13491 Haverstock Hill

Cambridge Gate Properties

SUDS and Below Ground Drainage (Strategy)

Conisbee

July 2016

Piercy&Company

122 Arlington Road
London NW1 7HP

Telephone
+44 (0)20 74249611

info@piercyandco.com
www.piercyandco.com

conisbee | Consulting Structural Engineers
Consulting Civil Engineers

5-17 Haverstock Hill,

London

NW3 2BL

SUDS & Below Ground Drainage

Maintenance Guide

London
1 – 5 Offord St London N1 1DH
Telephone 020 7700 6666

Norwich
2 Woolgate Court
St Benedicts Street
Norwich NR2 4AP
Telephone 01603 628 074

Cambridge
47 – 51 Norfolk Street
Cambridge CB1 2LD
Telephone 01223 656 058

design@conisbee.co.uk
www.conisbee.co.uk

Ref: 140870/AW

Date: 08th July 2016

Rev No: 1.0

CCAS REGISTERED ISO 9001 • 14001 UKAS MANAGEMENT SYSTEMS 055
2010/586

INVESTORS IN PEOPLE

Table of Contents

1.0 INTRODUCTION

The purpose of this document is to provide the necessary information required to maintain the drainage system, all drainage attenuation features and accessories operational and serviceable. Refer to Appendix A for extent of SUDS features and the Drainage Layout.

The report does not replace the requirement to adhere to manufacturer's recommendations for the various products used and should be read in conjunction with the relevant manufacturer's manuals.

2.0 CONVENTIONAL DRAINAGE SYSTEMS

2.1 Gullies, Silt Traps, Manholes, Catchpits & Pipework

2.1.1 Operation and maintenance requirements

On completion of construction, internal surfaces of sewers and manholes shall be thoroughly cleansed to remove all deleterious matter, without such matter being passed forward into existing public sewers or watercourses. Maintenance responsibility for a drainage system should be always placed with an appropriate organisation.

All silt trapped gullies, silt traps, manholes and catchpits to be regularly inspected every three months and cleared out on a regular frequency for the first nine months. After this period, the frequency can be reduced to every six months.

All drainage runs to be inspected once a year. The system is to be jetted clear if necessary. Refer to Appendix A for the extent of the below ground drainage.

3.0 SUDS FEATURES

3.1 Regular inspection and maintenance is important for the effective operation of SUDS features as designed. Maintenance responsibility for SUDS features should always be placed with an appropriate organisation. Initially this should be the installer or supplier of the system who should then be responsible for handing maintenance to a suitably qualified person.

3.2 Geo-cellular attenuation tank

3.2.1 Operation and maintenance requirements

Maintenance requirements for modular system are described in Table 1.

Table 1

Maintenance Schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly, if required, take remedial works	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may risk to performance.	Monthly.
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly (and after large storms).
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect /check all inlets, outlets, vents and overflowing to ensure that they are in good condition and operating as designed.	Annually, and after large storms.

3.2.2 Manufacturer recommendations

If debris enters the attenuation tank, the still water within the unit will have insufficient velocity to keep the particles moving. This can lead to any of the following undesirable consequences:

- Debris will be deposited in the attenuation tank around the pipe entry
- Some of the void intended for water storage will begin to fill up
- Organic matter may start to decay
- Noxious gases may build up.

3.2.3 Prevention

To prevent siltation, silt trap manholes are installed (as shown on drainage layout drawing in Appendix 1). To be effective, there must be a maintenance plan that ensures regular cleaning of the silt traps and catchpits as note in Table 1 above. Otherwise, if the trap is full, any additional debris will simply pass into the tank. Chatchpits should be regularly inspected once a year and any debris, silt to be removed from the sump.

Also before connecting to the tank, the system is to be jetted clear to remove any debris that has got collected in the inlet pipes and manholes during the installation.

3.3 Blue/ Green Roof

Ensure safe access can be gained to the roof and that relevant Health and Safety procedures are followed when working at roof level. It is advised that the contractor should always seek proof of current maintenance for any roof access, fall arrest / restraint systems prior to proceeding with the work on site.

