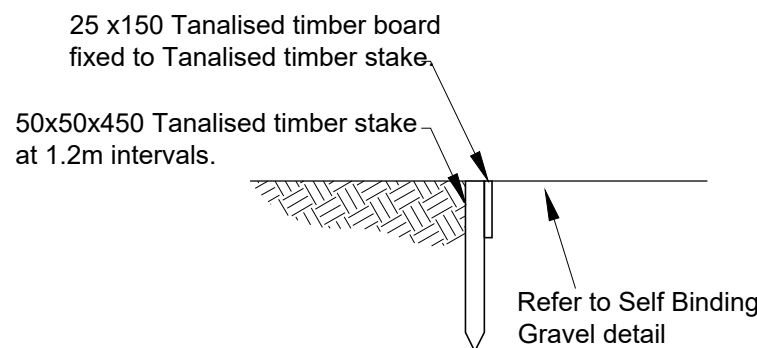
Typical cross section through subbase & Baffle Beam at formation level



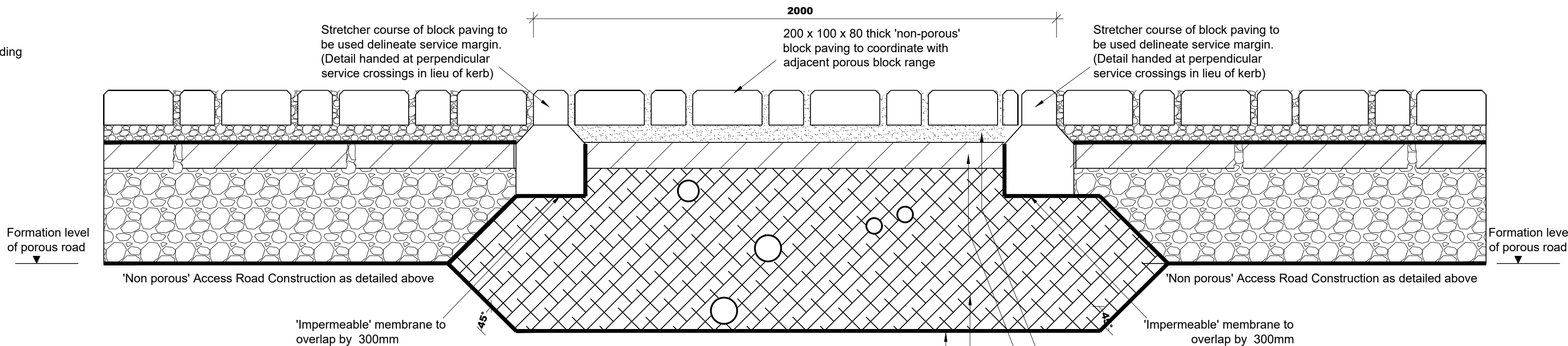
Typical Baffle Beam



Self Binding Gravel



Timber edging (Flush)



Non-Permeable Block Paved Service Margin Construction, Perpendicular to Access Road

(Service margins to be installed to road base level prior to installation of adjacent porous access road. Installation of blocks to be delayed as long as is practicable until all mains services have been installed.

Note: Refer to CPW external services drawings for the service route

50mm compacted thickness of sharp sand (bedding layer)
Base: 130mm Recipe mix AC 20 dense binder 40/60 to EN13108-1 (to be core drilled on a 750x750mm grid using a 50mm drilled hole prior to laying bedding course and blocks. Holes to be filled with bedding aggregate.
Type 1 granular subbase material to extend below formation of adjacent porous road formation sufficient to provide backfill to all services.
2000 gauge impermeable membrane

Notes:

- All dimensions in millimetres unless noted otherwise
- Drawing to be read in conjunction with all Newleafstudio Landscaping drawings and other relevant documents.
- All Concrete to be in accordance with standard prescribed mixes as contained in BS 8500-1:2002 table A7 & BS EN 206-1 and to comply with the BRE Special Digest 1 classifications as prescribed in the Geotechnical Report

Rev.	Note.	Date	By
A	Details coordinated with Landscaping proposal and revised the drawing Preliminary Issue	04.12.24	BM
		30.07.24	BM

REVISIONS

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working for

MCCARTHY STONE
Life, well lived

Project Title
Bowls Club, Gravesend Kent DA12 2QU

Drawing Title
External Finishes Details

Scale **NTS** Date **06.06.24**
Drawn **BM** Checked **PT**
Drawing No.
LSE-2821-04-DE-0106 A

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ALL DIMENSIONS TO BE CHECKED ON SITE. WORK TO FIGURED DIMENSIONS ONLY. REPORT DISCREPANCIES TO THE ARCHITECT AT ONCE BEFORE PROCEEDING

Appendix B

SURFACE WATER DRAINAGE CALCULATIONS

**Design Settings**

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	0.950	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	150.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	EasAng (m)	Northing (m)	Depth (m)
re1	0.042	5.00	10.400	150	565672.154	173781.038	0.750
S2	0.019	5.00	9.300	600	565692.832	173774.660	1.300
S3	0.028	5.00	8.400	600	565709.192	173764.412	1.400
S21	0.048	5.00	7.700	600	565731.151	173753.047	1.550
S24	0.000	5.00	7.720	600	565741.825	173740.898	1.690
re7	0.013	5.00	8.100	150	565706.228	173791.209	0.850
S8	0.021	5.00	8.000	500	565705.789	173778.607	1.040
S11	0.021	5.00	8.270	600	565714.754	173765.521	1.920
S13	0.012	5.00	7.500	600	565770.699	173735.483	1.050
S12	0.025	5.00	7.510	600	565775.927	173780.672	1.060
S14	0.012	5.00	7.550	600	565773.391	173758.751	1.250
re16	0.013	5.00	7.700	500	565718.741	173793.208	0.980
re15	0.013	5.00	7.500	500	565766.499	173787.683	0.800
S17	0.013	5.00	7.500	1200	565745.000	173790.170	1.200
S18	0.020	5.00	8.000	1200	565741.788	173762.407	1.880
S25		5.00	7.500	1200	565763.960	173726.136	1.490
S26			8.700	1200	565762.334	173720.199	2.715
S27			9.000	1200	565772.742	173712.986	3.060
7702			9.300	1	565771.224	173702.801	3.450

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	re1	S2	21.639	0.600	9.650	8.000	1.650	13.1	150	5.13	150.0
1.001	S2	S3	19.305	0.600	8.000	7.000	1.000	19.3	150	5.27	150.0
1.002	S3	S21	24.726	0.600	7.000	6.500	0.500	49.5	225	5.49	150.0
1.003	S21	S24	16.172	0.600	6.150	6.030	0.120	134.8	300	5.69	150.0
2.000	re7	S8	12.610	0.600	7.250	6.960	0.290	43.5	150	5.14	150.0
2.001	S8	S11	15.862	0.600	6.960	6.800	0.160	99.1	150	5.40	150.0
2.002	S11	S18	27.213	0.600	6.350	6.150	0.200	136.1	225	5.80	150.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.796	49.4	21.6	0.600	1.150	0.042	0.0	69	2.706
1.001	2.303	40.7	31.4	1.150	1.250	0.061	0.0	99	2.537
1.002	1.864	74.1	45.8	1.175	0.975	0.089	0.0	128	1.958
1.003	1.352	95.6	70.6	1.250	1.390	0.137	0.0	192	1.475
2.000	1.530	27.0	6.7	0.700	0.890	0.013	0.0	51	1.270
2.001	1.009	17.8	17.5	0.890	1.320	0.034	0.0	121	1.147
2.002	1.119	44.5	28.3	1.695	1.625	0.055	0.0	131	1.184

