

**PROPOSED EDUCATIONAL DEVELOPMENT
GREEN PARK VILLAGE SCHOOL,
READING, BERKSHIRE, RG2 6AB
DRAINAGE STRATEGY STATEMENT**

**FOR
REDS10**

11th October 2018

Report no: 2562 DRSTRAT

REV B

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Report Status: B

Project no: 2562

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1 Introduction and Brief

This statement has been produced to confirm the drainage strategy for the proposed residential development situated at Green Park Village, Reading, Berkshire, RG2 6AB as a result of the detailed design being progressed.

This document has been produced in accordance with current best practice and recommendations and guidance set out in the National Planning Policy Framework (NPPF).

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2 Existing Site Conditions

2.1 Location

The site is located along Longwater Avenue within the Green Park Village Development, Reading . The figure below shows the site in its current context.

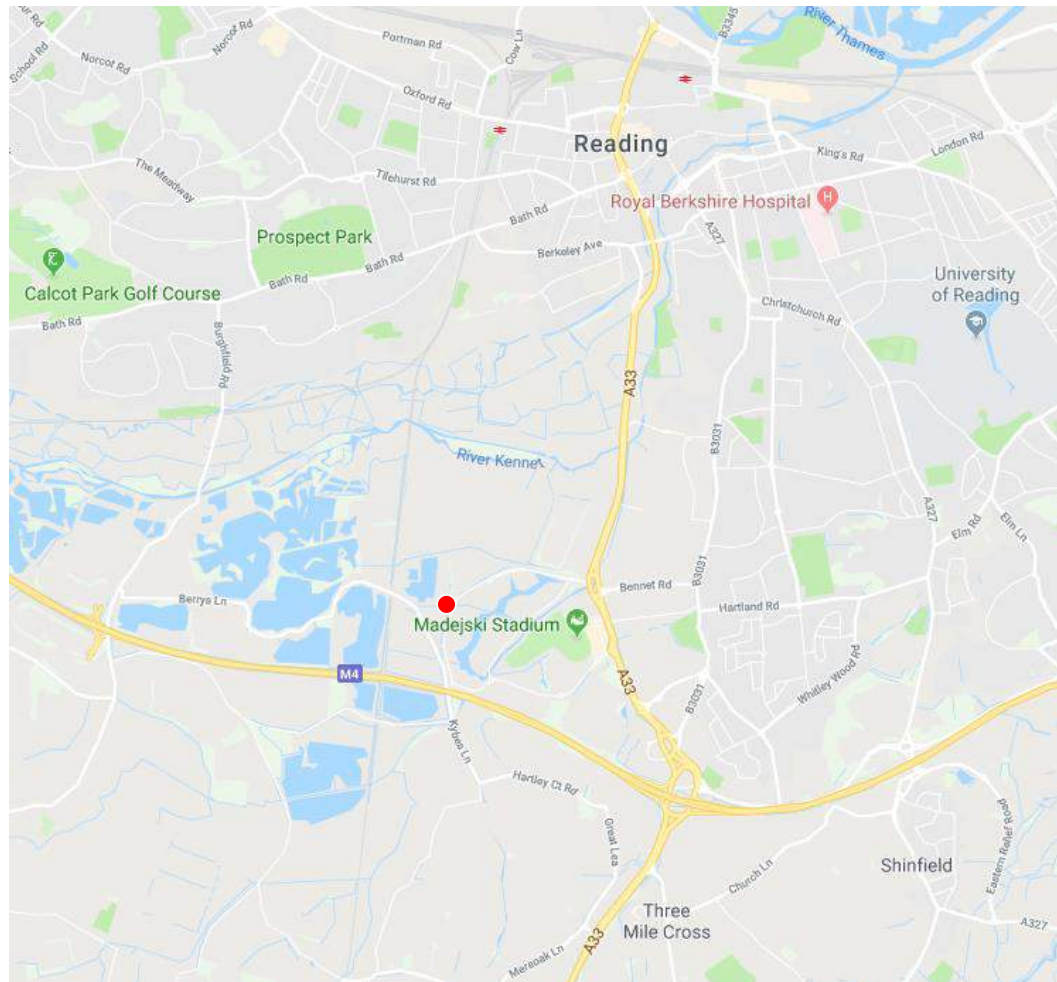


Figure 2.1 – Site location General Area – Location shown by red dot. © Google Maps



Figure 2.2 – Site location – Approximate Site Boundary shown in Red © Google Maps

The site previously comprised open field, however the existing site is cleared and enabled prior to construction of the proposed development.

Total Site Area: 9,392 m²

2.2 Site Topography

A review of the topographic survey shows that levels vary between approximately 40.6m AoD and 39.88m AoD, with a general slope across the site from North to South at approximately 1 in 132.

2.3 Site Geology

A review of the on-site borehole records indicate that the existing site geology consists of made ground on gravels (Beenham Grange Gravel Member) on Lambeth Group Clays and Sands.

2.4 Hydrogeology and Hydrology

Pre-development, the site is deemed to soak both through natural ground soakage and evapotranspiration into the lake in the neighbouring land. Subsequent to the development of Green Park Village, the land is currently levelled ready for the proposed development. The existing method of drainage of the site in its current form is unknown.

A Flood Risk Assessment has been carried out by Glanville Consultants which has determined the educational site will be connected to an existing network constructed during the previous phases of the Green Park Village development. The report states that the proposed educational site will be traditionally gravity drained to foul and surface water sewers.

The report states that the discharge rate for the proposed development should be set at 73.4 l/s. All drainage for the proposed development will be calculated using FEH and a 40% climate change increase. The report states that there is to be no flooding in a 30 year event with flooding in a 1:100 year event + 40% climate change allowed to occur provided the flooding can be retained on site and does not pose a risk to the school building or adjacent properties.

The report also states the minimum FFL for the final structure will be in accordance with the original FRA (un-sourced) and will set a minimum platform level of 40.200m with the floor level at a minimum of 40.350m.

3 Proposed Development

The proposed development comprises the construction of a new education building and associated amenity areas, multi-use games area (MUGA) and sports pitches. New vehicular/pedestrian access will be provided to the North West of the site with additional pedestrian accesses to the South West and Southern boundaries of the site.

The proposed impermeable area has been calculated as approximately 2,363m² however areas of the site are being provided with land drains to reduce the risk of ground saturation within the sports pitches and MUGA.

It is important to note that the MUGA and sports pitches will be designed with an element of self-storage due to their construction methods.

The existing site is cleared and enabled however the existing site was deemed predominantly permeable with a mixture of vegetation. The impermeable area of the proposed site is therefore significantly greater than that existing on the site today and as such increases surface water runoff potential.

As already noted the site is being developed within an existing wider strategy and drainage network system in accordance with the Flood Risk Assessment by Glanville Consulting (dated 29 March 2018). The proposed outfalls have therefore already been assessed and determined for this development with the intention of discharging flows to a wider managed network.

4 Proposed Foul Water Strategy

4.1 Existing Development FW System

FW system records have been assessed and reviewed. The proposed connection for the development is located within the site on the South Western boundary as provided by others. The proposed network will connect to this existing spur.

4.2 Foul Water Capacity

It is unknown to date whether a specific capacity check has been undertaken, however since the OFWAT Regulation changes of April 2018 it is no longer a requisite to check available capacity. The new requirement is for the drainage authority to accept all discharge from new development sites into their nearest available sewer. In exchange they receive an enhanced connection payment per dwelling in order to fund network improvements. If the local network does not have available capacity and the improvement programme is not going to be completed until some time after the development comes on line, then the drainage authority (Thames Water) can work with the developers to agree temporary solutions to the capacity issue – these measures can include on site storage or timed pumping.

It is the understanding of this report that the foul network for the proposed education development has been accounted for within the wider strategy and as such provision is suitable.

4.3 Foul Water Strategy

The foul water drainage points are associated with the main structure and the bin store, with no foul water discharge from the rest of the site.

The proposed strategy is to run a traditional gravity drainage network around the perimeter of the structure with a new chamber located on the previously constructed spur near the entrance of the site. The network has been assessed to minimise the amount of pipework required whilst maintaining a “minimum dig” approach. Outfalls from the structure are predominantly placed above the foundation top of concrete to a precast polypropylene inspection chamber. The network will then connect to the main perimeter sewer.

The interface between the sewers and the foundations of the proposed structure have been reviewed to ensure the pipework is not crushed/damaged by the foundation loads. The proposed foundations are RC strip footings located on improved stabilised ground via the use of 150kN capacity stone columns. The columns have been designed to maximum 2m centres but with the provision that the footings can span 4m where stone columns are omitted. Therefore the proposed foundations are deemed to act similarly to a piled foundation which therefore removes the potential crushing within the foundation angle of influence. In addition, the proposed network has been kept shallow to lift the pipes further away from the loading influence where possible.

In three locations, the depth of the network unavoidably passes beneath the proposed foundations. These positions have been marked on the proposed drainage drawings and refer to note S1. Pipes under these conditions are to be Extra Strength (ductile iron / concrete) with class Z bed and surround up to a minimum of 1m external offset from the outside edge of the foundations.

The FW strategy is included within 'FW and SW Drainage Strategy' drawing at Appendix 1.

5 Proposed Surface Water Strategy

5.1 Existing Run Off Rates

As previously stated, the proposed site is sited within a wider strategy network and as such has been defined as an outfall of 73.4 l/s into an existing chamber as per the Glanville Consulting FRA. Proposed run off rates have been agreed stating that there is to be no flooding in a 30 year event with flooding in a 1:100 year event + 40% climate change allowed to occur provided the flooding can be retained on site and does not pose a risk to the school building or adjacent properties.