Remove all dead vegetation and debris from the roof and ensuring all outlets, gutters and downpipes are clear. Where the species mix incorporates wild flowers and grasses it is recommended that all dead vegetation is mown / strimmed down and the waste is removed from the roof and disposed off.

Any vegetation which has encroached into drainage outlets, walkways and the vegetation barriers (pebbles) should be removed. Weeding an extensive green roof is necessary to maintain a healthy roof and all aggressive species of shrub sapling and undesirable plants should be removed. Some weeds however are helpful to the biodiversity of the roof and considered as a problem only of aesthetics. If considered excessive, they can be removed ensuring that care is taken to follow specific instructions as to the type and species of vegetation removed. All extensive green roof installations will at times include some moss and grass.

Areas of dead vegetation / bare patches can be easily repaired and this is best done during the main growing seasons of March/April or from late August until the end of September. Take plug plants (new) or vegetation cuttings from surrounding areas of healthy mature plants and place on bare patches, pressing gently into the soil. A light sprinkling of sand mixed with compost should then be dressed over the affected area and watered to improve the uptake of the cuttings. If the vegetation is showing signs of distress, but has received regular rainfall, then the most likely problem is a lack of nutrient and a fertiliser should be applied.

Remove the lids of all Inspection chambers, ensure that all rainwater outlets and downpipes are free from blockages and that water can flow freely away, clean filters to outlets twice yearly and replace every three years. Ensure that any protective metal flashings and termination bars remain securely fixed in place.

Examine all mastic sealant and mortar pointing for signs of degradation. Check that all promenade tiles and paving slabs are securely fixed to the roof surface and in good condition.

Advise the client of the need to repair or renew any defects as necessary.

Ensure that any new items of plant/equipment on the roof are mounted on suitable isolated slabs and that any fixings used to secure the plant/equipment in place do not penetrate the waterproofing. Report signs of damage or degradation to the waterproofing to ABG immediately, in order that arrangements can be made for remedial work to be carried out if necessary. It is recommended that a record is kept of the findings of the inspection to avoid confusion and provide an on-going record of roof performance. Plants suitable for an extensive green roof which will colonise in partial and full shade will generally be greener in colour and grow “taller” in these locations. There will be a significant variance in the growth and colour between the plants growing in full or partial shade and those exposed to full sunlight and this should be recognised as a feature of the biodiversity of each individual roof.

3.4 Pump Stations

3.4.1 Inspection

Pump sets should be inspected monthly by observing at least two switching cycles and checking the operation.

3.4.2 Operation and maintenance requirements

Regular inspection and maintenance is important for the effective operation of pump sets as designed. Maintenance responsibility for a pump set should be always placed with an appropriate organisation. The time between maintenance checks shall not be greater than;

- 1/4 year for pump station in commercial premises;
- 1/2 year for plants serving multiple dwellings;
- 1 year for plants in single dwellings;

Operation and maintenance requirements for pump sets are described below.

3.4.3 Regular Maintenance shall include:

1. Checking by visual inspection all connection points for leakage;
2. Operation of valves, checking ease of operation and sealing. If necessary, reset and grease;
3. Opening and closing of non-return valves; checking seating and ball/flap; functional check;
4. Cleaning the pumping unit and the pipework directly connected to it; checking impeller and bearings;
5. Checking oil level, where necessary, refill or change oil (if oil chamber fitted);
6. Internal cleaning of tank (if required or under special circumstances);
7. Checking that vent pipe is functioning.
8. Visual inspection of the electrical part of plant;
9. Visually checking condition of collection tank;
10. Every two years rinse out plant with water.

After carrying out maintenance, the plant shall be recommissioned in accordance with the clause below. A log should be kept of all maintenance work, detailing any work carried out and the applicable information. If faults are found that cannot be corrected, these shall be notified in writing to the operator of the wastewater pump set and an acknowledgement requested.