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	S13	S14	23.423	0.600	6.450	6.300	0.150	156.2	225	5.37	150.0
4.000	S12	S14	22.067	0.600	6.450	6.300	0.150	147.1	225	5.34	150.0
3.001	S14	S18	31.814	0.600	6.300	6.150	0.150	212.1	300	5.87	150.0
5.000	re16	S17	26.434	0.600	6.720	6.450	0.270	97.9	150	5.43	150.0
6.000	re15	S17	21.642	0.600	6.700	6.450	0.250	86.6	150	5.33	150.0
5.001	S17	S18	27.948	0.600	6.300	6.150	0.150	186.3	375	5.79	150.0
7.000	S25	S26	6.156	0.600	6.010	5.985	0.025	246.2	375	5.09	150.0
7.001	S26	S27	12.663	0.600	5.985	5.940	0.045	281.4	375	5.29	150.0
7.002	S27	7702	10.298	0.600	5.940	5.850	0.090	114.4	150	5.47	150.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.000	1.044	41.5	6.2	0.825	1.025	0.012	0.0	58	0.753
4.000	1.076	42.8	12.9	0.835	1.025	0.025	0.0	85	0.945
3.001	1.075	76.0	25.2	0.950	1.550	0.049	0.0	119	0.969
5.000	1.015	17.9	6.7	0.830	0.900	0.013	0.0	64	0.943
6.000	1.081	19.1	6.7	0.650	0.900	0.013	0.0	61	0.986
5.001	1.324	146.2	20.1	0.825	1.475	0.039	0.0	93	0.938
7.000	1.150	127.0	0.0	1.115	2.340	0.000	0.0	0	0.000
7.001	1.075	118.7	0.0	2.340	2.685	0.000	0.0	0	0.000
7.002	0.938	16.6	0.0	2.910	3.300	0.000	0.0	0	0.000

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	21.639	13.1	150	Circular	10.400	9.650	0.600	9.300	8.000	1.150
1.001	19.305	19.3	150	Circular	9.300	8.000	1.150	8.400	7.000	1.250
1.002	24.726	49.5	225	Circular	8.400	7.000	1.175	7.700	6.500	0.975
1.003	16.172	134.8	300	Circular	7.700	6.150	1.250	7.720	6.030	1.390
2.000	12.610	43.5	150	Circular	8.100	7.250	0.700	8.000	6.960	0.890
2.001	15.862	99.1	150	Circular	8.000	6.960	0.890	8.270	6.800	1.320
2.002	27.213	136.1	225	Circular	8.270	6.350	1.695	8.000	6.150	1.625
3.000	23.423	156.2	225	Circular	7.500	6.450	0.825	7.550	6.300	1.025
4.000	22.067	147.1	225	Circular	7.510	6.450	0.835	7.550	6.300	1.025
3.001	31.814	212.1	300	Circular	7.550	6.300	0.950	8.000	6.150	1.550
5.000	26.434	97.9	150	Circular	7.700	6.720	0.830	7.500	6.450	0.900

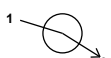
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	re1	150	Manhole	Adoptable	S2	600	Manhole	Adoptable
1.001	S2	600	Manhole	Adoptable	S3	600	Manhole	Adoptable
1.002	S3	600	Manhole	Adoptable	S21	600	Manhole	Adoptable
1.003	S21	600	Manhole	Adoptable	S24	600	Manhole	Adoptable
2.000	re7	150	Manhole	Adoptable	S8	500	Manhole	Adoptable
2.001	S8	500	Manhole	Adoptable	S11	600	Manhole	Adoptable
2.002	S11	600	Manhole	Adoptable	S18	1200	Manhole	Adoptable
3.000	S13	600	Manhole	Adoptable	S14	600	Manhole	Adoptable
4.000	S12	600	Manhole	Adoptable	S14	600	Manhole	Adoptable
3.001	S14	600	Manhole	Adoptable	S18	1200	Manhole	Adoptable
5.000	re16	500	Manhole	Adoptable	S17	1200	Manhole	Adoptable

**Pipeline Schedule**

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
6.000	21.642	86.6	150	Circular	7.500	6.700	0.650	7.500	6.450	0.900
5.001	27.948	186.3	375	Circular	7.500	6.300	0.825	8.000	6.150	1.475
7.000	6.156	246.2	375	Circular	7.500	6.010	1.115	8.700	5.985	2.340
7.001	12.663	281.4	375	Circular	8.700	5.985	2.340	9.000	5.940	2.685
7.002	10.298	114.4	150	Circular	9.000	5.940	2.910	9.300	5.850	3.300

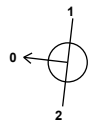
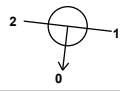
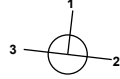
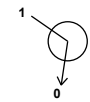
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
6.000	re15	500	Manhole	Adoptable	S17	1200	Manhole	Adoptable
5.001	S17	1200	Manhole	Adoptable	S18	1200	Manhole	Adoptable
7.000	S25	1200	Manhole	Adoptable	S26	1200	Manhole	Adoptable
7.001	S26	1200	Manhole	Adoptable	S27	1200	Manhole	Adoptable
7.002	S27	1200	Manhole	Adoptable	7702	1	Manhole	Adoptable

Manhole Schedule

Node	EasAng (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
re1	565672.154	173781.038	10.400	0.750	150		0	1.000	9.650	150
S2	565692.832	173774.660	9.300	1.300	600		1	1.000	8.000	150
							0	1.001	8.000	150
S3	565709.192	173764.412	8.400	1.400	600		1	1.001	7.000	150
							0	1.002	7.000	225
S21	565731.151	173753.047	7.700	1.550	600		1	1.002	6.500	225
							0	1.003	6.150	300
S24	565741.825	173740.898	7.720	1.690	600		1	1.003	6.030	300
re7	565706.228	173791.209	8.100	0.850	150		0	2.000	7.250	150
S8	565705.789	173778.607	8.000	1.040	500		1	2.000	6.960	150
							0	2.001	6.960	150
S11	565714.754	173765.521	8.270	1.920	600		1	2.001	6.800	150
							0	2.002	6.350	225



Manhole Schedule

Node	EasAng (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	ConnecÃons	Link	IL (m)	Dia (mm)	
S13	565770.699	173735.483	7.500	1.050	600		0	3.000	6.450	225
S12	565775.927	173780.672	7.510	1.060	600		0	4.000	6.450	225
S14	565773.391	173758.751	7.550	1.250	600		1 2 0	4.000 3.000 3.001	6.300 6.300 6.300	225 225 300
re16	565718.741	173793.208	7.700	0.980	500		0	5.000	6.720	150
re15	565766.499	173787.683	7.500	0.800	500		0	6.000	6.700	150
S17	565745.000	173790.170	7.500	1.200	1200		1 2 0	6.000 5.000 5.001	6.450 6.450 6.300	150 150 375
S18	565741.788	173762.407	8.000	1.880	1200		1 2 3	5.001 3.001 2.002	6.150 6.150 6.150	375 300 225
S25	565763.960	173726.136	7.500	1.490	1200		0	7.000	6.010	375
S26	565762.334	173720.199	8.700	2.715	1200		1 0	7.000 7.001	5.985 5.985	375 375
S27	565772.742	173712.986	9.000	3.060	1200		1 0	7.001 7.002	5.940 5.940	375 150
7702	565771.224	173702.801	9.300	3.450	1		1	7.002	5.850	150

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	2 year (l/s)	1.3
Rainfall Events	Singular	Drain Down Time (mins)	10080	30 year (l/s)	3.4
Summer CV	0.950	Additional Storage (m³/ha)	20.0	100 year (l/s)	4.6
Winter CV	0.950	Starting Level (m)		Check Discharge Volume	x
Analysis Speed	Normal	Check Discharge Rate(s)	✓		



Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0
100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.300	Betterment (%)	0
SAAR (mm)	555	QBar	1.4
Soil Index	5	Q 2 year (l/s)	1.3
SPR	0.53	Q 30 year (l/s)	3.4
Region	6	Q 100 year (l/s)	4.6
Growth Factor 2 year	0.88		

Node S26 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	5.985	Product Number	CTL-SHE-0051-1400-1450-1400
Design Depth (m)	1.450	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.4	Min Node Diameter (mm)	1200

Node S25 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Main Channel Length (m)	17.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	6.060	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)	60	Main Channel n	0.030

Inlets S24

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	125.0	0.0	0.420	125.0	0.0	0.631	0.0	0.0
0.210	125.0	0.0	0.630	125.0	0.0			

Node S24 Flow through Pond Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Main Channel Length (m)	20.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	6.100	Main Channel Slope (1:X)	1000.0
Safety Factor	2.0	Time to half empty (mins)	15	Main Channel n	0.030

Inlets S18



Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	229.5	0.0	0.420	229.5	0.0	0.631	0.0	0.0
0.210	229.5	0.0	0.630	229.5	0.0			

Node re1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	9.790	Slope (1:X)	40.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.350
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.33	Length (m)	28.000		

Node S2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	8.690	Slope (1:X)	40.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.350
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.33	Length (m)	19.000		

Node S3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.790	Slope (1:X)	40.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.350
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.33	Length (m)	28.000		

Node S21 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.090	Slope (1:X)	100.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.350
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.33	Length (m)	45.000		



Results for 2 year Critical Storm Duration. Lowest mass balance: 97.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	re1	10	9.688	0.038	6.8	0.0428	0.0000	OK
15 minute summer	S2	10	8.050	0.050	9.9	0.0288	0.0000	OK
15 minute summer	S3	10	7.068	0.068	14.3	0.0466	0.0000	OK
15 minute summer	S21	10	6.253	0.103	21.7	0.0926	0.0000	OK
360 minute winter	S24	352	6.228	0.198	5.4	0.0562	0.0000	OK
15 minute summer	re7	10	7.278	0.028	2.1	0.0091	0.0000	OK
15 minute summer	S8	10	7.018	0.058	5.5	0.0350	0.0000	OK
15 minute summer	S11	11	6.419	0.069	8.7	0.0344	0.0000	OK
15 minute summer	S13	10	6.482	0.032	1.9	0.0165	0.0000	OK
15 minute summer	S12	10	6.496	0.046	4.0	0.0346	0.0000	OK
15 minute summer	S14	11	6.364	0.064	7.7	0.0304	0.0000	OK
15 minute summer	re16	11	6.754	0.034	2.1	0.0159	0.0000	OK
15 minute summer	re15	10	6.734	0.034	2.1	0.0175	0.0000	OK
15 minute summer	S17	11	6.353	0.053	6.1	0.0710	0.0000	OK
360 minute winter	S18	352	6.228	0.108	3.9	0.1458	0.0000	OK
360 minute winter	S25	352	6.228	0.218	2.2	0.2471	0.0000	OK
360 minute winter	S26	352	6.228	0.243	1.1	0.2753	0.0000	OK
180 minute summer	S27	132	5.966	0.026	1.0	0.0291	0.0000	OK
180 minute summer	7702	132	5.875	0.025	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	re1	1.000	S2	6.8	1.578	0.137	0.0930	
15 minute summer	S2	1.001	S3	9.8	1.512	0.240	0.1249	
15 minute summer	S3	1.002	S21	14.0	1.417	0.189	0.2446	
15 minute summer	S21	1.003	S24	21.6	1.229	0.226	0.3148	
360 minute winter	S24	Flow through pond	S25	2.2	0.039	0.001	18.9949	
15 minute summer	re7	2.000	S8	2.1	0.495	0.077	0.0544	
15 minute summer	S8	2.001	S11	5.3	0.868	0.299	0.0978	
15 minute summer	S11	2.002	S18	8.7	0.863	0.195	0.2733	
15 minute summer	S13	3.000	S14	1.9	0.318	0.045	0.1490	
15 minute summer	S12	4.000	S14	3.9	0.568	0.092	0.1651	
15 minute summer	S14	3.001	S18	7.4	0.684	0.097	0.3429	
15 minute summer	re16	5.000	S17	2.0	0.673	0.114	0.0800	
15 minute summer	re15	6.000	S17	2.0	0.703	0.107	0.0628	
15 minute summer	S17	5.001	S18	6.1	0.659	0.042	0.2584	
360 minute winter	S18	Flow through pond	S24	2.6	0.034	0.001	25.8279	
360 minute winter	S25	7.000	S26	1.1	0.137	0.008	0.4380	
360 minute winter	S26	Hydro-Brake®	S27	1.0				
180 minute summer	S27	7.002	7702	1.0	0.516	0.062	0.0204	52.5



Results for 30 year Critical Storm Duration. Lowest mass balance: 97.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	re1	10	9.712	0.062	17.8	0.0708	0.0000	OK
15 minute summer	S2	10	8.087	0.087	25.8	0.0498	0.0000	OK
15 minute summer	S3	10	7.119	0.119	37.6	0.0812	0.0000	OK
960 minute winter	S21	930	6.454	0.304	3.5	0.2740	0.0000	SURCHARGED
960 minute winter	S24	930	6.454	0.424	5.2	0.1199	0.0000	OK
15 minute summer	re7	10	7.296	0.046	5.5	0.0148	0.0000	OK
15 minute summer	S8	10	7.068	0.108	14.4	0.0647	0.0000	OK
15 minute summer	S11	11	6.469	0.119	23.0	0.0594	0.0000	OK
15 minute summer	S13	10	6.503	0.053	5.1	0.0269	0.0000	OK
15 minute summer	S12	10	6.525	0.075	10.6	0.0569	0.0000	OK
960 minute winter	S14	930	6.454	0.154	1.3	0.0731	0.0000	OK
15 minute summer	re16	10	6.778	0.058	5.5	0.0266	0.0000	OK
15 minute summer	re15	10	6.756	0.056	5.5	0.0292	0.0000	OK
960 minute winter	S17	930	6.454	0.154	0.9	0.2074	0.0000	OK
960 minute winter	S18	930	6.454	0.334	4.0	0.4486	0.0000	OK
960 minute winter	S25	930	6.454	0.444	2.2	0.5019	0.0000	SURCHARGED
960 minute winter	S26	930	6.454	0.469	1.1	0.5302	0.0000	SURCHARGED
15 minute summer	S27	237	5.966	0.026	1.0	0.0291	0.0000	OK
15 minute summer	7702	237	5.875	0.025	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	re1	1.000	S2	17.7	2.036	0.359	0.1885	
15 minute summer	S2	1.001	S3	25.7	1.996	0.631	0.2462	
15 minute summer	S3	1.002	S21	37.1	1.814	0.501	0.5063	
960 minute winter	S21	1.003	S24	3.4	0.143	0.036	1.1388	
960 minute winter	S24	Flow through pond	S25	2.2	0.033	0.001	45.7541	
15 minute summer	re7	2.000	S8	5.5	0.612	0.202	0.1141	
15 minute summer	S8	2.001	S11	14.1	1.085	0.791	0.2066	
15 minute summer	S11	2.002	S18	22.9	1.110	0.514	0.5607	
15 minute summer	S13	3.000	S14	5.0	0.410	0.121	0.3032	
15 minute summer	S12	4.000	S14	10.5	0.714	0.246	0.3347	
960 minute winter	S14	3.001	S18	1.3	0.372	0.017	1.6984	
15 minute summer	re16	5.000	S17	5.4	0.882	0.300	0.1618	
15 minute summer	re15	6.000	S17	5.4	0.919	0.284	0.1276	
960 minute winter	S17	5.001	S18	0.9	0.334	0.006	1.9311	
960 minute winter	S18	Flow through pond	S24	1.9	0.028	0.001	74.9597	
960 minute winter	S25	7.000	S26	1.1	0.129	0.008	0.6790	
960 minute winter	S26	Hydro-Brake®	S27	1.0				
15 minute summer	S27	7.002	7702	1.0	0.516	0.062	0.0204	56.3



Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 97.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	re1	10	9.724	0.074	24.0	0.0839	0.0000	OK
15 minute summer	S2	10	8.109	0.109	34.8	0.0624	0.0000	OK
15 minute summer	S3	10	7.145	0.145	50.5	0.0990	0.0000	OK
1440 minute winter	S21	1380	6.621	0.471	3.5	0.4250	0.0000	SURCHARGED
1440 minute winter	S24	1380	6.621	0.591	5.1	0.1673	0.0000	OK
15 minute summer	re7	10	7.304	0.054	7.4	0.0173	0.0000	OK
15 minute summer	S8	11	7.127	0.167	19.4	0.1004	0.0000	SURCHARGED
1440 minute winter	S11	1380	6.621	0.271	1.3	0.1359	0.0000	SURCHARGED
1440 minute winter	S13	1380	6.621	0.171	0.3	0.0875	0.0000	OK
1440 minute winter	S12	1380	6.621	0.171	0.6	0.1291	0.0000	OK
1440 minute winter	S14	1380	6.621	0.321	1.2	0.1526	0.0000	SURCHARGED
15 minute summer	re16	10	6.788	0.068	7.4	0.0315	0.0000	OK
15 minute summer	re15	10	6.766	0.066	7.4	0.0346	0.0000	OK
1440 minute winter	S17	1380	6.621	0.321	0.9	0.4329	0.0000	OK
1440 minute winter	S18	1380	6.621	0.501	3.9	0.6736	0.0000	OK
1440 minute winter	S25	1380	6.621	0.611	2.1	0.6912	0.0000	SURCHARGED
1440 minute winter	S26	1380	6.621	0.636	1.0	0.7195	0.0000	SURCHARGED
15 minute summer	S27	550	5.966	0.026	1.0	0.0291	0.0000	OK
15 minute summer	7702	550	5.875	0.025	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	re1	1.000	S2	23.9	2.137	0.484	0.2408	
15 minute summer	S2	1.001	S3	34.5	2.175	0.849	0.3000	
15 minute summer	S3	1.002	S21	50.0	1.936	0.675	0.6396	
1440 minute winter	S21	1.003	S24	3.5	0.130	0.036	1.1388	
1440 minute winter	S24	Flow through pond	S25	2.1	0.037	0.001	65.6269	
15 minute summer	re7	2.000	S8	7.4	0.634	0.272	0.1465	
15 minute summer	S8	2.001	S11	18.8	1.100	1.054	0.2649	
1440 minute winter	S11	2.002	S18	1.3	0.429	0.029	1.0823	
1440 minute winter	S13	3.000	S14	0.3	0.182	0.007	0.8454	
1440 minute winter	S12	4.000	S14	0.6	0.294	0.014	0.7964	
1440 minute winter	S14	3.001	S18	1.2	0.337	0.016	2.2403	
15 minute summer	re16	5.000	S17	7.2	0.952	0.404	0.2017	
15 minute summer	re15	6.000	S17	7.3	0.992	0.382	0.1589	
1440 minute winter	S17	5.001	S18	0.9	0.322	0.006	2.9458	
1440 minute winter	S18	Flow through pond	S24	1.8	0.029	0.001	111.4475	
1440 minute winter	S25	7.000	S26	1.0	0.123	0.008	0.6790	
1440 minute winter	S26	Hydro-Brake®	S27	1.0				
15 minute summer	S27	7.002	7702	1.0	0.516	0.062	0.0204	75.3



Results for 100 year Critical Storm Duration. Lowest mass balance: 97.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	re1	10	9.722	0.072	22.8	0.0814	0.0000	OK
15 minute summer	S2	10	8.103	0.103	33.0	0.0595	0.0000	OK
15 minute summer	S3	10	7.140	0.140	47.9	0.0955	0.0000	OK
1440 minute winter	S21	1380	6.647	0.497	3.6	0.4484	0.0000	SURCHARGED
1440 minute winter	S24	1380	6.647	0.617	5.2	0.1746	0.0000	OK
15 minute summer	re7	10	7.302	0.052	7.1	0.0169	0.0000	OK
15 minute summer	S8	11	7.101	0.141	18.4	0.0848	0.0000	OK
1440 minute winter	S11	1380	6.647	0.297	1.5	0.1488	0.0000	SURCHARGED
1440 minute winter	S13	1380	6.647	0.197	0.3	0.1007	0.0000	OK
1440 minute winter	S12	1380	6.647	0.197	0.7	0.1486	0.0000	OK
1440 minute winter	S14	1380	6.647	0.347	1.3	0.1649	0.0000	SURCHARGED
15 minute summer	re16	10	6.786	0.066	7.1	0.0307	0.0000	OK
15 minute summer	re15	10	6.765	0.065	7.1	0.0337	0.0000	OK
1440 minute winter	S17	1380	6.647	0.347	0.9	0.4679	0.0000	OK
1440 minute winter	S18	1380	6.647	0.527	3.9	0.7084	0.0000	OK
1440 minute winter	S25	1380	6.647	0.637	2.1	0.7205	0.0000	SURCHARGED
1440 minute winter	S26	1380	6.647	0.662	1.0	0.7488	0.0000	SURCHARGED
15 minute summer	S27	489	5.966	0.026	1.0	0.0291	0.0000	OK
15 minute summer	7702	489	5.875	0.025	1.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	re1	1.000	S2	22.7	2.131	0.460	0.2298	
15 minute summer	S2	1.001	S3	32.8	2.142	0.805	0.2901	
15 minute summer	S3	1.002	S21	47.5	1.916	0.640	0.6135	
1440 minute winter	S21	1.003	S24	3.6	0.130	0.037	1.1388	
1440 minute winter	S24	Flow through pond	S25	2.1	0.037	0.001	68.6904	
15 minute summer	re7	2.000	S8	7.1	0.629	0.261	0.1417	
15 minute summer	S8	2.001	S11	18.0	1.115	1.007	0.2594	
1440 minute winter	S11	2.002	S18	1.5	0.394	0.034	1.0823	
1440 minute winter	S13	3.000	S14	0.3	0.175	0.007	0.8978	
1440 minute winter	S12	4.000	S14	0.7	0.295	0.016	0.8458	
1440 minute winter	S14	3.001	S18	1.2	0.321	0.016	2.2403	
15 minute summer	re16	5.000	S17	6.9	0.940	0.385	0.1946	
15 minute summer	re15	6.000	S17	6.9	0.980	0.364	0.1535	
1440 minute winter	S17	5.001	S18	0.9	0.330	0.006	3.0303	
1440 minute winter	S18	Flow through pond	S24	1.8	0.029	0.001	117.0980	
1440 minute winter	S25	7.000	S26	1.0	0.123	0.008	0.6790	
1440 minute winter	S26	Hydro-Brake®	S27	1.0				
15 minute summer	S27	7.002	7702	1.0	0.516	0.062	0.0204	71.7



Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 97.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	re1	10	9.738	0.088	31.9	0.0997	0.0000	OK
15 minute summer	S2	11	8.527	0.527	46.2	0.3032	0.0000	SURCHARGED
15 minute summer	S3	11	7.173	0.173	63.0	0.1185	0.0000	OK
360 minute summer	S21	288	6.776	0.626	21.3	0.5646	0.0000	SURCHARGED
600 minute winter	S24	405	6.705	0.675	76.5	0.1911	0.0000	OK
15 minute summer	re7	11	7.329	0.079	9.9	0.0256	0.0000	OK
15 minute summer	S8	11	7.299	0.339	25.3	0.2034	0.0000	SURCHARGED
360 minute summer	S11	288	6.758	0.408	8.6	0.2046	0.0000	SURCHARGED
960 minute summer	S13	570	6.748	0.298	10.7	0.1525	0.0000	SURCHARGED
960 minute summer	S12	570	6.748	0.298	9.7	0.2246	0.0000	SURCHARGED
960 minute summer	S14	570	6.750	0.450	20.1	0.2138	0.0000	SURCHARGED
15 minute summer	re16	10	6.801	0.081	9.9	0.0375	0.0000	OK
15 minute summer	re15	10	6.779	0.079	9.9	0.0411	0.0000	OK
360 minute summer	S17	288	6.745	0.445	6.0	0.6001	0.0000	SURCHARGED
600 minute winter	S18	405	6.706	0.586	10.3	0.7872	0.0000	OK
360 minute summer	S25	288	7.031	1.021	15.5	1.1543	0.0000	SURCHARGED
360 minute summer	S26	288	6.896	0.911	2.1	1.0305	0.0000	SURCHARGED
360 minute summer	S27	288	5.967	0.027	1.1	0.0302	0.0000	OK
360 minute summer	7702	288	5.876	0.026	1.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	re1	1.000	S2	31.8	2.170	0.644	0.3060	
15 minute summer	S2	1.001	S3	42.7	2.428	1.050	0.3399	
15 minute summer	S3	1.002	S21	63.0	2.011	0.850	0.7737	
360 minute summer	S21	1.003	S24	21.1	0.327	0.220	1.1388	
600 minute winter	S24	Flow through pond	S25	50.8	0.044	0.027	74.7626	
15 minute summer	re7	2.000	S8	9.4	0.654	0.346	0.1702	
15 minute summer	S8	2.001	S11	24.6	1.396	1.378	0.2744	
360 minute summer	S11	2.002	S18	7.9	0.528	0.176	1.0823	
960 minute summer	S13	3.000	S14	-10.3	-0.266	-0.249	0.9316	
960 minute summer	S12	4.000	S14	-8.9	0.380	-0.207	0.8776	
960 minute summer	S14	3.001	S18	-19.7	0.537	-0.259	2.2403	
15 minute summer	re16	5.000	S17	9.7	1.020	0.539	0.2510	
15 minute summer	re15	6.000	S17	9.7	1.064	0.509	0.1977	
360 minute summer	S17	5.001	S18	5.6	0.381	0.038	3.0826	
600 minute winter	S18	Flow through pond	S24	73.7	0.041	0.024	129.6784	
360 minute summer	S25	7.000	S26	2.1	0.200	0.017	0.6790	
360 minute summer	S26	Hydro-Brake®	S27	1.1				
360 minute summer	S27	7.002	7702	1.1	0.524	0.066	0.0214	187.5



Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 97.82%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	re1	11	9.743	0.093	33.1	0.1059	0.0000	OK
15 minute summer	S2	11	8.620	0.620	47.6	0.3565	0.0000	SURCHARGED
15 minute summer	S3	11	7.179	0.179	65.0	0.1221	0.0000	OK
720 minute summer	S21	435	6.783	0.633	13.1	0.5712	0.0000	SURCHARGED
720 minute winter	S24	465	6.902	0.872	573.3	0.2469	0.0000	OK
15 minute summer	re7	11	7.351	0.101	10.2	0.0329	0.0000	OK
15 minute summer	S8	11	7.320	0.360	25.6	0.2158	0.0000	SURCHARGED
480 minute winter	S11	416	6.778	0.428	13.8	0.2144	0.0000	SURCHARGED
480 minute summer	S13	352	6.812	0.362	2.2	0.1848	0.0000	SURCHARGED
480 minute summer	S12	352	6.805	0.355	3.2	0.2677	0.0000	SURCHARGED
480 minute summer	S14	352	6.789	0.489	11.8	0.2324	0.0000	SURCHARGED
15 minute summer	re16	10	6.803	0.083	10.2	0.0383	0.0000	OK
480 minute summer	re15	352	6.792	0.092	1.7	0.0481	0.0000	OK
480 minute winter	S17	416	6.772	0.472	41.1	0.6366	0.0000	SURCHARGED
480 minute winter	S18	416	6.819	0.699	391.8	0.9393	0.0000	OK
720 minute winter	S25	465	7.176	1.166	121.3	1.3185	0.0000	SURCHARGED
480 minute winter	S26	328	7.086	1.101	149.5	1.2456	0.0000	SURCHARGED
480 minute winter	S27	328	5.967	0.027	1.2	0.0300	0.0000	OK
480 minute winter	7702	328	5.876	0.026	1.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	re1	1.000	S2	32.6	2.179	0.660	0.3146	
15 minute summer	S2	1.001	S3	44.1	2.504	1.083	0.3399	
15 minute summer	S3	1.002	S21	65.0	2.017	0.877	0.7958	
720 minute summer	S21	1.003	S24	13.0	0.226	0.136	1.1388	
720 minute winter	S24	Flow through pond	S25	-568.4	-0.128	-0.301	75.5714	
15 minute summer	re7	2.000	S8	9.6	0.673	0.357	0.1909	
15 minute summer	S8	2.001	S11	25.2	1.433	1.414	0.2748	
480 minute winter	S11	2.002	S18	-13.0	0.499	-0.293	1.0823	
480 minute summer	S13	3.000	S14	5.7	0.268	0.137	0.9316	
480 minute summer	S12	4.000	S14	5.9	0.452	0.139	0.8776	
480 minute summer	S14	3.001	S18	19.3	0.395	0.253	2.2403	
15 minute summer	re16	5.000	S17	10.0	1.029	0.558	0.2577	
480 minute summer	re15	6.000	S17	1.7	0.666	0.089	0.3138	
480 minute winter	S17	5.001	S18	-40.9	0.381	-0.280	3.0826	
480 minute winter	S18	Flow through pond	S24	474.9	0.071	0.155	138.7186	
720 minute winter	S25	7.000	S26	201.7	1.829	1.588	0.6790	
480 minute winter	S26	Hydro-Brake®	S27	1.2				
480 minute winter	S27	7.002	7702	1.1	0.522	0.065	0.0212	240.2

Appendix C

MANAGEMENT & MAINTENANCE REGIME

The responsibility for maintenance of all elements of the development remains with McCarthy and Stone Lifestyle Developments Ltd until handed over to the Management Company. Once handed over, the building will be managed by McCarthy & Stone Management Services (MSMS), the in-house management company for McCarthy & Stone. Following the handover, MSMS is responsible for all aspects of the maintenance. Handover of the building to the Management Company typically takes place prior to occupation. At handover the Management Company and Managing Agent receive as built information together with operating and maintenance manuals which detail all maintenance protocols.

Within the first two years from the first occupation, there is a two-year warranty on the communal parts of the building. There is also a two-year warranty on the individual apartments, which commences from the date of legal completion of the individual apartment. Defects should be reported to the Estates Manager, who is an employee of MSMS, and they will log the defect with McCarthy & Stone's Customer Services team.

Cellular storage

The principle means of surface water attenuation/disposal from the development is by way of cellular storage.

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the surface water drainage system;

Inspections to identify any areas not operating correctly, pollution, blocked inlets or outlets, standing water etc.

Collect and remove from site all extraneous rubbish that is detrimental to the operation or detract from the appearance of the site, including paper, bottles, cans and similar debris.

