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63, AVENUE ROAD

SUDS MAINTENANCE GUIDE & OWNERS MANUAL

5 June 2019

SUDS TECHNIQUES USED ON THIS SCHEME:

- Rain Water Harvesting
- Geocellular/Modular Systems
- Silt traps and catchpits
- Flow control devices

FOREWORD

This guidance provides best practice guidance on the maintenance of Sustainable Drainage Systems (SuDS) to facilitate their effective implementation within the 62, Avenue Road scheme.

REFERENCES

Ciria documents C697 and C753

INTRODUCTION

Unlike conventional drainage systems, SuDs features are visible, and their function should be easily understood by those responsible for maintenance. When problems occur, they are generally obvious and can be remedied simply, using standard landscaping practice. If systems are properly monitored and maintained, any deterioration in performance can often be managed out.

Like any drainage system maintenance is a necessary and important consideration of SuDS design and sufficient thought should be given to long-term maintenance and its funding during feasibility and planning stages. In particular, the following requirements should be given full consideration:

OWNER'S MANUAL

SuDS are different from conventional drainage and require different maintenance regimes so this manual offers the following:

- location of all SuDS techniques in a site
- brief summary of how the techniques work, their purpose and how they can be damaged
- maintenance requirements (a maintenance plan) and a maintenance record
- explanation of the consequences of not carrying out the maintenance that is specified
- identification of areas where certain activities are prohibited (for example stockpiling materials on pervious surfaces)
- an action plan for dealing with accidental spillages
- advice on what to do if alterations are to be made to a development, if service companies undertake excavations or other similar works carried out that could affect the SuDS.

LOCATION OF SuDS TECHNIQUES USED ON THE SCHEME

The location of the SuDS features are shown on drawing MBP-7764-500, which is provided at the end of this report.

SUMMARY OF HOW THE TECHNIQUES WORK FOR THE SCHEME

Most of the runoff from the roof of 62, Avenue Road discharges via a piped system into a tanked cellular storage system beneath the front drive and then via an attenuated discharge to the public sewer running beneath Avenue Road. Discharge from the storage is controlled by a Hydrobrake, or similar flow control device, with the discharge limited to the agreed rate of 5 l/s. The storage is sized to accommodate a 1 in 100 year storm with an allowance of 30% for climate change.

About 15% of the roof runoff drains to a rainwater harvesting tank from where the garden irrigation system is supplied; overfill of this tank connects to storage system in the front drive.

MAINTENANCE REQUIREMENTS

These are detailed in the appropriate section of this document.

AREAS WHERE ACTIVITIES ARE PROHIBITED

Heavy loads should be avoided in areas where cellular storage is located to protect structural damage and collapse of the cellular limits.

Oils, other hydrocarbons and chemicals must not be discharged into the surface water system

ACCIDENTAL SPILLAGES

Health and safety consideration are a priority and addressing accidental spillages should only be attempted if the nature of the spillage is known and its potential hazardous properties understood. The source of the spillage should be stopped, and excess surface spillage removed by suction tank or absorption matts. Silt traps and sumps should be emptied by suction tanker. Areas of affected

permeable paving should have the surface and laying course removed. The surfacing blocks should be cleaned and relaid on new bedding material. Heavy pollution of the sub-base will require removal and replacement of the sub-base.

ALTERATIONS

If any alterations are proposed to the development, the design Engineer must be notified so that the impact/implications of the work can be assessed. Utilities should be restricted in the designated service zone areas.

OPERATION AND MAINTENANCE ACTIVITY CATEGORIES

There are likely to be three categories of maintenance activities:

1. Regular maintenance (including inspections and monitoring).
2. Occasional maintenance.
3. Remedial maintenance.

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

Occasional maintenance includes tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the regular tasks (e.g. sediment removal or filter replacement).

Remedial maintenance describes intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design, construction and regular maintenance activities. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and so timings are difficult to predict. Remedial maintenance can comprise activities such as:

- inlet/outlet repairs
- erosion repairs
- reinstatement or realignment of edgings, barriers, rip-rap or other erosion control
- infiltration surface rehabilitation
- replacement of blocked filter fabrics
- construction stage sediment removal (although this activity should have been undertaken before the start of the maintenance contract)
- system rehabilitation immediately following a pollution event.