3.4.4 Commisioning

The pump set shall be commissioned by a suitably qualified person. The supplier of the wastewater pump set is responsible for ensuring the availability of this person. Testing with water for a minimum of two switching sequences is required for commissioning. During the test, dry running shall be avoided. The following items shall be checked before, during and after testing:

1. electrical safety in accordance with IEC or local regulations;
2. direction of rotation of the motor;
3. valves (operation, opening, sealing);
4. switching and setting of the control levels in the collection tank, where not present by the manufacturer;
5. watertightness of pump, valves and pipes;
6. rated voltage and frequency;
7. functional test of the non-return valve;
8. warning device; in combination with a second switching circuit where applicable;
9. discharge pipework support;
10. motor protection switch (by removing individual fuses (two-phase running));
11. oil level (if oil chamber fitted);
12. control lights, gauges and meters;
13. operation of hand pump; where fitted.

Commissioning shall be recording in writing, including important data such as the setting of the motor overload switch and t he reading from hours-run meters.

3.4.5 Testing

The pump sets shall be tested at the manufacturer's premises to BS 5316: Part1: Class C Annex B (ISO 2548) to demonstrate that they are capable of achieving the specified design duty. Type-test curves are acceptable for verification of performance.

Characteristic curves of pump generated head, efficiency, and pump and pump sets absorbed power versus flow rate shall be provided before the pump sets are delivered to site.

Hydraulic drop test shall be carried out by the Developer on site in the presence of the Undertaker to verify the theoretical performance of each pump set.

Hydrobrake manhole

3.4.6 Operation and maintenance requirements

Chamber to be regularly inspected once a year and any debris, silt to be removed from the sump.

4.0 OWNER'S MANUAL

4.1 This document should be provided to the Client as an owner's manual on completion of the scheme. The manual should include all relevant construction drawings and aims to provide the following:

- Locations of all drainage elements on the site.
- A summary of how each element is designed to operate, their purpose, and the do's and don'ts of everyday use.
- Advice on maintaining the drainage elements to ensure efficiency is retained for the designed lifetime of each element.
- An action plan for dealing with accidental pollution events

APPENDIX A

Drainage Layout

LEGEND

- Site Boundary
- Existing Combined Sewer
- Proposed Foul Water Sewer
- Proposed Storm Water Sewer
- Proposed Combined Water Sewer

Proposed Private Surface Water Manholes:
- 450mm dia PPIC
- 750 x 675mm RC Insitu Manhole

Proposed Private Foul Water Manholes
- 450mm dia PPIC
- 1200 x 900mm RC Insitu Manhole
- 900mm dia PCC Manhole

Proposed Combined Water Manhole
1200 x 900mm RC Insitu Manhole

SVP SS — Soil Vent Pipe/stub Stack

RWP — Proposed Rainwater Pipe

FG — Proposed Floor Gully

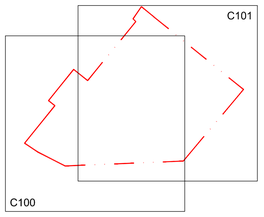
YG — Proposed Yard Gully

Private Pumping station

HB — Manhole with hydro-brake (1200mm dia PCC)