Onsite Surface Water Drainage System (generally)

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the surface water drainage system;

Every 6 months: Remove silt build up from *all* catchpits and road gullies.

Annually: elect approx. 20% of the development's surface water inspection chambers (situated in accessible non-private areas) and inspect for blockages / silt build up. Remove silt and debris. Rotate on a 5 yearly cycle to cover all such chambers over this period.

Every 2-5 years (depending on outcome of aforementioned inspections)

Commission a CCTV survey and report on condition of the surface water piped drainage system upstream of the soakaways to check for structural integrity and hydraulic fluidity. Carry out promptly any remedial work as advised by CCTV company.

Flow Control Chambers

Flow control chambers are to be maintained by the McCarthy & Stone Management Services (MSMS). Their maintenance regime shall be as follows:

Following installation of the Flow Controls any extraneous material i.e. Building materials are removed from the unit and the chamber. After the system is made live, the unit is to be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. The Hydrobrake Flow Control is fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur. Following the drain down and clearance of the blockage the pivoting by-pass door must be returned to the closed position to enable the hydrobrake to function as designed.

The chambers are to be cleared checked for structural integrity at the six monthly interval. Any damage/problems should be made good as per the original design drawings.

Permeable Paving

External parking areas and access roads are to be constructed in permeable block paving in order to;

- a) Delay the surface water runoff from these areas, and
- b) Enhance the quality of the rainwater prior to discharge into the receiving sewer.

The Management Company will ensure that the following measures are undertaken to ensure the longevity of the pervious pavement;

Quarterly

- i) Inspect the pervious pavement for signs of ponding and ensure there is no migration of soils from adjacent landscaped areas or other deleterious material that may prematurely clog up the jointing stone situated in the gaps between the blocks. Ideally this type of inspection should be undertaken immediately following a heavy rainfall event.
- ii) Commission vacuum sweeping and brushing of the pervious pavement to ensure joints are kept free of silt. Minimum 3 sweeping per year, thus;
 - a) End of Winter (April) – to collect winter debris
 - b) Mid-Summer (July/August) – to collect dust, flower and grass-type deposits.
 - c) After Autumn leaf fall (November)

The company commissioned to carry out this work should ensure that their vacuum equipment is adjusted accordingly to avoid the removal of jointing material.

Any lost material should be replaced promptly to avoid the blocks from being dislodged.

Last Resort Remedial Action

- i) Should a portion of the pervious pavement become substantially impervious due to excessive siltation, the following procedure should be followed;

- a) Lift block paving and laying course
- b) Break out underlying bitmac base layer and replace with similar compacted depth of course aggregate subbase material to BS EN 13242:2002 Type 4/20, wrapped in geotextile as Terram 1000 or similar.
- c) Renew laying course, replace blocks and renew jointing material

NB. Material removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and as such may need to be disposed of as 'controlled waste'. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

Renew laying course, replace blocks and renew jointing material.NB. Material removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and as such may need to be disposed of as 'controlled waste'. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

Appendix D

SURFACE WATER MANAGEMENT PLAN (SWMP)



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SURFACE WATER MANAGEMENT PLAN (SWMP)

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PROPOSED RESIDENTIAL DEVELOPMENT
GRFC BOWLS CLUB, CHURCH WALK, GRAVESEND, KENT DA12 2QU
ON BEHALF OF MCCARTHY STONE
DECEMBER 2024
IDL/1129/DS/010



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SURFACE WATER MANAGEMENT PLAN (SWMP)

IDL/1129/DS/010

REPORT ISSUE

Revision	Date	Notes
P01	05/12/2024	Preliminary Issue

PREPARED BY

Brijesh Mistry Infrastructure Engineer	December 2024
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REVIEWED BY

Phil Tomes Director	December 2024
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DISCLAIMER

This report has been prepared by Infrastructure Design Ltd for the sole use of the client. It may not be assigned to, relied upon or used by any third party in part or in whole without the written permission of Infrastructure Design Ltd.

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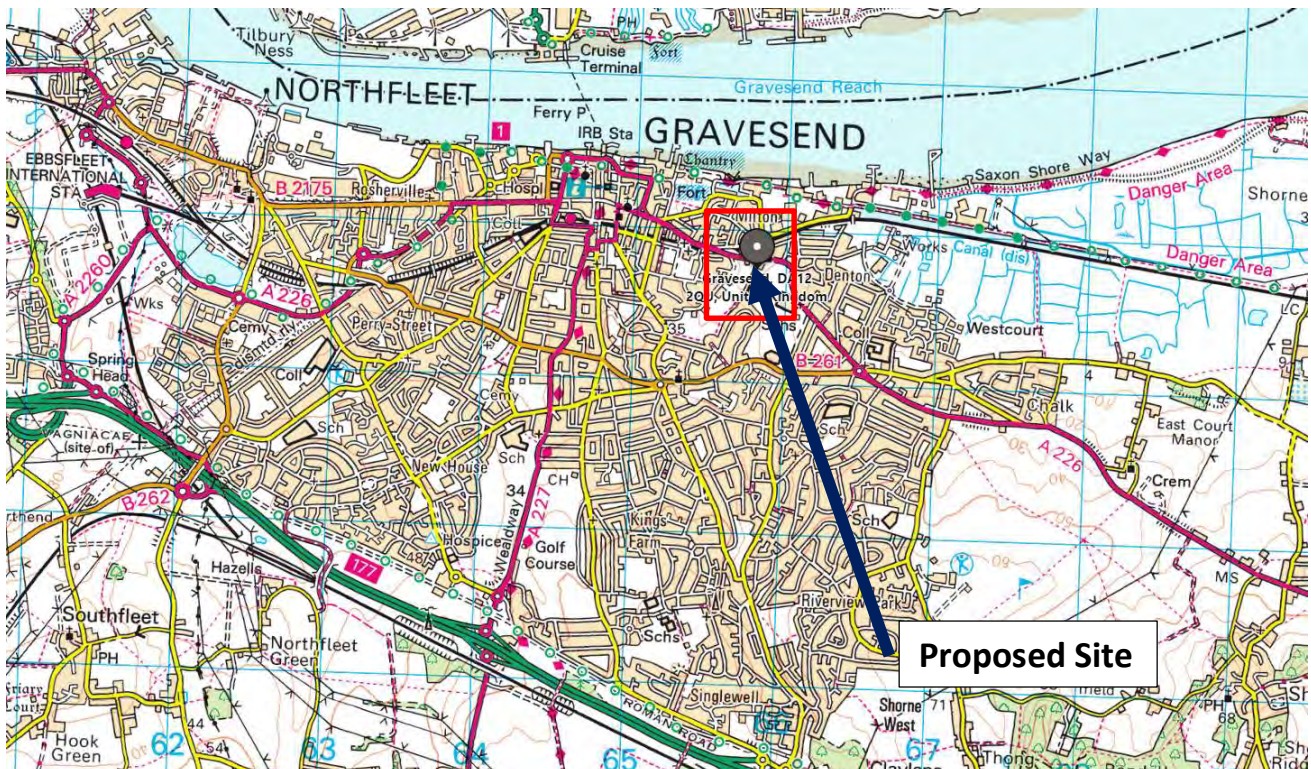
1 INTRODUCTION

- 1.1 Infrastructure Design Ltd has been appointed to prepare this report in order to support their planning application for their proposed residential development site.
- 1.2 This report aims to demonstrate the proposed measures for temporary drainage on site and the exceedance flow management.
- 1.3 This report should be read with the Surface Water Drainage Strategy report IDL/1129/DS/001 Rev P03 dated October 2022 and IDL drainage plans and calculations enclosed within the drainage strategy report.

