



RESPONSE TO PLANNING COMMENTS INCLUDING CALCULATIONS – Rev. D

SIMPLY UK

HOOK ROAD, PAGHAM

CS&P REF: 9418

DATE: AUGUST 2024



A

INNOVATION IN THOUGHT AND STRUCTURE

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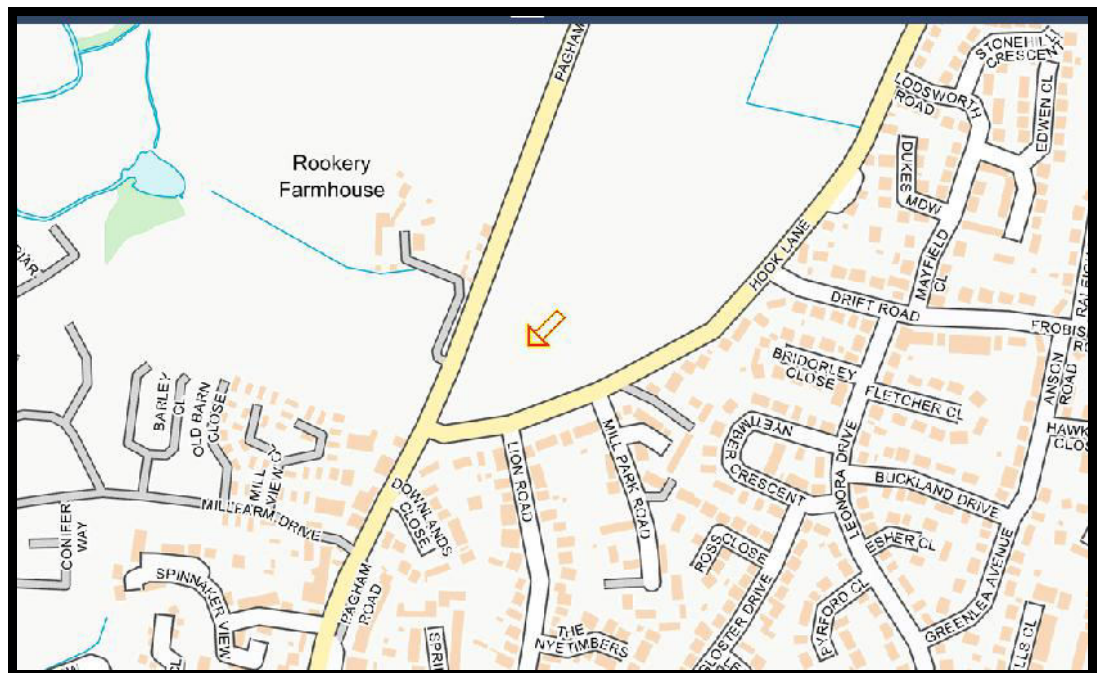
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1.0 INTRODUCTION

1.1 General

1.1.1 Charles Scott & Partners have been commissioned by Simply UK to assist with investigations and reporting on a proposed development for the Planning Application. This is in relation to any potential existing drainage and flooding issues to the proposed residential care home development near Hook Lane and Pagham Road, Chichester, PO21 3NY. We are to provide the comments within the body of an updated Calculations report to accompany Planning comments for the proposed facility.

1.1.2 The site is located at the corner of Hook Lane and Pagham Road, Chichester. The Ordnance Survey grid reference for the centre of the site is 489408, 98898 as shown on the Site Location Plan below. the National Grid Reference for the site is SZ 894988 / 8940898889. The nearest Post Code is PO21 3NY.



The site is bounded by Hook Lane to the south and east. Pagham Road is to the north and west. Open fields are situated to the north/northeast of the site. Residential properties are located along the southern boundary of Hook Lane and west of Pagham Road.