Attenuation Tank with Perforated Distributor Pipe

KEY PLAN



NOTES

1. Invert levels and positions of existing drains / chambers / sewers where new connections are to be made must be checked and confirmed to the engineer prior to the commencement of any works.
2. All drainage works shall be carried out in accordance with the requirements of the Local Authority, the Environment Agency and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 7th Edition and any addendums as appropriate.
3. All drainage shall comply with the typical details and the requirements of BS EN 752 and Part H of the Building Regulations.
4. Any part of the existing drainage system to be retained as part of the new scheme shall be cleaned and inspected. Any structural defects shall be repaired using appropriate and approved means.
5. For setting-out dimensions of SVP's, RWP's etc, refer to Architect's or Mechanical Engineer's drawings. Positions shown are indicative and subject to final design.
6. All foul and RWP connections shall be 100mm diameter unless otherwise specified.
7. All precast concrete units used in the drainage works shall be manufactured using sulphate resisting cement.
8. Manhole covers and frames shall be to BS EN 124 and shall be Kitemarked. Covers and frames shall be heavy duty D400 in carriageways and vehicular areas and medium duty B125 in footways and soft landscaping. In blocked/concrete paved areas covers shall be recessed fabricated steel. All recessed covers shall in accordance with the FACTA association gradings.
9. All internal inspection chambers to be recessed, double sealed with screw down covers.
10. Cover levels are to be adjusted locally to suit finished ground levels.
11. At least one soil pipe at the head of each foul run shall vent to the atmosphere.
12. Existing drainage to be removed is to be broken out to bed level and void backfilled with granular material, compacted in layers not exceeding 250mm.
13. All drain runs from SVP's, stub stacks or FW gullies to be laid at 1:40 gradient unless otherwise stated. All RWP's to be laid 1:80 min unless otherwise stated.
14. All manholes / inspection chambers in block paved areas, to have recessed covers. MH covers in paved areas to have cover & frame orientated 'square' with paving to minimise cut slabs or blocks.
15. 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. Pipes below structural building slabs or basements shall be Cast Iron to BS 437.
16. Rodding eyes, etc are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.
17. All proposed trees to have appropriate tree barrier details linking pits to ensure roots are directed away from drainage.
18. Where new sewers are constructed within 5m of a new or existing tree the sewer shall be concrete encased against root intrusion. Refer to drainage details.
19. All new drainage to be jetted and CCTV surveyed on completion. Contractor to make sure that the drainage is fully operational. Refer to Drainage maintenance manual for maintenance details.
20. All runs connecting into the public drainage network to be vitrified clay, extra length to BS EN 295 or BS65 with plain sleeved or socketed flexible joints.
21. CDM note: All pipework, silt traps, catchpits, trapped gullies and attenuation tanks to be regularly inspected every three months and cleared out on a regular frequency for the first nine months. After this period the frequency can be reduced to every six months. Porous surface to be regularly swept three times a year to remove the silt.
22. This drawing is to be read in conjunction with all relevant Conisbee drawings.
23. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation.Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.

NOT FOR CONSTRUCTION

Design Notes :
Greenfield runoff rates:

For 1 in 1 year storm event =	1.9 l/s
For 1 in 30 year storm event =	3.9 l/s
For 1 in 100 year storm event =	4.5 l/s
Qbar (urban) =	2.2 l/s

Design Notes :

Site Area:	2,070 m²
Total Existing Impermeable Area:	2,070 m²
Total Proposed Impermeable Area:	2,070m²
Existing Peak rate run off from Impermeable Areas (50mm/hr):	28.8 l/s
Proposed restricted Surface Water discharge rate	14.0 l/s
Total Attenuation for 100YS + 30%CC:	**70 m³**
Foul Water Discharge:	**T.B.C. l/s.**

Attenuation Notes

Green Roof	Roof Area = 54m² Max. water depth = 0.08m Total =3**m³**
Blue Roof	Roof Area = 20m² Max. water depth = 0.10m Total =20**m³**
Attenuation Tank	63m² x 0.80m deep **Total = 47m³**
TOTAL ATTENUATION	**70m³**

IMPORTANT NOTE:

- EXTENT AND LOCATION OF MANHOLES AND PUMP STATIONS TO BE DEVELOPED AT THE NEXT DESIGN STAGE.
- ALL DOWN PIPES ARE SHOWN INDICATIVELY. (BASED ON HAND MARK-UP)

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL OTHER RELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING.