It is important to note that the model, whilst detailed, still rationalises the site into a simple model. The drainage run that connects to the ground drains under the amenity areas, MUGA and sports pitches has been designed as the first branch away from the main network (S7). The model does not account for the inherent storage both within the surface of the amenity spaces, MUGA or sports pitches – nor the permeable pipework itself. In addition the time of infiltration into the network will also significantly vary depending on a number of determining factors (maintenance regime, vegetation uptake, losses from ground dispersion, permeability variations, evapotranspiration, temperature, time since last rainfall, etc.)

A typical time of infiltration of 20 mins has been used to account for the average infiltration into the network to the point flows reach chamber S7.

The proposed network has been designed to provide storage in cellular storage crates (void ratio = 0.95) and has been sized to accommodate a 1:30 year event + 40% climate change. The results of the detailed model can be found within Appendix 2.

The model has been assessed to determine the impacts of a 1:100 year + 40% climate change event which results in flooding of approximately 54.8m³.

53.1m³ of the flood is located on pipe-run 3.000 which is the spur to chamber S7 as mentioned above.

0.7m³ of this flood occurs within the car park area.

It is the summary of this report that the flooded volumes will be adequately stored within the confines of the site within the sub-structure storage (as discussed above) or spread across the impermeable car park (forming very shallow localised ponding) and is guided away from the proposed structures by means of appropriate level setting. It is not believed that the “flooding” effect of the 1:100 year + 40% cc event will impact on the main activities of the facility or the car park during this storm event.

Refer to the Engineering Layout in Appendix A for level information.

6 Conclusions

This document has been produced in accordance with current best practice and recommendations and guidance set out in the National Planning Policy Framework (NPPF) and as required Medway Council Strategic Flood Risk documentation.

The report concludes:

- The development comprises erection of a new education facility and associated amenity, multiuse gaming area and sports pitches within the context of a wider development strategy.
- The existing site is cleared and enabled.
- A review of the topographic survey shows that levels vary between approximately 40.6m AoD and 39.88m AoD, with a general slope across the site from North to South at approximately 1 in 132.
- A review of the on-site borehole records indicate that the existing site geology consists of made ground on gravels (Beenham Grange Gravel Member) on Lambeth Group Clays and Sands.
- The proposed strategy is founded on the Flood Risk Assessment as completed by Glanville Consulting which defines the outfalls for the proposed structure and the 73.4l/s outfall for the proposed surface water discharge.
- The proposed development has been modelled in Microdrainage against FEH data. The 1:30 year + 40% climate change event is retained within the storage crates. The 1:100 year + 40% climate change event causes flooding (54.8m³), but it is the conclusion of this report that the majority of the flooding will be retained within the vegetated areas of the site and away from the proposed structures, with minor ponding within the car park.

7 Appendices

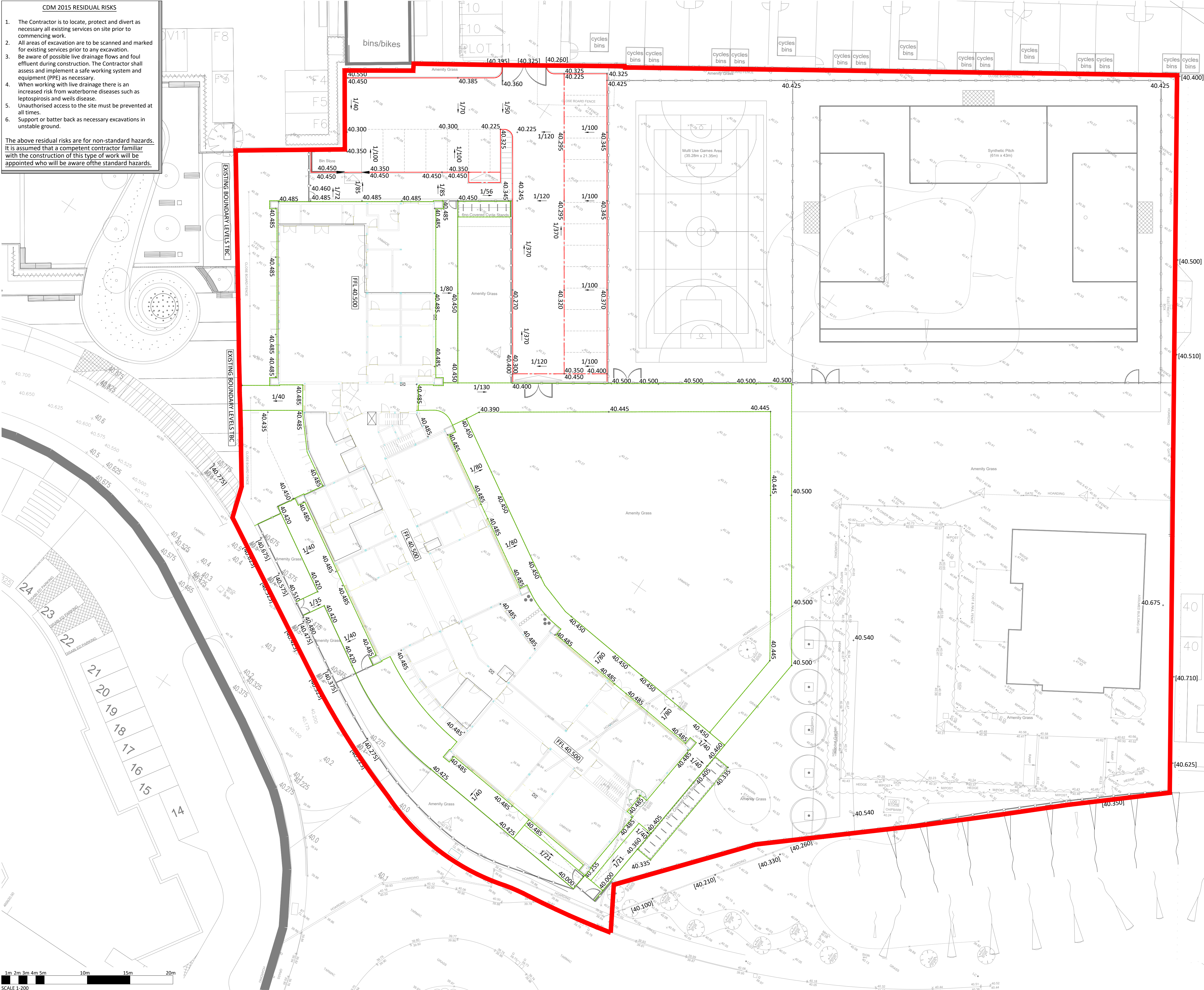
7.1 Appendix 1 – Proposed Site Drawings

2050-1500 P05 (Engineering Layout)
2050-1510 P09 (Proposed Drainage Layout)

COM 2015 RESIDUAL RISKS

1. The Contractor is to locate, protect and divert as necessary all existing services on site prior to commencing work.
2. All areas of excavation are to be scanned and marked for existing services prior to any excavation.
3. Be aware of possible live drainage flows and foul effluent during construction. The Contractor shall assess and implement a safe working system and equipment (PPE) as necessary.
4. When working with live drainage there is an increased risk from waterborne diseases such as leptospirosis and wells disease.
5. Unauthorised access to the site must be prevented at all times.
6. Support or batter back as necessary excavations in unstable ground.

The above residual risks are for non-standard hazards. It is assumed that a competent contractor familiar with the construction of this type of work will be appointed who will be aware of the standard hazards.



DO NOT SCALE THIS DRAWING. ALL SETTING OUT TO ARCHITECTS DETAILS AND DRAWINGS

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWING ISSUES AND THE SPECIFICATION.

- Notes:
- G1. All building materials, components and workmanship to comply with the appropriate public health acts, building regulations, british standards and codes of practice and the appropriate manufacturers recommendations.
 - G2. For all specialist work see relevant drawings.
 - G3. Any discrepancies, errors or omissions to be reported to the project co-ordinator for further instructions before commencement of works.
 - G4. The Engineer is not responsible for dimensions, except where shown on his drawings. All setting out information, dimensions, etc, shall be calculated from the Architects drawings.
 - G5. All private drainage shall comply with the requirements of the Building Regulations approved Document H.
 - G6. All drainage forming part of, or connecting to a public sewer shall comply with the requirements of Sewers for Adoption 7th Edition.
 - G7. Cover levels are shown indicative only and are subject to final adjustment on site.
 - G8. All FW pipes to be 100mm diameter unless noted otherwise.
 - G9. All SW pipes to be 100mm diameter unless noted otherwise.
 - G10. Minimum depth to invert of foul branch pipes to SVP/SS below finished floor level to be:
450mm 0 - 3 storey's
750mm 3 - 5 storey's
 - G11. Gradient of under floor branch pipes to be 1:40 and no flatter than 1:80 (minimum of 1 WC connected).
 - G12. All RWP, SVP and SS positions are subject to confirmation from the architect.

- KEY
- Proposed HB2 Kerb with 100mm Face
 - Proposed Bull Nose Kerb with 25mm Face
 - Proposed PC Edging
 - Proposed Channel Line
 - Proposed Transition Kerb
 - LEVEL Proposed Level
 - [LEVEL] Proposed Level to Match Existing
 - 1/100 Proposed Gradient

POS	Amended to new Site Layout	MJF	TK	11.10.18
P04	Site Layout Updated. Southern corner ramps amended to comments	MJF	RC	01.10.18
P03	Site Layout Updated as clouded	AB	SE	03.08.18
P02	Site Layout Updated	AM	RC	01.08.18
P01	First Issue	MJF	RC	27.07.18
Rev	Amendment	Drn	Chk	Date

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Client:
REDS10

Project:
**NEW SCHOOL
GREEN PARK VILLAGE**

Drawing Title:
ENGINEERING LAYOUT

considine ref	drawn by	date	drawing scales	original paper size
2562	MJF	July' 18	1:200@A1	A1

drawing reference :	originator	volume	level	type	role	number
2050	- CONSI	- 00	- XX	- DR	- C	- 1500

status :
S2
revision :
P05

status description :
SUITABLE FOR INFORMATION
revision description :
PRELIMINARY

- COM 2015 RESIDUAL RISKS
1. The Contractor is to locate, protect and divert as necessary all existing services on site prior to commencing work.
 2. All areas of excavation are to be scanned and marked for existing services prior to any excavation.
 3. Be aware of possible live drainage flows and foul effluent during construction. The Contractor shall assess and implement a safe working system and equipment (PPE) as necessary.
 4. When working with live drainage there is an increased risk from waterborne diseases such as leptospirosis and wells disease.
 5. Unauthorised access to the site must be prevented at all times.
 6. Support or batter back as necessary excavations in unstable ground.
- The above residual risks are for non-standard hazards. It is assumed that a competent contractor familiar with the construction of this type of work will be appointed who will be aware of the standard hazards.