It is important to note that these remedial activities will not be required for all systems, but for the purpose of estimating whole life maintenance costs, a contingency sum of 15-20% should be added to the annual regular and occasional maintenance costs to cover the risk of these activities being required.

	Modular storage	Rain water harvesting	Perforated ring soakaways	Oil interceptors	Flow control devices
Inspection	■	■	■	■	■
Litter/debris removal	□	■	■	□	□
Grass cutting	□	□		□	□
Weed/invasive plant control		□			
Sediment management (*)	■	■		■	■
Structure rehabilitation/repair	□	□	□	□	□
Infiltration surface reconditioning			□		

■ Will be required

□ May be required

* Sediment should be collected and managed in pre-treatment systems, upstream of the main device. The maintenance regime of a site also needs to consider the response to extreme pollution events. A response action plan should be developed and communicated to all those involved in the operation of a site, so that if a spillage occurs it can be prevented from causing pollution to receiving waters.

1.9 HEALTH AND SAFETY

To comply with the Construction (Design and Management) Regulations (DETR, 1994 the designer has assessed all foreseeable risks during construction and maintenance and the risks minimised by the following (in order of preference):

- Avoid.
- Reduce.
- Identify and mitigate residual risks.

1.10 REGULAR MAINTENANCE ACTIVITIES

1.10.1 Sections and Reporting

Regular SuDS scheme inspections will:

- help determine optimum future maintenance activities
- confirm hydraulic, water quality, amenity and ecological performance
- allow identification of potential system failures, e.g. blockage, poor infiltration, poor water quality etc.

Inspections can generally be required at monthly site visits (e.g. for grass cutting) for little additional cost, and should, therefore, be subsumed into regular maintenance requirements. During the first year of operation, inspections should ideally be carried out after every significant storm event to ensure proper functioning, but in practice this may be difficult or impractical to arrange.
Typical routine inspection questions that will indicate when occasional or remedial maintenance activities are required, and/or when water quality requires investigation include:

- are inlets or outlets blocked?
- does any part of the system appear to be leaking (especially ponds and wetlands)?
- is the vegetation healthy?
- is there evidence of poor water quality (e.g. algae, oils, milky froth, odour, unusual colourings)?
- is there evidence of sediment build-up?
- is there evidence of ponding above an infiltration surface?
- is there any evidence of structural damage that requires repair?
- are there areas of erosion or channelling over vegetated surfaces?

1.10.2 Gutter/Debris Removal

This is an integral part of SuDS maintenance and reduces the risks of inlet and outlet blockages, retains amenity value and minimises pollution risks. High litter removal frequencies may be required at high profile commercial/retail parks where aesthetics are a major driver.

1.10.3 Grass Cutting

It is recommended that grass cutting be minimised around SuDS facilities, apart from swales and filter strips and structural embankments where a height of 100–150 mm is recommended to prevent the plants falling over, or “lodging”, when water flows across the surface. In general, allowing grass to grow tends to enhance water quality performance. Short grass around a wet system such as pond or wetland provides an ideal habitat for nuisance species such as geese; allowing the grass to grow is an effective means of discouraging them. Grass around wet pond or wetland systems should not be cut to the edge of the permanent water.

Grass cutting is an activity undertaken primarily to enhance the perceived aesthetics of the facility. The frequency of cutting will tend to depend on surrounding land uses, and public requirements. Therefore, grass cutting should be done as infrequently as possible, recognising the aesthetic concerns of local residents. However, grass around inlet and outlet infrastructure should be strimmed closely to reduce risks to system performance. If a manicured, parkland effect is required, then cutting will need to be undertaken more regularly than for meadow type grass areas, which aim to maximise habitat and biodiversity potential.

1.10.4 Weed/Invasive Plant Control

Weeds are generally defined as vegetation types that are unwanted in a particular area.
For SuDS, weeds are often alien or invasive species, which do not enhance the technical performance or aesthetic value of the system, or non-native species and the spread of which is undesirable.

In some places, weeding has to be done by hand to prevent the destruction of surrounding vegetation (hand weeding should generally be required only during the first year, i.e. during plant establishment). However, over grassed surfaces, mowing can be an effective management measure. The use of herbicides and pesticides should be prohibited since they cause water quality deterioration. The use of

fertilisers should also be limited or prohibited to minimise nutrient loadings which are damaging to water bodies.