Rev	Date	Description	Drawn	Check
P4	10.05.16	Architect's Layout Updated	JC	TG
P3	25.04.16	Tank size revised	AW	TG

conisbee
Consulting Structural Engineers
Consulting Civil Engineers
1-5 Offord St
London N1 1DH
Tel 020 7700 6666
Fax 020 7700 6686
design@conisbee.co.uk
www.conisbee.co.uk

Drawing Status: PRELIMINARY

Project: 5-17 Haverstock Hill London NW3 2I

Title: DRAINAGE LAYOUT GROUND FLOOR SHEET 1 OF 2

Date March 2016
Scale 1:100 @A1
Drawn AW
Engineer AW
Project No **140870**
Drawing No **C100**
Revision **P4**

LEGEND

- Site Boundary
- CW — CW — Existing Combined Sewer
- Proposed Foul Water Sewer
- Proposed Storm Water Sewer
- Proposed Combined Water Sewer

Proposed Private Surface Water Manholes:
- 450mm dia PPIC
- 750 x 675mm RC Insitu Manhole

Proposed Private Foul Water Manholes
- 450mm dia PPIC
- 1200 x 900mm RC Insitu Manhole
- 900mm dia PCC Manhole

Proposed Combined Water Manhole
1200 x 900mm RC Insitu Manhole

SVP SS — Soil Vent Pipe/stub Stack

RWP — Proposed Rainwater Pipe

FG — Proposed Floor Gully

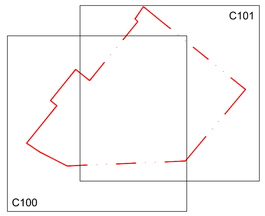
YG — Proposed Yard Gully

Private Pumping station

HB — Manhole with hydro-brake (1200mm dia PCC)

Attenuation Tank with Perforated Distributor Pipe

KEY PLAN



Design Notes :
Greenfield runoff rates:

For 1 in 1 year storm event =	1.9 l/s
For 1 in 30 year storm event =	3.9 l/s
For 1 in 100 year storm event =	4.5 l/s
Qbar (urban) =	2.2 l/s

Design Notes :

Site Area:	2,070 m²
Total Existing Impermeable Area:	2,070 m²
Total Proposed Impermeable Area:	2,070m²
Existing Peak rate run off from Impermeable Areas (50mm/hr):	28.8 l/s
Proposed restricted Surface Water discharge rate	14.0 l/s
Total Attenuation for 100YS + 30%CC:	**70 m³**
Foul Water Discharge:	**T.B.C. l/s.**

Attenuation Notes

Green Roof	Roof Area = 54m² Max. water depth = 0.08m Total =3m³
Blue Roof	Roof Area = 20m² Max. water depth = 0.10m Total =20m³
Attenuation Tank	63m² x 0.80m deep **Total = 47m³**
TOTAL ATTENUATION	**70m³**

IMPORTANT NOTE:

- EXTENT AND LOCATION OF MANHOLES AND PUMP STATIONS TO BE DEVELOPED AT THE NEXT DESIGN STAGE.
- ALL DOWN PIPES ARE SHOWN INDICATIVELY. (BASED ON HAND MARK-UP)