RWP's, SVP's, SS's, to be confirmed by the Architect

Existing network designed by others to accommodate 73.4 l/s from proposed site
Discharge to Existing Chamber S157 (IL: 38.746)

ATTENUATION CRATES
CL:40.275
IL:38.770
TOP OF CRATES:39.570
PLAN AREA:140m²
VOLUME:1.12m³
TANK DEPTH:0.800m
1:100 Year Event + 40% CC (FEH)

DO NOT SCALE THIS DRAWING. ALL SETTING OUT TO ARCHITECTS DETAILS AND DRAWINGS

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWING ISSUES AND THE SPECIFICATION.

Notes:

G1. All building materials, components and workmanship to comply with the appropriate public health acts, building regulations, british standards and codes of practice and the appropriate manufacturers recommendations.

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G12. All RWP, SVP and SS positions are subject to confirmation from the architect.

Specific Notes:

S1. Where pipework is located under foundations (as flagged), pipework is to be Extra Strength (ductile iron / concrete) with class 2 bed and surround up to a minimum of 1m external offset from the outside edge of the foundations.

P09	Amended to new site layout	MJF	TK	11.10.18
P08	Attenuation tank amended	MJF	RC	03.10.18
P07	Revised to correct Outfall IL	MJF	RC	03.10.18
P06	Amended to comments	MJF	RC	01.10.18
P05	RWPs amended to include canopy drainage	MJF	RC	23.08.18
P04	Site Layout Updated as clouded	AM	RC	06.08.18
P03	Site Layout Updated as clouded	AB	SE	03.08.18
Rev	Amendment	Drn	Chk	Date

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Client:
REDS10

Project:
**NEW SCHOOL
GREEN PARK VILLAGE**

Drawing Title:
DRAINAGE LAYOUT

considine ref
2562

drawn by
MJF

date
July '18

drawing scales
1:200@A1

original paper size
A1

drawing reference:
project

2050 - CONSI - 00 - XX - DR - C - 1510

status:
S2

revision:
P09

status description:
SUITABLE FOR INFORMATION

revision description:
PRELIMINARY

- KEY
- Proposed Surface Water Pipe
Ø and gradient as stated
 - Proposed Foul Water Pipe
Ø and gradient as stated
 - Proposed Perforated Surface Water
Pipe Ø and gradient as stated
 - Proposed Surface Water PPIC
size as stated in MH schedule
 - Proposed Foul Water PPIC
size as Stated in MH schedule
 - Proposed Surface Water Manhole
Pre Cast Concrete - Circular
Size as Stated in MH Schedule
 - Proposed Foul Water Manhole
Precast concrete - Circular
Size as stated in MH schedule
 - ACO
Proposed ACO Drain
Pedestrian Areas only
 - TH
Proposed Threshold Drain
ACO Hexdrain or Similar
 - BIRCO
Proposed Birco Channel
Vehicular Areas
 - CP
Proposed Catchpit
 - HB
Proposed Hydro-Brake
 - RWP
Proposed Rainwater Pipe
 - SVP
Proposed Soil and Vent Pipe
 - SS
Proposed Stub Stack

1m 2m 3m 4m 5m 10m 15m 20m
SCALE 1:200

7.2 Appendix 2 – Microdrainage Modelling

Considine Limited		Page 1																																																																																																																																																																	
25 Hollingworth Court Kent ME14 5PP	GREEN PARK VILLAGE DETAILED DESIGN MODEL 1:30, FEH + 40% CC																																																																																																																																																																		
Date 03/10/2018	Designed by MJF																																																																																																																																																																		
File DETAILED STORAGE MODEL.MDX	Checked by RSC																																																																																																																																																																		
Innovyze	Network 2018.1																																																																																																																																																																		
STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Storm Pipe Sizes STANDARD Manhole Sizes STANDARD FEH Rainfall Model Return Period (years)2 FEH Rainfall Version2013 Site Location GB 469944 170093 Data TypePoint Maximum Rainfall (mm/hr)50 Maximum Time of Concentration (mins)30 Foul Sewage (l/s/ha)0.000 Volumetric Runoff Coeff.0.750 PIMP (%)100 Add Flow / Climate Change (%)0 Minimum Backdrop Height (m)0.200 Maximum Backdrop Height (m)1.500 Min Design Depth for Optimisation (m)1.200 Min Vel for Auto Design only (m/s)1.00 Min Slope for Optimisation (1:X)500 Designed with Level Soffits																																																																																																																																																																			
Network Design Table for Storm <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section Type</th><th>Auto Design</th></tr><tr><td>S1.000</td><td>36.876</td><td>0.360</td><td>102.4</td><td>0.018</td><td>6.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.001</td><td>28.598</td><td>0.235</td><td>121.7</td><td>0.018</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.002</td><td>23.090</td><td>0.280</td><td>82.5</td><td>0.040</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.000</td><td>26.209</td><td>0.340</td><td>77.1</td><td>0.030</td><td>6.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S3.000</td><td>5.558</td><td>0.015</td><td>370.5</td><td>0.500</td><td>20.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.001</td><td>23.694</td><td>0.075</td><td>315.9</td><td>0.050</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr></table> Network Results Table <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>S1.000</td><td>50.00</td><td>6.62</td><td>39.815</td><td>0.018</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.99</td><td>17.5</td><td>2.4</td></tr><tr><td>S1.001</td><td>50.00</td><td>7.14</td><td>39.405</td><td>0.036</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.91</td><td>16.1</td><td>4.9</td></tr><tr><td>S1.002</td><td>50.00</td><td>7.37</td><td>39.120</td><td>0.076</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.73</td><td>122.5</td><td>10.3</td></tr><tr><td>S2.000</td><td>50.00</td><td>6.38</td><td>39.305</td><td>0.030</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.15</td><td>20.3</td><td>4.1</td></tr><tr><td>S3.000</td><td>28.69</td><td>20.11</td><td>39.030</td><td>0.500</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.81</td><td>57.3</td><td>38.9</td></tr><tr><td>S2.001</td><td>28.29</td><td>20.56</td><td>38.965</td><td>0.580</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.88</td><td>62.1</td><td>44.4</td></tr></table> ©1982-2018 Innovyze			PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design	S1.000	36.876	0.360	102.4	0.018	6.00	0.0	0.600	o	150	Pipe/Conduit		S1.001	28.598	0.235	121.7	0.018	0.00	0.0	0.600	o	150	Pipe/Conduit		S1.002	23.090	0.280	82.5	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit		S2.000	26.209	0.340	77.1	0.030	6.00	0.0	0.600	o	150	Pipe/Conduit		S3.000	5.558	0.015	370.5	0.500	20.00	0.0	0.600	o	300	Pipe/Conduit		S2.001	23.694	0.075	315.9	0.050	0.00	0.0	0.600	o	300	Pipe/Conduit		PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	S1.000	50.00	6.62	39.815	0.018	0.0	0.0	0.0	0.99	17.5	2.4	S1.001	50.00	7.14	39.405	0.036	0.0	0.0	0.0	0.91	16.1	4.9	S1.002	50.00	7.37	39.120	0.076	0.0	0.0	0.0	1.73	122.5	10.3	S2.000	50.00	6.38	39.305	0.030	0.0	0.0	0.0	1.15	20.3	4.1	S3.000	28.69	20.11	39.030	0.500	0.0	0.0	0.0	0.81	57.3	38.9	S2.001	28.29	20.56	38.965	0.580	0.0	0.0	0.0	0.88	62.1	44.4
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Online Controls for Storm Hydro-Brake® Optimum Manhole: S6, DS/PN: S1.005, Volume (m³): 1.5 <table><tr><td>Unit Reference</td><td colspan="2">MD-SHE-0340-7340-1500-7340</td></tr><tr><td>Design Head (m)</td><td colspan="2">1.500</td></tr><tr><td>Design Flow (l/s)</td><td colspan="2">73.4</td></tr><tr><td>Flush-Flo™</td><td colspan="2">Calculated</td></tr><tr><td>Objective</td><td colspan="2">Minimise upstream storage</td></tr><tr><td>Application</td><td colspan="2">Surface</td></tr><tr><td>Sump Available</td><td colspan="2">Yes</td></tr><tr><td>Diameter (mm)</td><td colspan="2">340</td></tr><tr><td>Invert Level (m)</td><td colspan="2">38.770</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td colspan="2">375</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td colspan="2">Site Specific Design (Contact Hydro International)</td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>1.500</td><td>73.4</td></tr><tr><td>Flush-Flo™</td><td>0.554</td><td>73.4</td></tr><tr><td>Kick-Flo®</td><td>1.104</td><td>63.3</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>61.0</td></tr></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>10.0</td><td>1.200</td><td>65.9</td><td>3.000</td><td>102.7</td><td>7.000</td><td>155.3</td></tr><tr><td>0.200</td><td>34.5</td><td>1.400</td><td>71.0</td><td>3.500</td><td>110.7</td><td>7.500</td><td>160.6</td></tr><tr><td>0.300</td><td>62.7</td><td>1.600</td><td>75.7</td><td>4.000</td><td>118.1</td><td>8.000</td><td>165.8</td></tr><tr><td>0.400</td><td>72.0</td><td>1.800</td><td>80.1</td><td>4.500</td><td>125.1</td><td>8.500</td><td>170.7</td></tr><tr><td>0.500</td><td>73.2</td><td>2.000</td><td>84.3</td><td>5.000</td><td>131.7</td><td>9.000</td><td>175.6</td></tr><tr><td>0.600</td><td>73.3</td><td>2.200</td><td>88.3</td><td>5.500</td><td>138.0</td><td>9.500</td><td>180.3</td></tr><tr><td>0.800</td><td>71.6</td><td>2.400</td><td>92.1</td><td>6.000</td><td>144.0</td><td></td><td></td></tr><tr><td>1.000</td><td>67.7</td><td>2.600</td><td>95.8</td><td>6.500</td><td>149.7</td><td></td><td></td></tr></table>			Unit Reference	MD-SHE-0340-7340-1500-7340		Design Head (m)	1.500		Design Flow (l/s)	73.4		Flush-Flo™	Calculated		Objective	Minimise upstream storage		Application	Surface		Sump Available	Yes		Diameter (mm)	340		Invert Level (m)	38.770		Minimum Outlet Pipe Diameter (mm)	375		Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)		Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.500	73.4	Flush-Flo™	0.554	73.4	Kick-Flo®	1.104	63.3	Mean Flow over Head Range	-	61.0	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	10.0	1.200	65.9	3.000	102.7	7.000	155.3	0.200	34.5	1.400	71.0	3.500	110.7	7.500	160.6	0.300	62.7	1.600	75.7	4.000	118.1	8.000	165.8	0.400	72.0	1.800	80.1	4.500	125.1	8.500	170.7	0.500	73.2	2.000	84.3	5.000	131.7	9.000	175.6	0.600	73.3	2.200	88.3	5.500	138.0	9.500	180.3	0.800	71.6	2.400	92.1	6.000	144.0			1.000	67.7	2.600	95.8	6.500	149.7		
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Storage Structures for Storm Cellular Storage Manhole: S6, DS/PN: S1.005 Invert Level (m) 38.575 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>140.0</td><td>120.0</td><td>0.801</td><td>0.0</td><td>155.1</td></tr><tr><td>0.800</td><td>140.0</td><td>155.1</td><td></td><td></td><td></td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	140.0	120.0	0.801	0.0	155.1	0.800	140.0	155.1			
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GREEN PARK VILLAGE
DETAILED DESIGN MODEL
1:30, FEH + 40% CC