1.1.3 The proposal involves a new development of 3 storey, 80-bedroom care home with associated facilities.

1.1.4 Arun District Council Planning have provided a response in the form of the following points –

Winter Infiltration monitoring data	Adequate winter groundwater monitoring data must be supplied to ensure that the potential for buoyancy has been adequately considered in attenuation designs.	Not Supplied
Hierarch for Sustainable Drainage	The proposed discharge method must accord with the SuDS hierarchy as given below. Evidence must be supplied to justify the proposed discharge method. 1. Rainwater reuse where possible. 2. Complete discharge into the ground (infiltration). 3. Hybrid infiltration and restricted discharge to an appropriate water body or surface water sewer. 4. Restricted discharge to an appropriate water body. 5. Restricted discharge to a surface water sewer. 6. Restricted discharge to a combined sewer. A water body may be defined as a river, watercourse, ditch, culverted watercourse, reservoir, wetland or the sea. Engineers cannot support any proposed connection of surface water to the foul sewer.	Not supplied
Calculations	Calculations for pre-development run off rates must be based upon the positively drained area only. The current calculations provided are insufficient and need to be updated in response to the discrepancies highlighted in the separate comment tracker.	Not supplied
Natural Catchment Design	The submission must define the natural drainage characteristics within, and hydraulically linked to, the site and demonstrate that the drainage proposals will integrate with and not compromise the function of the natural and existing drainage systems. The condition, performance (including capacity where appropriate) and ownership of any existing site surface water drainage infrastructure must be accurately reported. Appropriate easements to watercourses and other services must be shown on all plans. Where there are areas of flood risk from any source on the site, it must be shown how a sustainable surface water drainage design can be accommodated on the site without conflicting with those areas of flood risk. Designs must replicate the natural drainage catchments of the site. All surface water drainage designs must therefore drain via gravity to corresponding points of discharge. The use of pumps for surface water drainage is not sustainable and will not be supported.	Not supplied
Plans	Plan areas, depths and levels of drainage infrastructure must accurately correspond with the supporting calculations.	Insufficient
Water Quality Benefits	An assessment of water quality is necessary to evidence that the proposed design provides adequate treatment of surface water.	Not supplied
Biodiversity & Amenity Benefits	The surface water drainage design must provide biodiversity and amenity benefits.	Not supplied
Trees & Planting	There should be no conflict between surface water drainage infrastructure and existing or proposed trees or planting.	Insufficient

	The design must consider the potential growth of proposed trees and adequate mitigation must be provided to protect drainage infrastructure where conflict <u>cannot</u> be avoided.	
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2.0 PLANNING CONDITION 9 – RESPONSE FROM CHARLES SCOTT & PARTNERS

2.1 Comment 1

It is recommended that the applicant reviews the surface water drainage design checklist provided on the Arun District Council website and makes a full resubmission including all required data, even if it has been submitted under previous applications. The comments below are given on the information that has been submitted to date, further information is required as listed on the checklist.

This Note explains that these points have been answered already but still require more information to be supplied despite previous CS&P responses. All previous responses have used the drainage design checklist.

2.2 Comment 2

Provide details of counter-buoyancy measures and calculations and for the proposed cellular storage tanks.

We have provided flotation calculations in Appendix A.

We have provided the Final Groundwater Monitoring Report in Appendix J.

2.3 Comment 3

The calculations provided are not consistent with the drawings and appear to include errors:

- a) The permeable paving area in the calculation is stated as $30 \times 25 = 750\text{m}^2$ whereas the catchment drawing states 641m^2 .

We would note that this is an increase in area for calculation purposes. A reduction on this area will have no effect. We have updated our calculations accordingly with an area of 650m^2 . See attached Appendix B for calculations. This has little impact on the calculations.

Width (m)	26.000
Length (m)	25.000
Slope (1:X)	150.0

- b) Demonstrate that the 1:150 gradient used for the permeable paving is representative of the levels.

We can model various gradients. This has little impact on the calculations. The formation level is graded to low points. We have used a gradient of 1 in 250 for the permeable paving which is relatively flat. See Screenshot below. We have also attached these results in Appendix B.