NOTES

1. Invert levels and positions of existing drains / chambers / sewers where new connections are to be made must be checked and confirmed to the engineer prior to the commencement of any works.
2. All drainage works shall be carried out in accordance with the requirements of the Local Authority, the Environment Agency and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 7th Edition and any addendums as appropriate.
3. All drainage shall comply with the typical details and the requirements of BS EN 752 and Part H of the Building Regulations.
4. Any part of the existing drainage system to be retained as part of the new scheme shall be cleaned and inspected. Any structural defects shall be repaired using appropriate and approved means.
5. For setting-out dimensions of SVP's, RWP's etc, refer to Architect's or Mechanical Engineer's drawings. Positions shown are indicative and subject to final design.
6. All foul and RWP connections shall be 100mm diameter unless otherwise specified.
7. All precast concrete units used in the drainage works shall be manufactured using sulphate resisting cement.
8. Manhole covers and frames shall be to BS EN 124 and shall be Kitemarked. Covers and frames shall be heavy duty D400 in carriageways and vehicular areas and medium duty B125 in footways and soft landscaping. In blocked/concrete paved areas covers shall be recessed fabricated steel. All recessed covers shall in accordance with the FACTA association gradings.
9. All internal inspection chambers to be recessed, double sealed with screw down covers.
10. Cover levels are to be adjusted locally to suit finished ground levels.
11. At least one soil pipe at the head of each foul run shall vent to the atmosphere.
12. Existing drainage to be removed is to be broken out to bed level and void backfilled with granular material, compacted in layers not exceeding 250mm.
13. All drain runs from SVP's, stub stacks or FW gullies to be laid at 1:40 gradient unless otherwise stated. All RWP's to be laid 1:80 min unless otherwise stated.
14. All manholes / inspection chambers in block paved areas, to have recessed covers. MH covers in paved areas to have cover & frame orientated 'square' with paving to minimise cut slabs or blocks.
15. 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. Pipes below structural building slabs or basements shall be Cast Iron to BS 437.
16. Rodding eyes, etc are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.
17. All proposed trees to have appropriate tree barrier details linking pits to ensure roots are directed away from drainage.
18. Where new sewers are constructed within 5m of a new or existing tree the sewer shall be concrete encased against root intrusion. Refer to drainage details.
19. All new drainage to be jetted and CCTV surveyed on completion. Contractor to make sure that the drainage is fully operational. Refer to Drainage maintenance manual for maintenance details.
20. All runs connecting into the public drainage network to be vitrified clay, extra length to BS EN 295 or BS65 with plain sleeved or socketed flexible joints.
21. CDM note: All pipework, silt traps, catchpits, trapped gullies and attenuation tanks to be regularly inspected every three months and cleared out on a regular frequency for the first nine months. After this period the frequency can be reduced to every six months. Porous surface to be regularly swept three times a year to remove the silt.
22. This drawing is to be read in conjunction with all relevant Conisbee drawings.
23. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation.Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.

NOT FOR CONSTRUCTION

Rev	Date	Description	Drawn	Check
P4	10.05.16	Architect's Layout Updated	JC	TG
P3	25.04.16	Tank size revised	AW	TG

conisbee
Consulting Structural Engineers
Consulting Civil Engineers
1-5 Offord St
London N1 1DH
Tel 020 7700 6666
Fax 020 7700 6686
design@conisbee.co.uk
www.conisbee.co.uk