Designed by MJF
Checked by RSC

Network 2018.1

Page 5



Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0

MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0

Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500

Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0

Number of Storage Structures 1

Number of Online Controls 1

Number of Time/Area Diagrams 0

Number of Offline Controls 0

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FEH

Data Type Point

FEH Rainfall Version 2013 Cv (Summer) 0.750

Site Location GB 469944 170093 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status ON

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

Return Period(s) (years) 30

Climate Change (%) 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	60 Winter	30	+40%	30/60 Winter				40.125
S1.001	S2	60 Winter	30	+40%	30/15 Summer				40.119
S1.002	S3	60 Winter	30	+40%	30/15 Summer				40.112
S2.000	S4	60 Winter	30	+40%	30/15 Summer				40.220
S3.000	S5	60 Winter	30	+40%	30/15 Summer				40.271
S2.001	S5	60 Winter	30	+40%	30/15 Summer				40.213
S1.003	S4	60 Winter	30	+40%	30/15 Summer				40.109
S1.004	S5	60 Winter	30	+40%	30/15 Summer				40.037
S1.005	S6	60 Winter	30	+40%	30/15 Winter				39.961

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.160	0.000	0.27		4.5	FLOOD RISK	
S1.001	S2	0.564	0.000	0.56		8.6	SURCHARGED	
S1.002	S3	0.692	0.000	0.16		17.5	SURCHARGED	
S2.000	S4	0.765	0.000	0.30		5.8	FLOOD RISK	
S3.000	S5	0.941	0.000	2.16		97.8	FLOOD RISK	

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25 Hollingworth Court Kent ME14 5PP		GREEN PARK VILLAGE DETAILED DESIGN MODEL 1:30, FEH + 40% CC	
Date 03/10/2018 File DETAILED STORAGE MODEL.MDX		Designed by MJF Checked by RSC	
Innovyze		Network 2018.1	



Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged		Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow (l/s)					
S2.001	S5	0.948	0.000	1.95	107.6	FLOOD RISK			
S1.003	S4	0.969	0.000	2.22	117.0	SURCHARGED			
S1.004	S5	0.937	0.000	2.55	125.3	FLOOD RISK			
S1.005	S6	0.741	0.000	0.78	73.2	SURCHARGED			