Width (m)	26.000
Length (m)	25.000
Slope (1:X)	250.0

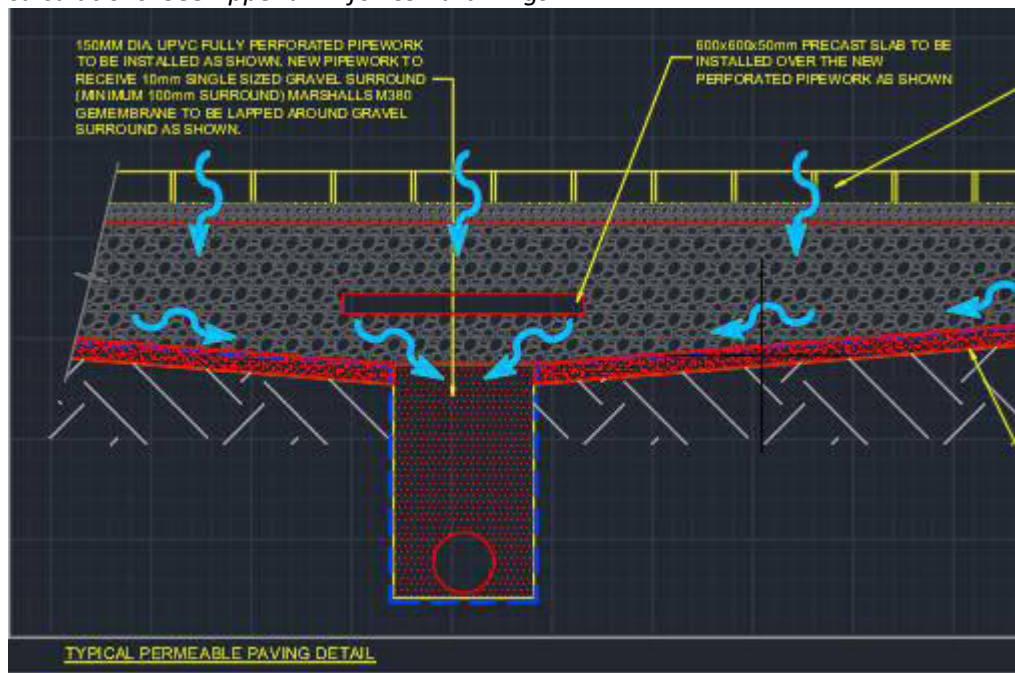
- c) The porosity used in the calculation for the permeable paving is 1. This should reflect the void ratio of the sub base.

This was provided in Rev. C calculations. We have provided screenshot below showing this. These are further provided in Appendix B.

Structure Type	Carpark
Infiltration Rate(s)	Calc
Base Coefficient (m/hr)	0.00000
Side Coefficient (m/hr)	0.00000
Safety Factor	2.0
Porosity	0.30

- d) The permeable paving invert level used in the calculations will cause the software to use a depth of 742mm. The depth on the construction details is 200-300mm.

If you review C003 drawing – it is greater than 742mm invert. This has little impact on the calculations. See Appendix F for CSP drawings.



- e) Tank SW1 appears to be oversized in the calculations. The drawing states $21.6 \times 3.6 = 77.76\text{m}^2$. The calculations use an area of 82.1m^2 .

*We have revised the Calculations Plan drawing in conjunction with Drainage Drawing. Tank ST2 notes 21.6m long * 3.6m wide. We have revised these calculations to show 77.76 m2 area. See revised calculations in Appendix B.*

- f) Calculations use a design head of 1.5m for the flow control, 1m is stated on the drainage plan.

We have revised our calculations with a design head of 1m as shown on the drainage plan. This has been revised in Appendix B calculations.

- g) The final connection is shown as 150mm dia on the drainage plan but 300mm dia in the calculations. It is shown with a gradient of 1:200. Demonstrate that this will be self-cleansing with the proposed 2l/s flow rate.

This was revised in our previous Rev. C Calculations. See screenshot below.

Please check the size of the outgoing pipe from manhole SW-MH-02.04, the schedule indicates this as 150mm diameter but the calculations as 300mm. Please note that if 150mm diameter then this is laid too flat at 1 in 200 and will not achieve self-cleansing velocity which is unacceptable.

We have revised our calculations accordingly with sufficient self-cleansing velocity. This is noted as 1 in 100 with self-cleansing >1 m/s. See Appendix B for calculations.

We have appended more detailed calculations in Appendix B.

- h) The calculations do not confirm pipe gradients or lengths.

All our previous calculations including Revision C calculations included pipe lengths and gradients in the pipeline schedules. See screenshot of our previous Revision C calculations. These are also shown in more detailed calculations in Appendix B.

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)
1.000	6.015	100.0	150	Circular	6.050	5.500
1.001	7.009	100.0	150	Circular	6.050	5.450
1.002	43.227	100.0	150	Circular	6.050	5.380
1.003	20.604	125.0	225	Circular	6.050	4.873
1.004	22.607	200.0	225	Circular	6.050	4.708
2.000	30.782	100.0	225	Circular	6.050	5.500
3.001	5.342	100.0	225	Circular	6.050	5.238
2.001	7.464	150.0	225	Circular	6.050	5.185
2.002	23.754	170.0	225	Circular	6.050	5.135

- i) The calculations do not include invert levels but a check using the chamber depth shows that that invert levels in the calculations are not consistent with the drawings.