2 LOCATION OF SITE

- 2.1 The site is located on Church Walk, Gravesend. Milton Road bounds the site to the north, Church Walk to the east, a road identified as Ellerslie on the western boundary and sports playing field to the south. The National Grid Reference for the site is TQ 65754 73773.

Figure 1 – Site Location Plan



3 PROPOSAL OF THE SWMP

- 3.1 The SWMP will ensure that during the construction phase, any surface water runoff leaving the development site is sufficiently treated as to be acceptable for disposal into controlled waters.
- 3.2 This will be achieved by:
- Identifying potential entry and collection points of surface water runoff onto or within site.
 - The implementation of specific measures for capture of this surface water runoff.
 - Final treatment of surface water runoff, within the development site boundary, prior to being discharged off-site.
 - Implementation of Emergency Measures/ Arrangements.
- 3.3 Additionally, the plan will identify the requirements to ensure that any implemented measures are adequate and effective. This will be achieved/supported through monitoring, maintenance, sample collections and other means.
- 3.4 Records are to be kept and will form part of the site handover documentation.
- 3.5 The plan will identify the responsible parties for each management item and the frequency of any actions to be undertaken.
- 3.6 The plan will be reviewed at appropriate frequencies, dependent on risk and impact.

4 DRAINAGE STRATEGY

Permanent Phase Plan

- 4.1 The IDL prepared a detailed drainage strategy for the proposed residential development.
- 4.2 The philosophy and calculations for the permanent situation have been defined in the IDL Foul & Surface water drainage strategy plan and calculations.

Potential Water Sources

- 4.3 Topographically, the site falls towards Church Walk.
- 4.4 The potential overland flow of water going to Church Walk, Milton Road, and adjacent properties must be protected during construction and regularly inspected for siltation and pollutants.

Discharge Points

- 4.5 The discharge from the proposed development site will be discharged into the proposed cellular storage system and then to the sewer via a control manhole.
- 4.6 Construction surface water runoff captured via the measures described in this SWMP will be treated and also discharged into the cellular storage system, as shown in the drainage strategy plans.

5 CAPTURE & TREATMENT

Capture through French Drains

- 5.1 The site compound area will be constructed to include collecting French drains, which will discharge to the surface water sewer system (cellular system) via catch pit manholes.

Capture through linear drainage channels with sump units and trapped gullies & cathpit manholes

- 5.2 The surface water runoff from the hardstanding areas will discharge to the drainage channels or trapped gullies, which will discharge into the cellular system via catch pit manholes.
- 5.3 Catchpit manholes are installed to minimise debris entering the drainage system.

Treatment

- 5.4 The compound area and all proposed external paved and path areas are to be regularly brushed and cleaned.
- 5.5 The clean granular stone fill within the trenches of the French drains will provide initial treatment of the runoff from the compound areas.
- 5.6 The French drains discharge via conventional pipes/catchpit and into the infiltration features (cellular system). This will provide a level of treatment.
- 5.7 All the road gullies to have a permeable geotextile membrane placed under the grating or place to capture silt runoff during construction.
- 5.8 The course aggregates subbase/cellular storage tank construction makeup will have a sacrificial tarmac layer on top to avoid any surface water runoff going through the subbase/cellular system during construction. Once the construction period is complete, the sacrificial tarmac will be removed and replaced with permanent permeable paving construction makeup.

6 EXCEEDANCE MANAGEMENT

- 6.1 National SuDS standards, the Design and Construction Guidance 2020 and Sewers for Adoption recommend that the 1 in 30-year storm event is managed below ground with exceedance flows managed above ground.
- 6.2 Any runoff up to a 1 in 100-year storm event, including 40% climate change, will be attenuated within the curtilage of the site in the proposed drainage system.
- 6.3 The proposed layout, indicating the management of exceedance flows, has been produced and included in the IDL drainage plan.
- 6.4 Emergency pumping will be undertaken in the unlikely event that areas are inundated with floodwater. The construction manager will be made aware of low points and will monitor these during excessive storm events. An emergency team will be appointed by contractors.

7 MONITORING

7.1 The monitoring and maintenance regime for the temporary and permanent drainage during construction is shown below:

Elements	Maintenance Action	Frequency	Responsible Party Manager
Trapped Gullies /drainage channels	Inspected, and cleaned of debris as necessary to prevent entry into the main drainage system.	Every two weeks, or at a greater frequency due to site conditions	Site Manager
Compound areas – French Drains	Inspected, and cleaned of debris as necessary to prevent entry into the main drainage system.	Every two weeks, or at a greater frequency due to site conditions	Site Manager
Catch pits	Inspected and cleaned of debris as necessary to prevent entry into the main drainage system	Every two weeks, or at a greater frequency due to site conditions	Site Manager
French drains	Surface stone to be inspected and cleaned of debris by removal and replacing of top 75mm of stone to ensure adequate infiltration	Following heavy rainfall	Site Manager
Subabse/Cellular storage tank	Inspected and cleaned of debris/ blockages, as necessary. The systems to be checked to ensure operating adequately	Every two weeks, or at a greater frequency due to site conditions. rainfall	Site Manager
Site entry and exit points	Inspected and cleaned of debris with road sweeper plant, as necessary	Daily	Site Manager
Testing/ analysis of samples	Suspended solids test, hydrocarbons, sample from watercourse	Before to set a baseline and then every 1 month, or at a greater frequency if required	Site Manager

Capture

7.2 The following incidents should be reported to Construction Management immediately:

- Breaches of measures to control flows (e.g. damage to French drains and crates etc.)
- Inadequacy of implemented measures to control flows (localised flooding, new sources of water flow, etc.)
- Changes of visual water quality through the outfalls
- Changes to suspended solids or hydrocarbons in sampled water analysis.

Review Frequencies

7.3 The SWMP, environmental objective, and any required actions must be reviewed periodically. The frequencies of each review are shown below:

Elements	Review Procedure	Frequency	Responsible Party
Surface Water Management Plan	A set procedure – minimum every two weeks and following/ during severe weather conditions	Every two weeks and following adverse weather.	Site Manager
Environmental objective	Silt/ slurry collection, also visual assessments, flow rate assessments	Every two weeks and following adverse weather.	Site Manager
Actions	System amendment if potential failures Identified.	Immediate	Site Manager

7.4 All the permanent drainage elements such as manholes, drainage pipes, drainage channels, silt or catchpit pits, gullies and SuDS features such as subbase/cellular storage tank should be inspected after construction is completed to ensure the reliability and functionality of the drainage system. A full CCTV survey and verification report should also be carried out as necessary to ensure it is constructed according to approved drawings. In all instances, inspection and cleaning should be carried out only by a specialist contractor. Refer to IDL drainage management and maintenance regime requirements for the permanent maintenance of the drainage system after handover to the management company.

Appendix E

SOUTHERN WATER CONSENT



Mr Brijesh Mistry
Infrastructure Design Limited
Suite 44
Harborough Innovation Centre
Market Harborough
Leicestershire
LE16 7WB

Your ref

16767

Our ref

DSA000036570

Date

06 September 2024

Contact

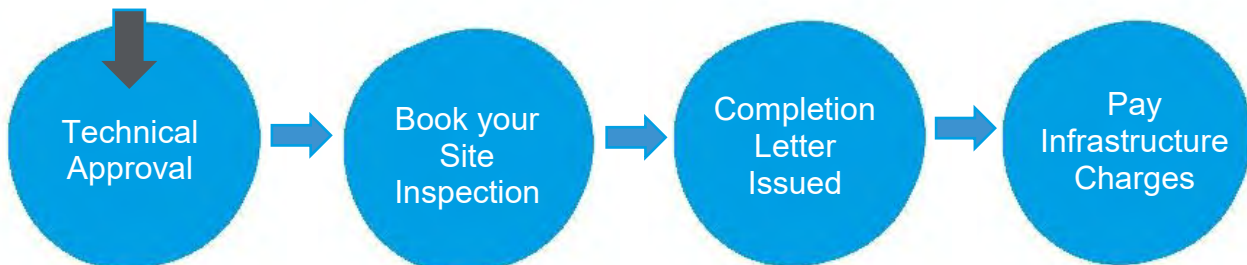
Tel 0330 303 0119

Dear Mr Mistry,

Application to Connect to the Public Sewerage System - Section 106.