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25 Hollingworth Court Kent ME14 5PP	GREEN PARK VILLAGE DETAILED DESIGN MODEL 1:100, FEH + 40% CC																																																																																																																																																																		
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STORM SEWER DESIGN by the Modified Rational Method Design Criteria for Storm Pipe Sizes STANDARD Manhole Sizes STANDARD FEH Rainfall Model Return Period (years)2 FEH Rainfall Version2013 Site Location GB 469944 170093 Data TypePoint Maximum Rainfall (mm/hr)50 Maximum Time of Concentration (mins)30 Foul Sewage (l/s/ha)0.000 Volumetric Runoff Coeff.0.750 PIMP (%)100 Add Flow / Climate Change (%)0 Minimum Backdrop Height (m)0.200 Maximum Backdrop Height (m)1.500 Min Design Depth for Optimisation (m)1.200 Min Vel for Auto Design only (m/s)1.00 Min Slope for Optimisation (1:X)500 Designed with Level Soffits																																																																																																																																																																			
Network Design Table for Storm <table><tr><th>PN</th><th>Length (m)</th><th>Fall (m)</th><th>Slope (1:X)</th><th>I.Area (ha)</th><th>T.E. (mins)</th><th>Base Flow (l/s)</th><th>k (mm)</th><th>HYD SECT</th><th>DIA (mm)</th><th>Section Type</th><th>Auto Design</th></tr><tr><td>S1.000</td><td>36.876</td><td>0.360</td><td>102.4</td><td>0.018</td><td>6.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.001</td><td>28.598</td><td>0.235</td><td>121.7</td><td>0.018</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S1.002</td><td>23.090</td><td>0.280</td><td>82.5</td><td>0.040</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.000</td><td>26.209</td><td>0.340</td><td>77.1</td><td>0.030</td><td>6.00</td><td>0.0</td><td>0.600</td><td>o</td><td>150</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S3.000</td><td>5.558</td><td>0.015</td><td>370.5</td><td>0.500</td><td>20.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr><tr><td>S2.001</td><td>23.694</td><td>0.075</td><td>315.9</td><td>0.050</td><td>0.00</td><td>0.0</td><td>0.600</td><td>o</td><td>300</td><td>Pipe/Conduit</td><td></td></tr></table> Network Results Table <table><tr><th>PN</th><th>Rain (mm/hr)</th><th>T.C. (mins)</th><th>US/IL (m)</th><th>Σ I.Area (ha)</th><th>Σ Base Flow (l/s)</th><th>Foul (l/s)</th><th>Add Flow (l/s)</th><th>Vel (m/s)</th><th>Cap (l/s)</th><th>Flow (l/s)</th></tr><tr><td>S1.000</td><td>50.00</td><td>6.62</td><td>39.815</td><td>0.018</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.99</td><td>17.5</td><td>2.4</td></tr><tr><td>S1.001</td><td>50.00</td><td>7.14</td><td>39.405</td><td>0.036</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.91</td><td>16.1</td><td>4.9</td></tr><tr><td>S1.002</td><td>50.00</td><td>7.37</td><td>39.120</td><td>0.076</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.73</td><td>122.5</td><td>10.3</td></tr><tr><td>S2.000</td><td>50.00</td><td>6.38</td><td>39.305</td><td>0.030</td><td>0.0</td><td>0.0</td><td>0.0</td><td>1.15</td><td>20.3</td><td>4.1</td></tr><tr><td>S3.000</td><td>28.69</td><td>20.11</td><td>39.030</td><td>0.500</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.81</td><td>57.3</td><td>38.9</td></tr><tr><td>S2.001</td><td>28.29</td><td>20.56</td><td>38.965</td><td>0.580</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.88</td><td>62.1</td><td>44.4</td></tr></table> ©1982-2018 Innovyze			PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design	S1.000	36.876	0.360	102.4	0.018	6.00	0.0	0.600	o	150	Pipe/Conduit		S1.001	28.598	0.235	121.7	0.018	0.00	0.0	0.600	o	150	Pipe/Conduit		S1.002	23.090	0.280	82.5	0.040	0.00	0.0	0.600	o	300	Pipe/Conduit		S2.000	26.209	0.340	77.1	0.030	6.00	0.0	0.600	o	150	Pipe/Conduit		S3.000	5.558	0.015	370.5	0.500	20.00	0.0	0.600	o	300	Pipe/Conduit		S2.001	23.694	0.075	315.9	0.050	0.00	0.0	0.600	o	300	Pipe/Conduit		PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	S1.000	50.00	6.62	39.815	0.018	0.0	0.0	0.0	0.99	17.5	2.4	S1.001	50.00	7.14	39.405	0.036	0.0	0.0	0.0	0.91	16.1	4.9	S1.002	50.00	7.37	39.120	0.076	0.0	0.0	0.0	1.73	122.5	10.3	S2.000	50.00	6.38	39.305	0.030	0.0	0.0	0.0	1.15	20.3	4.1	S3.000	28.69	20.11	39.030	0.500	0.0	0.0	0.0	0.81	57.3	38.9	S2.001	28.29	20.56	38.965	0.580	0.0	0.0	0.0	0.88	62.1	44.4
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Online Controls for Storm Hydro-Brake® Optimum Manhole: S6, DS/PN: S1.005, Volume (m³): 1.5 <table><tr><td>Unit Reference</td><td colspan="2">MD-SHE-0340-7340-1500-7340</td></tr><tr><td>Design Head (m)</td><td colspan="2">1.500</td></tr><tr><td>Design Flow (l/s)</td><td colspan="2">73.4</td></tr><tr><td>Flush-Flo™</td><td colspan="2">Calculated</td></tr><tr><td>Objective</td><td colspan="2">Minimise upstream storage</td></tr><tr><td>Application</td><td colspan="2">Surface</td></tr><tr><td>Sump Available</td><td colspan="2">Yes</td></tr><tr><td>Diameter (mm)</td><td colspan="2">340</td></tr><tr><td>Invert Level (m)</td><td colspan="2">38.770</td></tr><tr><td>Minimum Outlet Pipe Diameter (mm)</td><td colspan="2">375</td></tr><tr><td>Suggested Manhole Diameter (mm)</td><td colspan="2">Site Specific Design (Contact Hydro International)</td></tr></table> <table><tr><td>Control Points</td><td>Head (m)</td><td>Flow (l/s)</td></tr><tr><td>Design Point (Calculated)</td><td>1.500</td><td>73.4</td></tr><tr><td>Flush-Flo™</td><td>0.554</td><td>73.4</td></tr><tr><td>Kick-Flo®</td><td>1.104</td><td>63.3</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>61.0</td></tr></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated <table><tr><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td><td>Depth (m)</td><td>Flow (l/s)</td></tr><tr><td>0.100</td><td>10.0</td><td>1.200</td><td>65.9</td><td>3.000</td><td>102.7</td><td>7.000</td><td>155.3</td></tr><tr><td>0.200</td><td>34.5</td><td>1.400</td><td>71.0</td><td>3.500</td><td>110.7</td><td>7.500</td><td>160.6</td></tr><tr><td>0.300</td><td>62.7</td><td>1.600</td><td>75.7</td><td>4.000</td><td>118.1</td><td>8.000</td><td>165.8</td></tr><tr><td>0.400</td><td>72.0</td><td>1.800</td><td>80.1</td><td>4.500</td><td>125.1</td><td>8.500</td><td>170.7</td></tr><tr><td>0.500</td><td>73.2</td><td>2.000</td><td>84.3</td><td>5.000</td><td>131.7</td><td>9.000</td><td>175.6</td></tr><tr><td>0.600</td><td>73.3</td><td>2.200</td><td>88.3</td><td>5.500</td><td>138.0</td><td>9.500</td><td>180.3</td></tr><tr><td>0.800</td><td>71.6</td><td>2.400</td><td>92.1</td><td>6.000</td><td>144.0</td><td></td><td></td></tr><tr><td>1.000</td><td>67.7</td><td>2.600</td><td>95.8</td><td>6.500</td><td>149.7</td><td></td><td></td></tr></table>			Unit Reference	MD-SHE-0340-7340-1500-7340		Design Head (m)	1.500		Design Flow (l/s)	73.4		Flush-Flo™	Calculated		Objective	Minimise upstream storage		Application	Surface		Sump Available	Yes		Diameter (mm)	340		Invert Level (m)	38.770		Minimum Outlet Pipe Diameter (mm)	375		Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)		Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.500	73.4	Flush-Flo™	0.554	73.4	Kick-Flo®	1.104	63.3	Mean Flow over Head Range	-	61.0	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	10.0	1.200	65.9	3.000	102.7	7.000	155.3	0.200	34.5	1.400	71.0	3.500	110.7	7.500	160.6	0.300	62.7	1.600	75.7	4.000	118.1	8.000	165.8	0.400	72.0	1.800	80.1	4.500	125.1	8.500	170.7	0.500	73.2	2.000	84.3	5.000	131.7	9.000	175.6	0.600	73.3	2.200	88.3	5.500	138.0	9.500	180.3	0.800	71.6	2.400	92.1	6.000	144.0			1.000	67.7	2.600	95.8	6.500	149.7		
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Storage Structures for Storm Cellular Storage Manhole: S6, DS/PN: S1.005 Invert Level (m) 38.575 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>140.0</td><td>120.0</td><td>0.801</td><td>0.0</td><td>155.1</td></tr><tr><td>0.800</td><td>140.0</td><td>155.1</td><td></td><td></td><td></td></tr></tbody></table>			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	140.0	120.0	0.801	0.0	155.1	0.800	140.0	155.1			
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<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u> <u>Simulation Criteria</u> <table><tr><td>Areal Reduction Factor</td><td>1.000</td><td>Additional Flow - % of Total Flow</td><td>0.000</td></tr><tr><td>Hot Start (mins)</td><td>0</td><td>MADD Factor * 10m³/ha Storage</td><td>2.000</td></tr><tr><td>Hot Start Level (mm)</td><td>0</td><td>Inlet Coeffiecient</td><td>0.800</td></tr><tr><td>Manhole Headloss Coeff (Global)</td><td>0.500</td><td>Flow per Person per Day (l/per/day)</td><td>0.000</td></tr><tr><td>Foul Sewage per hectare (l/s)</td><td>0.000</td><td></td><td></td></tr></table> <table><tr><td>Number of Input Hydrographs</td><td>0</td><td>Number of Storage Structures</td><td>1</td></tr><tr><td>Number of Online Controls</td><td>1</td><td>Number of Time/Area Diagrams</td><td>0</td></tr><tr><td>Number of Offline Controls</td><td>0</td><td>Number of Real Time Controls</td><td>0</td></tr></table> <u>Synthetic Rainfall Details</u> <table><tr><td>Rainfall Model</td><td>FEH</td><td>Data Type</td><td>Point</td></tr><tr><td>FEH Rainfall Version</td><td>2013</td><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Site Location</td><td>GB 469944 170093</td><td>Cv (Winter)</td><td>0.840</td></tr></table> <table><tr><td>Margin for Flood Risk Warning (mm)</td><td>300.0</td></tr><tr><td>Analysis Timestep</td><td>2.5 Second Increment (Extended)</td></tr><tr><td>DTS Status</td><td>ON</td></tr><tr><td>DVD Status</td><td>ON</td></tr><tr><td>Inertia Status</td><td>ON</td></tr></table> <table><tr><td>Profile(s)</td><td>Summer and Winter</td></tr><tr><td>Duration(s) (mins)</td><td>15, 30, 60, 120, 240, 360, 480, 960, 1440</td></tr><tr><td>Return Period(s) (years)</td><td>100</td></tr><tr><td>Climate Change (%)</td><td>40</td></tr></table>									Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000	Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000	Hot Start Level (mm)	0	Inlet Coeffiecient	0.800	Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000	Foul Sewage per hectare (l/s)	0.000			Number of Input Hydrographs	0	Number of Storage Structures	1	Number of Online Controls	1	Number of Time/Area Diagrams	0	Number of Offline Controls	0	Number of Real Time Controls	0	Rainfall Model	FEH	Data Type	Point	FEH Rainfall Version	2013	Cv (Summer)	0.750	Site Location	GB 469944 170093	Cv (Winter)	0.840	Margin for Flood Risk Warning (mm)	300.0	Analysis Timestep	2.5 Second Increment (Extended)	DTS Status	ON	DVD Status	ON	Inertia Status	ON	Profile(s)	Summer and Winter	Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440	Return Period(s) (years)	100	Climate Change (%)	40																												
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Analysis Timestep	2.5 Second Increment (Extended)																																																																																																	
DTS Status	ON																																																																																																	
DVD Status	ON																																																																																																	
Inertia Status	ON																																																																																																	
Profile(s)	Summer and Winter																																																																																																	
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440																																																																																																	
Return Period(s) (years)	100																																																																																																	
Climate Change (%)	40																																																																																																	
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7.3 Appendix 3 – Maintenance Manual

Project:

**PROPOSED EDUCATIONAL DEVELOPMENT
GREEN PARK VILLAGE SCHOOL
READING, BERKSHIRE, RG2 6AB**

Client:

REDS10

Document Title:

MAINTENANCE MANUAL FOR DRAINAGE SYSTEMS

Date:

11TH OCTOBER 2018

Job No:

2562

Reference:

2562/DRAINAGE O&M

CONTENTS

- 1.0 INTRODUCTION
- 2.0 SURFACE WATER DRAINAGE
 - 2.1 PERMEABLE PAVEMENTS
 - 2.2 SOAKAWAYS
 - 2.3 ATTENUATION TANKS
 - 2.4 STORAGE PIPES
 - 2.5 HEADWALLS
 - 2.6 FLOW CONTROLS
 - 2.7 GENERAL MAINTENANCE
- 3.0 FOUL WATER DRAINAGE
 - 3.1 GENERAL MAINTENANCE

APPENDIX A – SCHEME DRAWINGS

2050 (2562) -1510 (Drainage Layout)

2050 (2562) -1510 (Typical Drainage Details)

1.0 INTRODUCTION

This report has been produced to provide general maintenance guidance procedures for the various components of the foul and surface water drainage systems serving the proposed educational development at Green Park Village, Reading, Berkshire, RG2 6AB.

Ownership and responsibility for drainage and SuDS features will be transferred to the school governors/overseers which may be managed internally or via a wider educational facility management framework.

This document has been produced in accordance with current best practice and recommendations and guidance set out in CIRIA C735 'The SUDS Manual'. Considine has no responsibility to any other parties to whom this report may be circulated, in part or in full, and any such parties rely on the contents of this report solely at their own risk.