All our previous calculations including Revision C calculations included pipe lengths and gradients in the pipeline schedules. See screenshot above showing our previous Revision C calculations. These are also shown in more detailed calculations in Appendix B.

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	6.015	100.0	150	Circular	6.050	5.500	0.400	6.050	5.440	0.460
1.001	7.009	100.0	150	Circular	6.050	5.440	0.460	6.050	5.370	0.530
1.002	43.227	100.0	150	Circular	6.050	5.370	0.530	6.050	4.938	0.962
1.003	20.604	125.0	225	Circular	6.050	4.863	0.962	6.050	4.698	1.127
1.004	22.607	200.0	225	Circular	6.050	4.698	1.127	6.050	4.585	1.240
2.000	30.782	100.0	225	Circular	6.050	5.500	0.325	6.050	5.192	0.633
3.001	9.569	180.0	225	Circular	6.050	5.047	0.778	6.050	4.994	0.831
2.001	7.464	150.0	225	Circular	6.050	5.192	0.633	6.050	5.142	0.683
2.002	23.754	180.0	225	Circular	6.050	5.142	0.683	6.050	5.010	0.815
2.003	21.081	200.0	300	Circular	6.050	4.919	0.831	6.050	4.814	0.936
2.004	29.881	240.0	300	Circular	6.050	4.814	0.936	6.050	4.689	1.061
2.005	23.396	240.0	300	Circular	6.050	4.680	1.070	6.050	4.583	1.167
4.000	33.596	116.0	225	Circular	6.050	5.475	0.350	6.050	5.185	0.640
3.000	11.222	150.0	225	Circular	6.050	5.122	0.703	6.050	5.047	0.778
Outfall	16.463	115.0	150	Circular	6.050	4.567	1.333	6.050	4.424	1.476
SW1 STORAGE 001	3.913	240.0	300	Circular	6.050	4.583	1.167	6.050	4.567	1.183
SW13 STORAGE 001	2.206	240.0	300	Circular	6.050	4.689	1.061	6.050	4.680	1.070
SW2 STORAGE 001	2.732	200.0	225	Circular	6.050	4.585	1.240	6.050	4.571	1.254
CARPARK OUTFALL	9.381	150.0	225	Circular	6.050	5.185	0.640	6.050	5.122	0.703

j) The calculations do not include results for all required design storm events.

Worst Case Calculations were provided in previous Rev. C calculations. All other storm events were included in previous calculations. Despite this, we have enclosed all design storm events in Appendix C for the 1 in 1 year, 10 year, 30 year and 100 year as requested.

k) The calculations do not include the FEH22 point descriptor information.

Our previous Revision A calculations included the FEH22 point descriptor information. See screenshot below.

We have used the FEH 22 data and updated our calculations. See Appendix E for revised calculations.

See Appendix B showing design settings with FEH 22 information with design storm events.

2.4 Comment 4

Whilst a catchment drawing has been provided it does not clearly split the catchment into nodes. eg.

a) Area 8 catchment is collected by 2 nodes.

We have revised drawing accordingly. We would further note that this will have little impact on the drainage calculations. See Appendix D.

b) Similarly, whilst the total permeable paving area is shown, it is collected by 3 nodes.

We have revised Catchment Area drawing accordingly. We would further note that this will have little impact on drainage calculations. See Appendix D. This aligns with drainage calculations.

2.5 Comment 5

The design proposals should clearly demonstrate its relationship with the surrounding Bellway's development, especially as its proposing to connect to a surface water manhole provided within that development. In addition, confirmation of acceptance of these flows, based on the proposed contributing areas from this development should be provided

This was shown in our previous Revision A Calculations in Appendix F. We have appended extract in Appendix E.

2.6 Comment 6

The drainage construction details are not consistent with the others plans and the calculations.

- a) The tank detail shows a manifold arrangement for the tank connections, the plan shows a single pipe. A.

These details were provided in previous Rev. C. calculations. We have updated our drawings in Appendix F.

- b) The tank detail shows catchpits upstream and downstream of the tanks, they are not shown on the plan or manhole schedule.

These details were provided in previous Rev. C. calculations. We have updated our drawings in Appendix F.

- c) The volume stated for tank ST2 is not consistent with the plan.