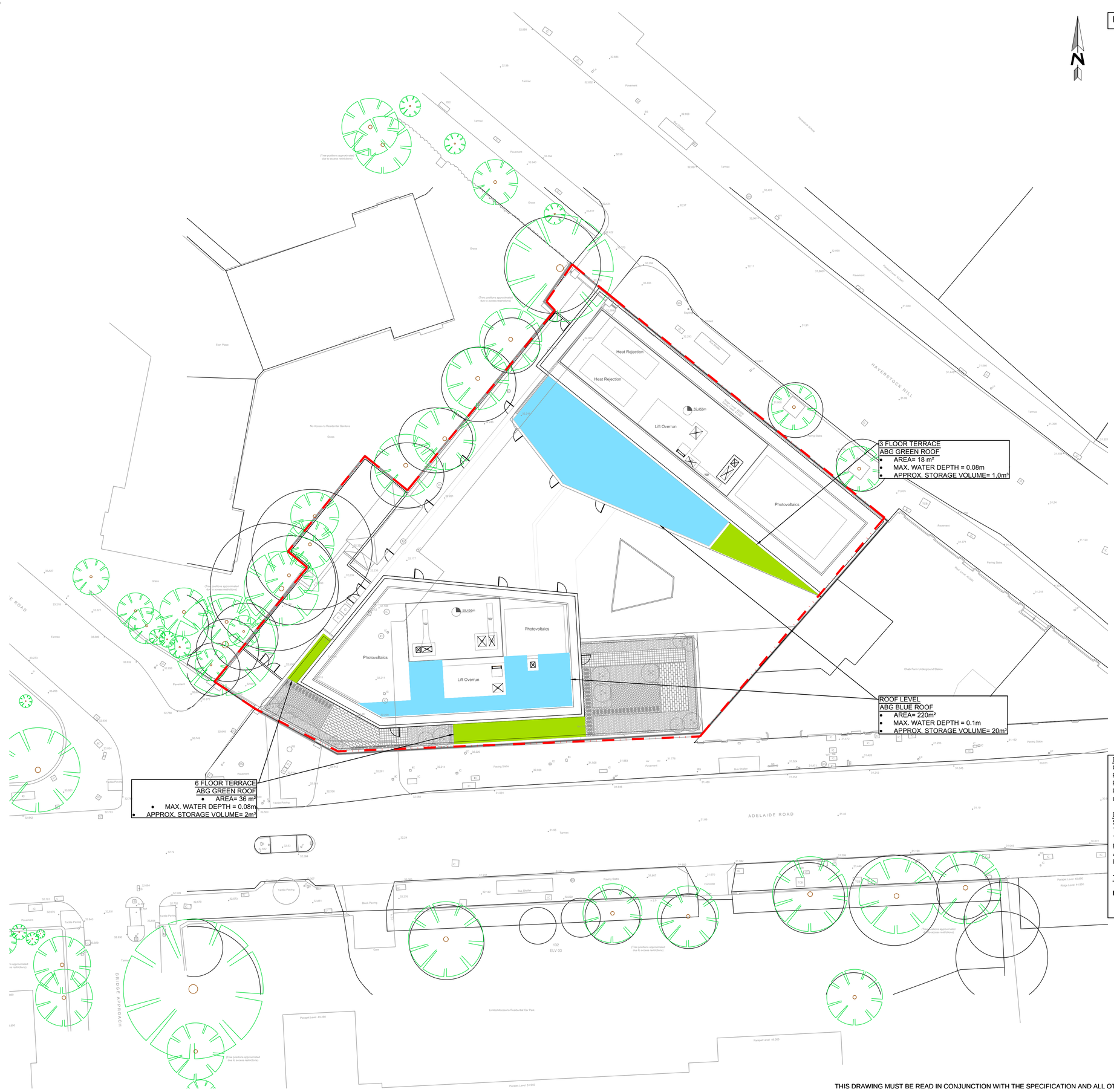
Drawing Status: PRELIMINARY

Project: 5-17 Haverstock Hill
London NW3 2I

Title: DRAINAGE LAYOUT
GROUND FLOOR
SHEET 2 OF 2

Date March 2016
Scale 1:100 @A1
Drawn AW
Engineer AW
Project No **140870**
Drawing No **C101**
Revision **P4**

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL OTHER RELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING.



LEGEND	NOTES

Linetype Legend:

Site Boundary

Blocks Legend:

RWP

Green Roof

Blue Roof

1. Invert levels and positions of existing drains / chambers / sewers where new connections are to be made must be checked and confirmed to the engineer prior to the commencement of any works.
2. All drainage works shall be carried out in accordance with the requirements of the Local Authority, the Environment Agency and in conjunction with all relevant British Standards, Codes of Practice and 'Sewers for Adoption' 7th Edition and any addendums as appropriate.
3. All drainage shall comply with the typical details and the requirements of BS EN 752 and Part H of the Building Regulations.
4. Any part of the existing drainage system to be retained as part of the new scheme shall be cleaned and inspected. Any structural defects shall be repaired using appropriate and approved means.
5. For setting-out dimensions of SVP's, RWP's etc, refer to Architect's or Mechanical Engineer's drawings. Positions shown are indicative and subject to final design.
6. All foul and RWP connections shall be 100mm diameter unless otherwise specified.
7. All precast concrete units used in the drainage works shall be manufactured using sulphate resisting cement.
8. Manhole covers and frames shall be to BS EN 124 and shall be Kitemarked. Covers and frames shall be heavy duty D400 in carriageways and vehicular areas and medium duty B125 in footways and soft landscaping. In blocked/concrete paved areas covers shall be recessed fabricated steel. All recessed covers shall in accordance with the FACTA association gradings.
9. All internal inspection chambers to be recessed, double sealed with screw down covers.
10. Cover levels are to be adjusted locally to suit finished ground levels.
11. At least one soil pipe at the head of each foul run shall vent to the atmosphere.
12. Existing drainage to be removed is to be broken out to bed level and void backfilled with granular material, compacted in layers not exceeding 250mm.
13. All drain runs from SVP's, stub stacks or FW gullies to be laid at 1:40 gradient unless otherwise stated. All RWP's to be laid 1:80 min unless otherwise stated.
14. All manholes / inspection chambers in block paved areas, to have recessed covers. MH covers in paved areas to have cover & frame orientated 'square' with paving to minimise cut slabs or blocks.
15. 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. Pipes below structural building slabs or basements shall be Cast Iron to BS 437.
16. Rodding eyes, etc are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.
17. All proposed trees to have appropriate tree barrier details linking pits to ensure roots are directed away from drainage.
18. Where new sewers are constructed within 5m of a new or existing tree the sewer shall be concrete encased against root intrusion. Refer to drainage details.
19. All new drainage to be jetted and CCTV surveyed on completion. Contractor to make sure that the drainage is fully operational. Refer to Drainage maintenance manual for maintenance details.
20. All runs connecting into the public drainage network to be vitrified clay, extra length to BS EN 295 or BS65 with plain sleeved or socketed flexible joints.
21. CDM note: All pipework, silt traps, catchpits, trapped gullies and attenuation tanks to be regularly inspected every three months and cleared out on a regular frequency for the first nine months. After this period the frequency can be reduced to every six months. Porous surface to be regularly swept three times a year to remove the silt.
22. This drawing is to be read in conjunction with all relevant Conisbee drawings.
23. HEALTH AND SAFETY: The works shall be carried out by specialist competent and experienced contractors who are members of a recognised national organisation.Operatives shall have received full and appropriate training for the operations they are to undertake. All work shall be carried out in accordance with all pertinent Health and Safety Regulations.

Design Notes :

Greenfield runoff rates:

For 1 in 1 year storm event =	1.9 l/s
For 1 in 30 year storm event =	3.9 l/s
For 1 in 100 year storm event =	4.5 l/s
Qbar (urban) =	2.2 l/s

Design Notes :

Site Area:	2,070 m²
Total Existing Impermeable Area:	2,070 m²
Total Proposed Impermeable Area:	2,070m²
Existing Peak rate run off from Impermeable Areas (50mm/hr):	28.8 l/s
Proposed restricted Surface Water discharge rate	14.0 l/s
Total Attenuation for 100YS + 30%CC:	**70 m³**
Foul Water Discharge:	**T.B.C. l/s.**

Attenuation Notes

Green Roof	Roof Area = 54m² Max. water depth = 0.08m Total =3**m³**
Blue Roof	Roof Area = 20m² Max. water depth = 0.10m Total =20**m³**
Attenuation Tank	63m² x 0.80m deep **Total = 47m³**
TOTAL ATTENUATION	**70m³**

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL OTHER RELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING.

NOT FOR CONSTRUCTION

Rev	Date	Description	Drawn	Check
P4	26.04.16	Green roof area revised	AW	TG
P3	25.04.16	Blue / green roof area revised	AW	TG
P2	08.04.16	Water depths revised.	DN	TG

conisbee
Consulting Structural Engineers
Consulting Civil Engineers

1-5 Offord St
London N1 1DH
Tel 020 7700 6666
Fax 020 7700 6686
design@conisbee.co.uk
www.conisbee.co.uk

Drawing Status
PRELIMINARY

Project
5-17 Haverstock Hill
London NW3 2I

Title
DRAINAGE LAYOUT
ROOF LEVEL

Date March 2016
Scale 1:200 @A1
Drawn AW
Engineer AW

Project No
140870

Drawing No
C105

Revision
P4