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2.0 SURFACE WATER DRAINAGE

This section of the report will provide general maintenance procedures for the various components comprising the surface water drainage systems, serving the proposed development.

2.1 PERMEABLE PAVEMENTS

Permeable surfaces have been adopted for the multi-use games area (MUGA). The proposed surface comprises permeable asphalt layers on a Type 3 sub-base.

Maintenance Schedule	Required Works/Action	Frequency
Regular Maintenance	Inspect and identify incorrect operation.	Monthly
	Debris removal from catchment area using sweeping and vacuuming.	3 Monthly
	Removal of sediment from asphalt surfaces by vacuum.	Annually

Table 2.1 – Recommended Maintenance Requirements

2.2 SOAKAWAYS

Soakaways are not specified for this development and are not considered further.

2.3 ATTENUATION TANKS

Regular inspection of geo-cellular storage systems is required to ensure effective long-term performance of the system.

The following maintenance regime would be recommended as a minimum but actions and frequencies should be adjusted to suit the specific requirements of this development. However, manufacturer's specific recommendations should always be followed.

Maintenance Schedule	Required Works/Action	Frequency
Regular Maintenance	Inspect and identify incorrect operation.	Monthly
	Debris removal from catchment area using sweeping and vacuuming.	3 Monthly
	Removal of sediment from pre-treatment components i.e. catchpits.	Annually

Table 2.3 – Recommended Maintenance Requirements

2.4 STORAGE PIPES

Storage pipes are large diameter surface water pipes. They require the same maintenance regime as ordinary pipework as noted below.

Maintenance Schedule	Required Works/Action	Frequency
Routine Maintenance	Inspect and identify incorrect operation.	Annually

Table 2.4 - Recommended Maintenance Requirements

2.5 HEADWALLS

Headwalls are not specified for this development and are not considered further.

2.6 FLOW CONTROLS

The proposed development incorporates one Hydrobrake® device in chamber S16 (refer to the Drainage Layout Drawing 2050-1510 (2562) Rev P09 (Drainage Layout)). Regular inspection of flow control devices is required to ensure effective long-term performance of the system.

The following maintenance regime would be recommended as a minimum but actions and frequencies should be adjusted to suit the specific requirements of this development. However, manufacturer's specific recommendations should always be followed.

Maintenance Schedule	Required Works/Action	Frequency
Regular Maintenance	Inspect and identify incorrect operation.	Monthly
	Removal of sediment from pre-treatment components i.e. catchpits.	Annually

Table 2.6 – Recommended Maintenance Requirements

Note that entry into confined spaces should only be undertaken by suitably trained, qualified, experienced and equipped personnel after completion of suitable risk assessments. Issues to be addressed include risk of asphyxiation, becoming trapped, and drowning.

2.7 ATTENUATION PONDS

Attenuation ponds are not specified for this development and are not considered further.

2.8 FLOW CHANNEL

Flow channels are not specified for this development and are not considered further.

2.9 GENERAL MAINTENANCE

Regular inspection and maintenance of drainage systems is essential to ensure effective long term performance. The following maintenance regime would be recommended as a minimum but actions and frequencies should be adjusted to suit the specific requirements of this development. However, as previously discussed, component specific regimes and any manufacturer's specific recommendations should always be followed.

Maintenance Schedule	Required Works/Action	Frequency
Routine Maintenance	Inspect and identify incorrect operation.	Monthly
	Debris removal from catchment area using sweeping and vacuuming.	3 Monthly
	Removal of sediment from pre-treatment components i.e. catchpits.	Annually

Table 2.9 - Recommended Maintenance Requirements

3.0 FOUL WATER DRAINAGE

This section of the report will provide general maintenance procedures for the foul water drainage system serving the proposed development.

Regular inspection and maintenance of drainage systems is essential to ensure effective long term performance. Maintenance needs of the system should be monitored and schedules adjusted to suit the specific requirements of the development.

Maintenance Schedule	Required Works/Action	Frequency
Routine Maintenance	Inspect and identify incorrect operation.	Annually

Table 3.0 - Recommended Maintenance Requirements

3.1 PUMPING STATIONS

Pumping stations are not specified for this development and are not considered further.

- COM 2015 RESIDUAL RISKS
1. The Contractor is to locate, protect and divert as necessary all existing services on site prior to commencing work.
 2. All areas of excavation are to be scanned and marked for existing services prior to any excavation.
 3. Be aware of possible live drainage flows and foul effluent during construction. The Contractor shall assess and implement a safe working system and equipment (PPE) as necessary.
 4. When working with live drainage there is an increased risk from waterborne diseases such as leptospirosis and weils disease.
 5. Unauthorised access to the site must be prevented at all times.
 6. Support or batter back as necessary excavations in unstable ground.
- The above residual risks are for non-standard hazards. It is assumed that a competent contractor familiar with the construction of this type of work will be appointed who will be aware of the standard hazards.

RWP's, SVP's, SS's, to be confirmed by the Architect

Existing network designed by others to accommodate 73.4 l/s from proposed site
Discharge to Existing Chamber S157 (IL: 38.746)

ATTENUATION CRATES
CL:40.275
IL:38.770
TOP OF CRATES:39.570
PLAN AREA:140m²
VOLUME:112m³
TANK DEPTH:0.800m
1:100 Year Event + 40% CC (FEH)

DO NOT SCALE THIS DRAWING. ALL SETTING OUT TO ARCHITECTS DETAILS AND DRAWINGS

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWING ISSUES AND THE SPECIFICATION.

- Notes:
- G1. All building materials, components and workmanship to comply with the appropriate public health acts, building regulations, british standards and codes of practice and the appropriate manufacturers recommendations.
 - G2. For all specialist work see relevant drawings.
 - G3. Any discrepancies, errors or omissions to be reported to the project co-ordinator for further instructions before commencement of works.
 - G4. The Engineer is not responsible for dimensions, except where shown on his drawings. All setting out information, dimensions, etc, shall be calculated from the Architects drawings.
 - G5. All private drainage shall comply with the requirements of the Building Regulations approved Document H.
 - G6. All drainage forming part of, or connecting to a public sewer shall comply with the requirements of Sewers for Adoption 7th Edition.
 - G7. Cover levels are shown indicative only and are subject to final adjustment on site.
 - G8. All FW pipes to be 100mm diameter unless noted otherwise.
 - G9. All SW pipes to be 100mm diameter unless noted otherwise.
 - G10. Minimum depth to invert of foul branch pipes to SVP/SS below finished floor level to be:
450mm 0 - 3 storey's
750mm 3 - 5 storey's
 - G11. Gradient of under floor branch pipes to be 1:40 and no flatter than 1:80 (minimum of 1 WC connected).
 - G12. All RWP, SVP and SS positions are subject to confirmation from the architect.

- Specific Notes:
- S1. Where pipework is located under foundations (as flagged), pipework is to be Extra Strength (ductile iron / concrete) with class 2 bed and surround up to a minimum of 1m external offset from the outside edge of the foundations.

P09	Amended to new site layout	MJF	TK	11.10.18
P08	Attenuation tank amended	MJF	RC	03.10.18
P07	Revised to correct Outfall IL	MJF	RC	03.10.18
P06	Amended to comments	MJF	RC	01.10.18
P05	RWPs amended to include canopy drainage	MJF	RC	23.08.18
P04	Site Layout Updated as clouded	AM	RC	06.08.18
P03	Site Layout Updated as clouded	AB	SE	03.08.18
Rev	Amendment	Drn	Chk	Date

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Client:
REDS10

Project:
**NEW SCHOOL
GREEN PARK VILLAGE**

Drawing Title:
DRAINAGE LAYOUT

considine ref: 2562
drawn by: MJF
date: July '18
drawing scales: 1:200@A1
original paper size: A1

drawing reference: 2050 - CONSI - 00 - XX - DR - C - 1510
status: S2
revision: P09

status description:
SUITABLE FOR INFORMATION
revision description:
PRELIMINARY

- KEY
- Proposed Surface Water Pipe
Ø and gradient as stated
 - Proposed Foul Water Pipe
Ø and gradient as stated
 - Proposed Perforated Surface Water
Pipe Ø and gradient as stated
 - Proposed Surface Water PPIC
size as stated in MH schedule
 - Proposed Foul Water PPIC
size as Stated in MH schedule
 - Proposed Surface Water Manhole
Pre Cast Concrete - Circular
Size as Stated in MH Schedule
 - Proposed Foul Water Manhole
Precast concrete - Circular
Size as stated in MH schedule
 - ACO
Proposed ACO Drain
Pedestrian Areas only
 - TH
Proposed Threshold Drain
ACO Hexdrain or Similar
 - BIRCO
Proposed Birco Channel
Vehicular Areas
 - CP
Proposed Catchpit
 - HB
Proposed Hydro-Brake
 - RWP
Proposed Rainwater Pipe
 - SVP
Proposed Soil and Vent Pipe
 - SS
Proposed Stub Stack

1m 2m 3m 4m 5m 10m 15m 20m
SCALE 1:200

THIS DRAWING IS TO BE READ IN
CONJUNCTION WITH ALL OTHER RELEVANT
DRAWING ISSUES AND THE SPECIFICATION.

G1. All building materials, components and workmanship to comply with the appropriate public health acts, building regulations, british standards and codes of practice and the appropriate manufacturers recommendations.

G3. Any discrepancies, errors or omissions to be reported to the project co-ordinator for further instructions before commencement of works.