These details were provided in previous Rev. C. calculations. We have updated our drawings in Appendix F.

- d) Vent pipes are shown on the top of the tank "by others" connecting to the upstream and downstream chambers, no details are provided showing how these chambers are vented.

These details were provided in previous Rev. C. calculations. We have updated our drawings in Appendix F.

- e) The tank detail suggest that pipes run through it at base level, this is not shown on the plan.

We have updated our drawings in Appendix F.

- e) The tank detail refers to Ecobloc and Stormcell, the plan refers to Aco Stormbrix. Rev. C calculations.

We have updated our drawings in Appendix F.

- g) The tank detail does not state which specific product in the range it to be used. eg. There are 3 types of Stormbrixx. Drainage plan to be updated with GRAF ECO.

We have updated our drawings in Appendix F.

- h) The tank detail specifies a plan size that is not consistent with the drainage plan. Rev. C Calculations.

We have updated our drawings in Appendix F.

- i) The tank detail makes reference to “final detailed design by Ecobloc. Provide the final design.

We have removed this note. This will be forwarded after PLANNING conditions removed. We have updated our drawings in Appendix F.

- j) The permeable paving detail shows a 150mm perforated pipe, the calculations and plan show a 225mm perforated pipe.

This has no impact on the drainage design. We have updated our drawings in Appendix F.

- k) The flow control chamber detail does not appear to reflect what is shown on the plan.

This was answered in previous Calculations. We have updated our drawings in Appendix F.

- l) Provide details of how the flow control device will be protected from blockage given that its pass through is less than the recommended 75mm.

We have updated our drawings in Appendix F. As shown on details – steel cable connected to pivoting bypass door for blockages as shown on C003 drawing.

- m) The typical manhole detail states a range of diameters that are dependant on depth and contradict the manhole schedule.

These are standard details. We have updated our drawings in Appendix F.

- n) Demonstrate that sufficient working space will be available under the cover slab in the 1200mm dia manholes (usually 900mm is required from top of benching to underside of cover slab).

We have updated our drawings in Appendix F. Manhole Details show rungs at 300mm centres. There is greater than 1m height (5no). The note also indicates step irons not required where <1m.

- o) The typical manhole detail shows a grade D400 cover which contradicts the manhole schedule.

We have updated our drawings in Appendix F. All covers are noted as B125 covers.

- p) The Typical inspection chamber detail appears to show a light duty cover which contradicts the manhole schedule.

We have updated our drawings in Appendix F. Inspection chamber covers are shown on the Manhole Schedules/C003.

2.7 Comment 7

The drainage construction details are unclear, not comprehensive or site specific. Details should be accurately drawn, readable and include:

- a) Fully dimensioned details for all component in the drainage system.

We have updated our drawings in Appendix F. Fully dimensioned drawings are shown on the drainage plan and Construction Details. They are also shown on Drawing C003 and C006.

- b) Base and top levels for all tanks.

We have updated our drawings in Appendix F. We have provided 3 different long sections showing details.

- c) Flow control chamber cover level, invert level, weir level, sump dimensions, flow control model number and flow characteristics.

We have updated our drawings in Appendix F. We have updated our drawings with these details. This is also shown on the calculations page in Appendix B. We have attached screenshot below.

Notes
Product Number: CTL-SHE-0067-2000-1000-2000
Dimensions W x D (mm):
410.0 x 75.0
Sump Dimensions W x D (mm):
150.0 x 310.0

2.8 Comment 8

Detailed landscaping proposals are required to demonstrate that the landscaping and drainage proposals are coordinated.

- a) The indicative landscape proposal drawing shows a tree very close to tank ST1. Section A-A provided does not appear to represent this.

We addressed in previous Revision C Calculations. We have updated our drawings in Appendix F. Section A-A is drawn to scale and indicates the distance/levels details of the closest tree next to the cellular Storage features.

- b) Provide information from the root barrier manufacturer and the tank manufacturer that the proposal is acceptable.

See Appendix G for details relating to correspondence from both Tank manufacturer and Root barrier manufacturer. See screenshot below. BS5837 recommends a minimum distance of 500mm between new surfacing and buttress roots.

How close to a tree can I go with the core TRP system?

BS5837 recommends a minimum distance of 500mm between new surfacing and buttress roots. There may be scope for flexibility in this separation for mature trees with little potential for future growth, if agreed by the supervising arboriculturist.