Location: Bowling Green, Church Walk, Gravesend, Kent, DA12 2QU

You are here



What happens next?

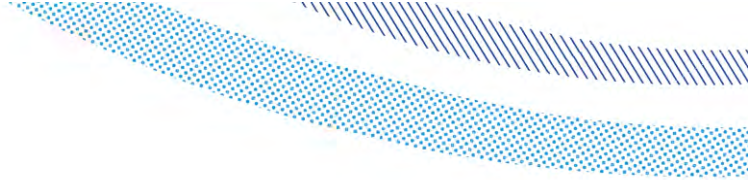
1. This is your technical approval.
2. Construction of the wastewater connection begins. Once completed, ensure you book a site inspection, so we know the connection is in line with your application.
3. Once the site inspection has confirmed the work is satisfactory, a completion letter will be issued. See the Essential Sewer Connection Information document to find out why this letter is important.
4. Your infrastructure charge invoice will be issued (if applicable*).

Technical Approval

We are pleased to advise that your Section 106 application to connect to the public combine sewer, as shown on your drawing LSE-2821-04-DE-101 dated 25.06.24 is approved by Southern Water.

Southern Water, Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX
[southernwater.co.uk](https://www.southernwater.co.uk)

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670



Our approval means we are satisfied with your connection method. Inspection of the wastewater connection is required to complete your Section 106 application.

Connections to existing/new Southern Water assets (i.e., manholes) and the arrangement of Southern Water assets (i.e., pipe junctions within manholes) should always be in accordance with the new Design and Construction Guidance manual (“the Code”) and Southern Water’s guidance documentation. [water.org.uk/sewerage-sector-guidance-approved-documents/](https://www.southernwater.co.uk/sewerage-sector-guidance-approved-documents/)

This Section 106 approval does not confirm that public sewer network capacity is available at your location for the proposed development. The availability of capacity may be assessed through the Pre-Planning Enquiry process.

Please note that your connection should not proceed if:

- There are unapproved changes to your submitted plan or to the intended connection point. Any unapproved changes may lead to us disconnecting your connection under Section 109 of the Water Industry Act 1991.
- The relevant Planning Authority has set out conditions relating to the site’s drainage and those conditions have not yet been discharged.
- You have not consulted our Health and Safety Advisory that can be viewed at the following link southernwater.co.uk/developing-building/health-and-safety
- You have not obtained the necessary Building Regulations Approvals or, if relevant, obtained a Highway Authority Road Opening License.
- Landowner consent has not been obtained where your connection is to be made through another Party’s land.

How to book your site Inspection

To progress, select the 'Accept' option on the Get Connected customer dashboard. Or, if you have further questions, please select the 'Query' option. If you do not wish to progress with the application, then please select the 'Withdraw' option.

Now you have received our approval, you will need to arrange with your contractor to carry out your works on site to connect into our sewer. Once the connection has been made it is a mandatory requirement for the point of connection to be inspected by one of our Assistant Adoption Managers.

To arrange this inspection, please select 'Ready for Inspection' on your Get Connected customer dashboard. Once this has been selected, please contact **Sarah Simmons** our Assistant Adoption Manager for this area on **07803259274** and request an inspection giving at least two full working days’ notice.

Once we are happy that your connection to the public sewer complies with our requirements and have passed our inspection, we will send you a completion letter within 7 working days. It’s important to ensure your connection is inspected to prevent any risk of disconnection at a later date.

Yours sincerely,

Southern Water, Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX
[southernwater.co.uk](https://www.southernwater.co.uk)

Southern Water Services Ltd, Registered Office: Southern House, Yeoman Road, Worthing, West Sussex, BN13 3NX Registered in England No. 2366670

A handwritten signature in black ink, appearing to read 'Neil Packham', on a light blue background.

Neil Packham

Technical Delivery Manager - Wastewater
Developer Services



Essential Sewer Connection Information

1. Site Inspection Checklist
2. What happens if the sewer connection is not inspected?
3. Adoption of a sewer
4. Infrastructure charges
5. Enforcement Policy

1. Site Inspection Checklist

We have prepared a site inspection checklist so that inspection of your sewer connection can be passed first time southernwater.co.uk/media/3028/ds-site-inspection-checklist.pdf

2. What happens if the sewer connection is not inspected and a completion letter is not issued?

Incidences where construction of the sewer connection has been completed but a site inspection has not been requested then the sewer connection application is not completed. You will need to request for a site inspection to finalise the application. If the sewer connection has not been built as per the designs submitted then we will ask you to rectify.

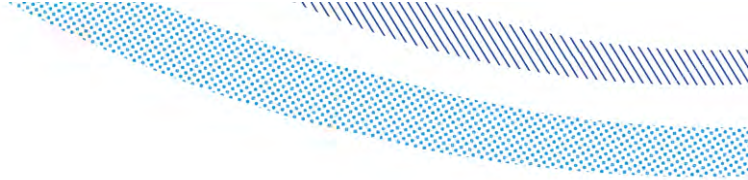
3. Adoption of a sewer

When a new development is planned, the developer can construct the sewers using approved materials and to a standard, which makes them suitable for adoption by Southern Water when construction is complete.

An adoption agreement can be entered into under Section 104 of the Water Industry Act 1991, prior to the sewers being built. This is the most desirable arrangement and if all new developments were covered by such adoption agreements, there would be few, if any, new private sewers on housing estates. However, there are many kilometres of existing private sewers that were built without an adoption agreement in place.

Section 102 of the Water Industry Act 1991 provides for the adoption of such sewers to be considered. It is important to draw a distinction between sewers, drains, and lateral drains:

- Sewers are pipes carrying sewage from more than one property
- Drains are pipes carrying sewage from only one property to the curtilage of the building or premises
- Lateral drains are those pipes which extend from the curtilage of a single building to the point of connection with an existing public or private sewer



To start the process of having the private sewer adopted, please visit our website and fill in the S102 Adoption Form.

4. Infrastructure charges

New developments increase the load on our networks and may require investment in upstream network reinforcement. This investment is funded through the Infrastructure Charge where the cost of network reinforcement is levied per property at the time of final connection.

* In addition to the sewer connection application charge, a charge for sewerage infrastructure is levied on each dwelling connecting onto the sewerage system. Non domestic properties will be individually assessed according to the number of appliances/fittings producing wastewater. Infrastructure charges are applicable even if the connection is made via a private sewer providing that the private sewer ultimately discharges into the public system.

There are three scenarios:

1. Water and wastewater connections are made within Southern Waters supply area. Infrastructure charges will be included in you water connection quote.
2. Water connections are made within another water company's supply zone and Wastewater is within the Southern Water supply area. Infrastructure charges will be invoiced following connection of the meters as advised by each water company.
3. You already have a water connection and require a wastewater connection in the Southern Water supply area. Infrastructure charges will be invoiced directly following completion of the wastewater connection.

For information and our current Connection Charges please refer to section 2 of the Southern Water Charging Arrangements [Connection charging arrangements \(southernwater.co.uk\)](https://www.southernwater.co.uk/connection-charging-arrangements)

5. Enforcement Policy

It is an offence to not comply with the requirements of a S106 Water Industry Act 1991, which are detailed in the body of the letter. This can result in prosecution and a fine and/or removal of the illegal connection.