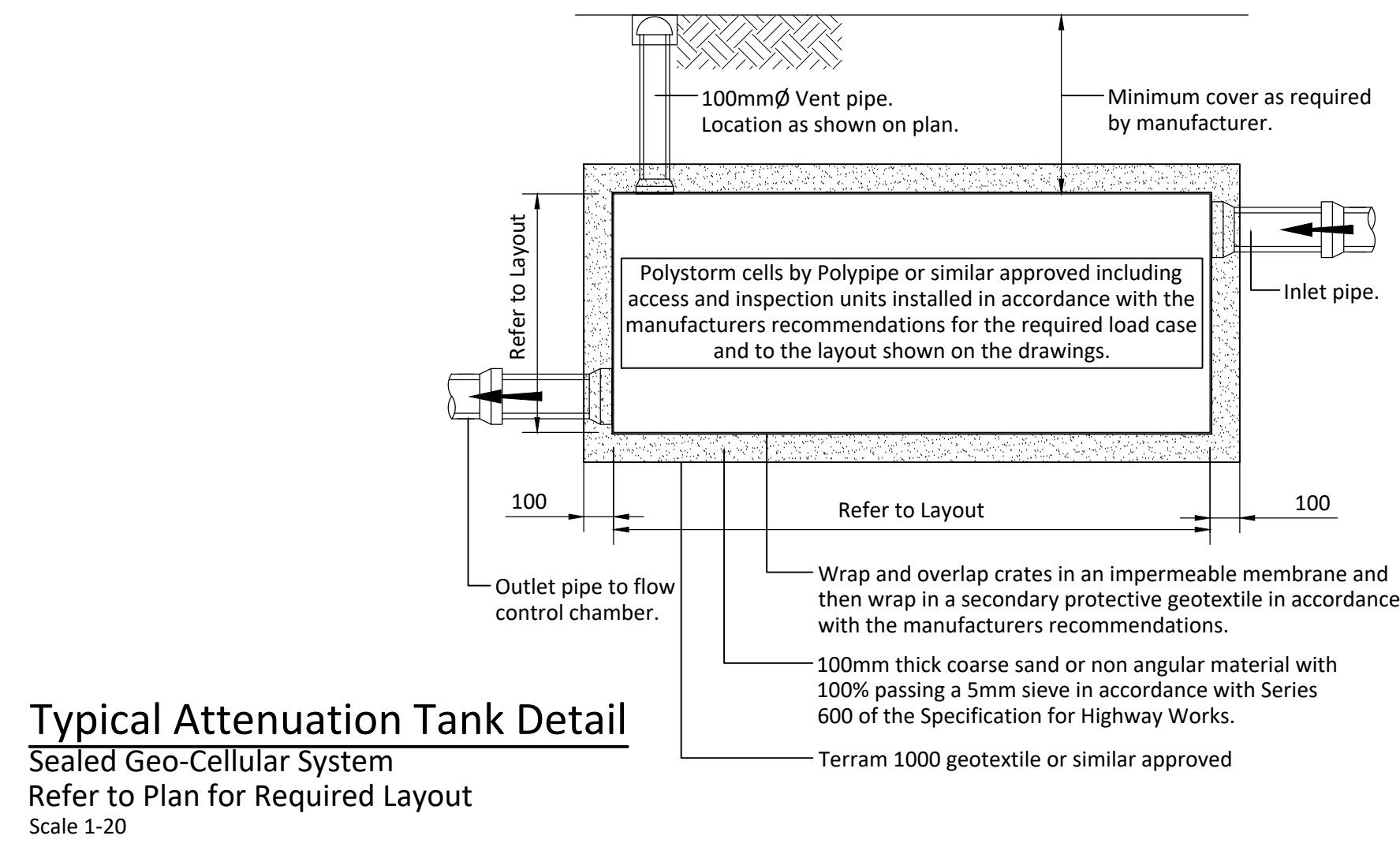
G5. All private drainage shall comply with the requirements of the Building Regulations approved Document H.

G7. Cover levels are shown indicative only and are subject to final adjustment on site.

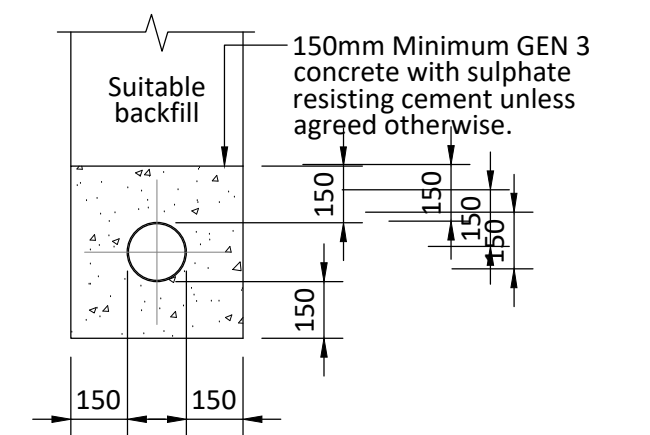
G9. All SW pipes to be 100mm diameter unless noted otherwise.

450mm 0 - 3 storey's
750mm 3 - 5 storey's

G12. All RWP, SVP and SS positions are subject to confirmation from the architect.



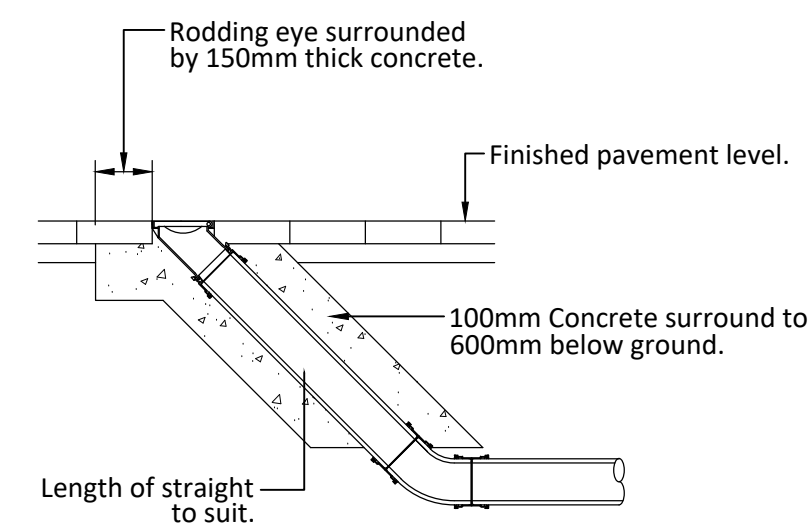
Sealed Geo-Cellular System
Refer to Plan for Required Layout
Scale 1-20



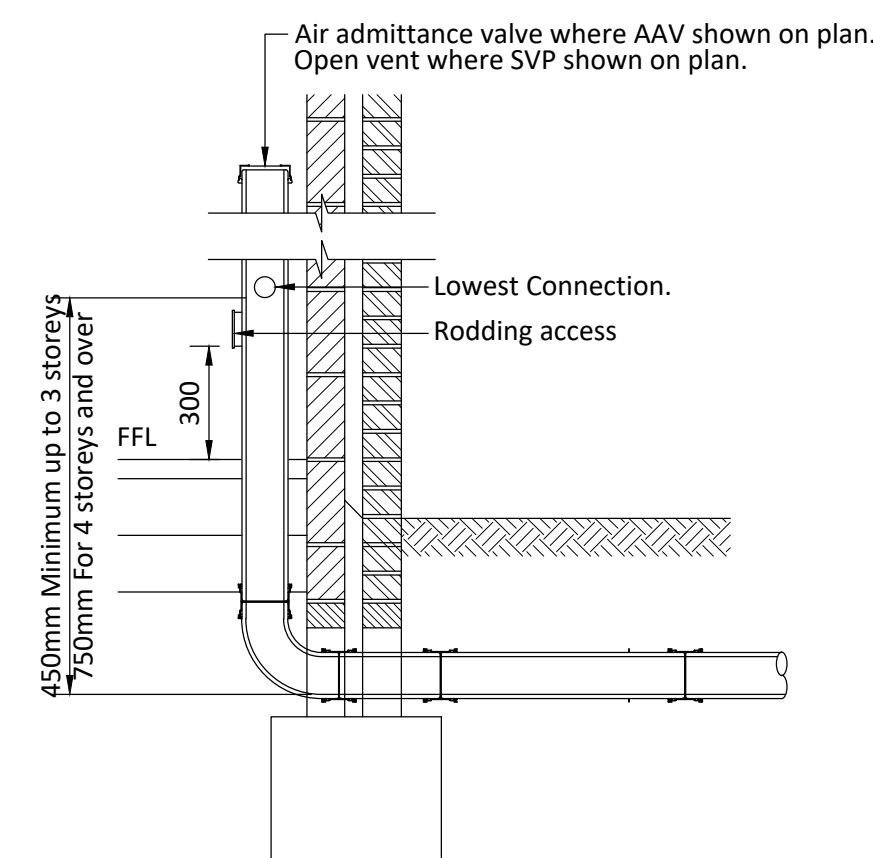
NOTE:
For all Inspection Chambers greater than 1200mm in depth, provide a reducer section 300mm Dia to make these a non-entry chamber.