- c) Demonstrate that the tanks are structurally sufficient given the close proximity of the trees.

See Appendix H for technical details relating to the structural details of the storage tanks.

- d) Provide accurate cross sections showing that there is adequate space for the building foundations, foul and surface water drainage pipes, tree pits.

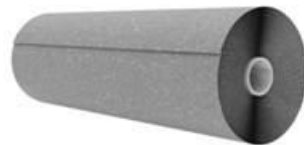
This was provided in Rev. C calculations. We have updated our drawings in Appendix F.

- d) Demonstrate that the roots of the trees planted close to the permeable paving will not damage the impermeable liner.

See Appendix G in relation to the cellular storage and liner details.



Geomembrane:
1mm Thick LLDPE Geomembrane
with a density of at least
0.939g/m².



Geotextile:
300g/m² Non-woven,
needle punched
geotextile

Geomembranes and Geotextiles with characteristics less than those specified are unlikely to be suitable and are therefore not recommended for use with Graf UK systems for this application

- e) Show on plan the measures proposed to protect the drainage components from root damage. Rev. C Calculations show this on plan.

We have updated our drawings in Appendix F. This is shown on the drainage plan and cross/long sections.

2.9 Comment 9

Detailed landscaping proposals are required to demonstrate that the landscaping and drainage proposals are coordinated.

- a) The manhole schedules do not identify the type of chamber.

We have updated our drawings in Appendix F. Note added to drawing C005– Type B only.

- b) The coordinates on the manhole schedule do not match the coordinates in the calculations.

This has little impact on the drainage design. We have updated our drawings in Appendix F. Drawing C003 aligns with the Flow Drainage Calculations.

- c) The invert levels on the manhole schedules and long sections are not consistent with the plan.

We have updated our drawings in Appendix F. Drainage plan and long sections are consistent.

- d) The long sections do not include levels for the drainage components.

We have updated our drawings in Appendix F. The Long sections for tanks/chambers etc are shown on Construction details as previously requested. We have also included drawing C016 with updated details in Appendix F.

- e) See comment 6.

Comment 6 has various responses from A to P. These have been addressed in that section.

2.10 Comment 10

The current level of detail provided on the Drainage layout drawing 9418-C002 is insufficient.

- a) There is no north point or key.

We have updated our drawings in Appendix F. We have added North point to the drawing.

- b) There is potential for surface water to enter the foul pumping station via the turret/cover, where it passes through the permeable paving. Provide a detail showing how this will be prevented.

Foul pumping stations do not allow water ingress into the sealed cover lids and the turrets are heavily concrete encased. See Appendix I for typical details.

- c) There is potential for surface water to enter the foul water system via FW MH-02.05, as it is located within the permeable paving. Provide a detail showing how this will be prevented.

Rainwater can only enter through the manhole cover. This has no impact. Manhole details as shown in Appendix F do not allow water ingress otherwise.

- d) There are some large areas of paving around the building which do not appear to be drained.

The contributing areas have included for footpaths and paving around the building. These are included within the calculations in Appendix B.

- e) The drawing of manholes/inspection chambers is inconsistent with the schedule size.

We have updated our drawings in Appendix F.

- f) The invert levels are not consistent with the manhole schedules, long sections or calculations.

We have updated our drawings in Appendix F.

- g) Make it clear on the plan where the flow control chamber is.

This was responded in previous calculations. Flow control is clearly marked on Drainage plan and Construction details. We have updated our drawings in Appendix F.

- h) The point of connection to the existing manhole is not clear and the existing manhole data is missing.

We replied to this in previous Rev. A calculation. We have updated our drawings in Appendix F.

2.11 Comment 11

Provide a detailed level design to clearly demonstrate that surface water run off will discharge to the proposed gullies/permeable paving etc. and not cause a risk of flooding to the building or off site.

- A) There are some large areas of paving around the buildings where levels have not been shown or are sparse. Please demonstrate that there are adequate falls for these areas. to be drained as intended. The manhole cover levels on the drainage drawing suggest some of these areas are flat.

This was replied to previous Rev. C Calculations. Levels and drainage drawings showing adequate falls. Flat areas are drained by permeable paving features. We have updated our drawings in Appendix F.

- B) Levels of the formation of the permeable paving must be provided.

The minimum thickness of subbase is 300mm thick as shown on our drawings in Appendix F. The formation level is graded out to low points. Contractor will install pipes accordingly to suit services.