Minimum bed and surround thickness shall be the greater of 150mm or pipe OD / 4

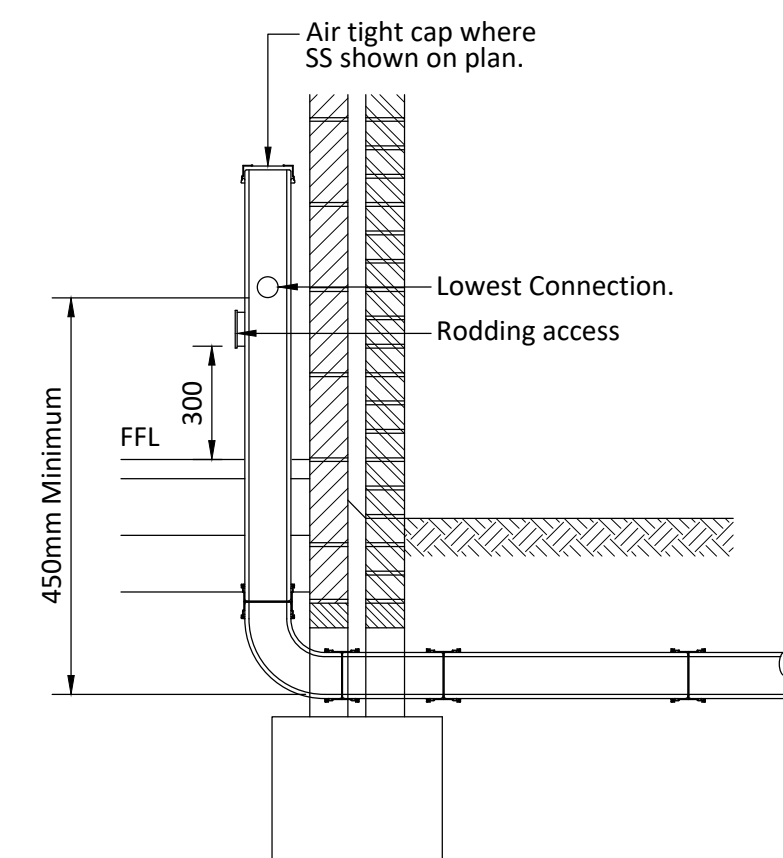
450mmØ Polypropylene
Scale 1-20



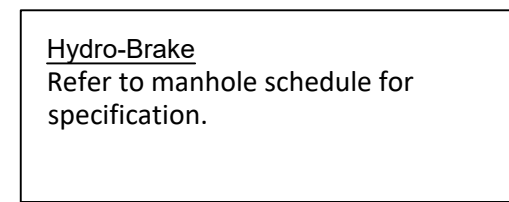
Scale 1-20



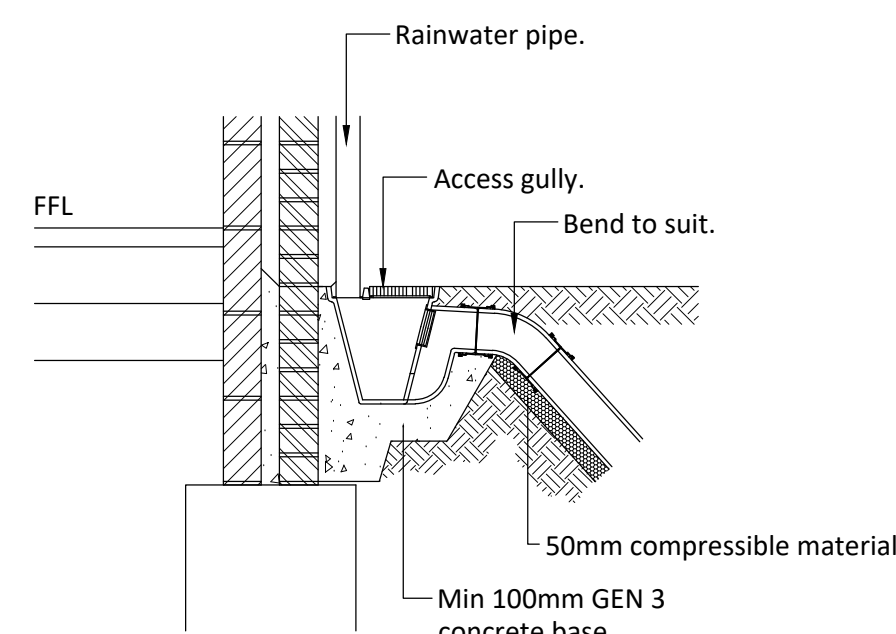
To Architects Specification
Scale 1-20



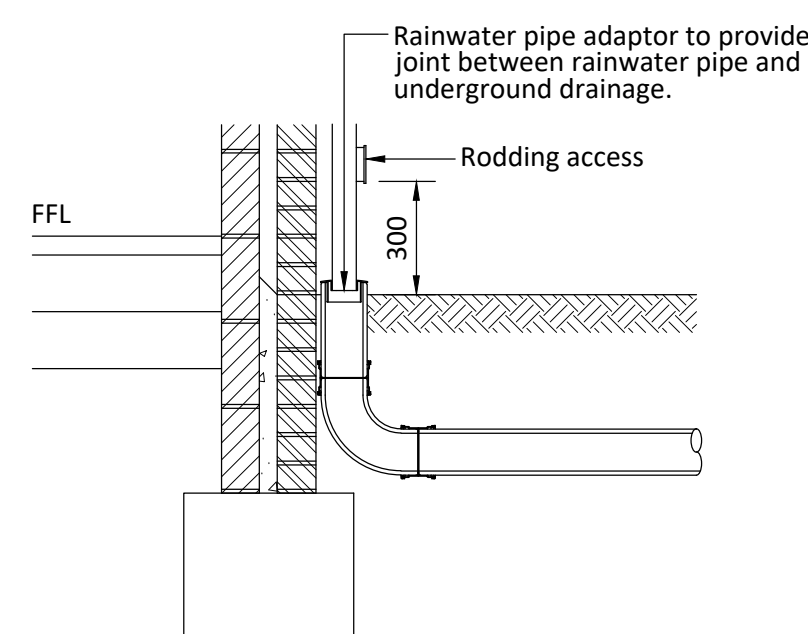
To Architects Specification
Scale 1-20



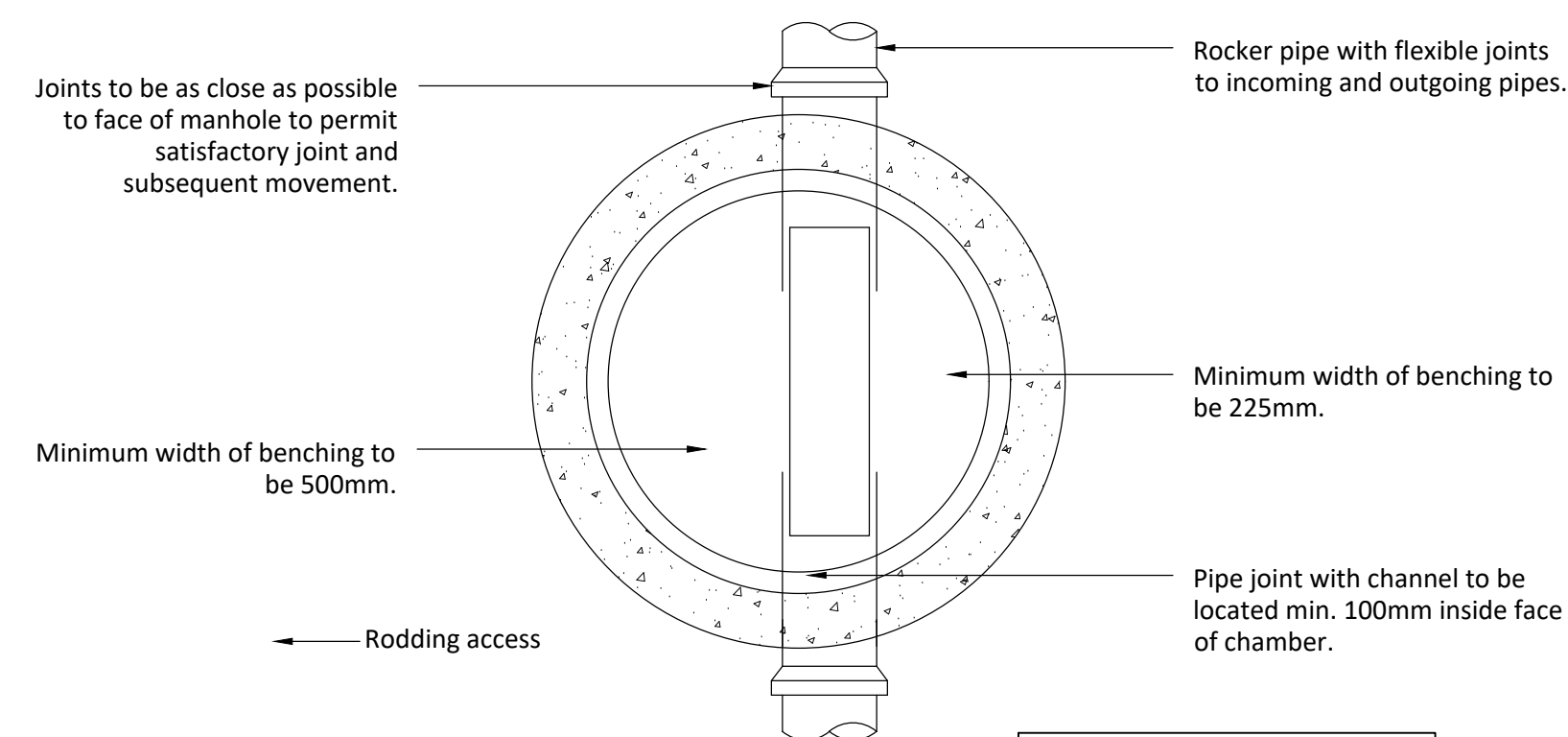
Refer to Plan for Location
Scale 1-20



To Architects Specification
Scale 1-20



To Architects Specification
Scale 1-20



Max Depth from Ground Level to Soffit of 3.0m
Scale 1-20

Where depth to benching >3.0m
Type D, Class 1, double
encapsulated step rungs in
accordance with BS EN 13101
are required.



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Client: **REDS10** 

Project:
NEW SCHOOL
GREEN PARK VILLAGE

Drawing Title:
SCHEMATIC DRAINAGE - DETAILS

considine ref	drawn by	date	drawing scales	original paper size
2562	MJF	July' 18	1:200@A1	A1

drawing reference :
 project originator volume level type role number
 2050 - CONSI - 00 - XX - DR - C - 1530

status :	status description :
S2	SUITABLE FOR INFORMATION
revision :	revision description :
P1	PRELIMINARY

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