1.10.5 Management

Shrubs tend to be densely planted and are likely to require weeding at the base, especially during the first year to ensure that they get enough water. Shrubs should be selected so they can grow to their maximum natural height without pruning.

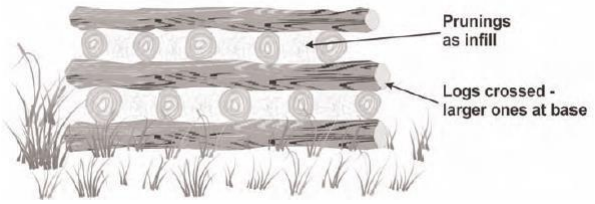
1.10.6 Management of Green Waste

Appropriate methods should be implemented to dispose of green waste, including:

- Development of Wildlife Piles

  These provide refuges, hibernation shelter, food and egg laying sites for a large number of animals. When rotted down at the end of 3–5 years they provide compost that can be used as fertiliser for planting areas outside of the SuDS system and, in general:
  - wildlife piles should be located in sunny or semi-shaded areas away from direct access by people
  - their bases should be constructed using substantial prunings or other branch material laid in a criss-cross pattern
  - seasonal shrub and other woody prunings should be added through the winter
  - non-woody and grass cuttings should be added through the summer
  - wildlife piles should comprise tidy piles up to 1.2 m high
  - new wildlife piles should be constructed each year and old wildlife piles should be used as compost to plant beds after 3–5 years
  - wildlife piles should be located above normal flood level of watercourses and be protected by hedges or similar features.

  A schematic of a typical wildlife pile structure is shown below, courtesy of Steve Wilson and Robert Bray of Sustainable Drainage Associates

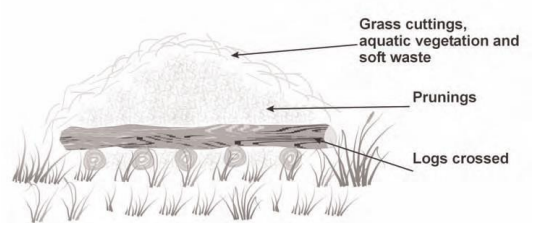


- On- or off-site composting

  A compost facility allows all green waste, particularly grass cuttings and prunings to be recycled and provide compost for mulching ornamental plant beds. The following process should be followed for composting:

  - shred all arisings from site
  - combine all arisings in active compost bin with grass cuttings not exceeding 70%
  - turn and mix active compost when bin is >50% full, at weekly intervals for at least four weeks
  - turn and mix full bin every 28 days until used
  - combine adjacent compost bins/bays when contents are settled to 50% volume reduction
  - Use compost after 3–4 months.

  A typical composting structure is below, courtesy of Steve Wilson and Robert Bray of Sustainable Drainage Associates



- Disposal to Landfill
  As a last resort, green waste can be disposed of to some approved tips or landfill sites, although it is only accepted at certain locations.

1.11 IRREGULAR MAINTENANCE ACTIVITIES

1.11.1 Sediment removal

To ensure long-term effectiveness, the sediment that accumulates in SuDS should be removed periodically. The required frequency of sediment removal is dependent on many factors including:

- design of upstream drainage system
- type of system
- design storage volume
- characteristics of upstream catchment area (eg land use, level of imperviousness, upstream construction activities, erosion control management and effectiveness of upstream pre-treatment).

Sediment accumulation will typically be rapid for the entire construction period (including time required for the building, turfing and landscaping of all upstream development plots). Once a catchment is completely developed and all vegetation is well-established, sediment mobility and accumulation is likely to drop significantly.

1.11.2 Vegetation/plant replacement

Some replacement of plants may be required in the first 12 months after installation, especially after storm events. Dead or damaged plants should be removed and replaced to restore the prescribed number of living plants per hectare.

Inspection programmes should identify areas of filtration, or infiltration surfaces where vegetation growth is poor and likely to cause a reduced level of system performance.
Such areas can then be rehabilitated, and plant growth repaired.

1.12 REMEDIAL MAINTENANCE

1.12.1 structure rehabilitation/repair

There will come a time with most SuDS techniques when a major overhaul of the system is required to remove clogged filters, geotextiles, gravel etc. This will typically be between 10 and 25 years, depending on the technique and factors such as the type of catchment and sediment load. The SuDS design allows for vehicle access to undertake this work and consider the need for the overhaul without causing major disruption. For example, the use of geotextiles close to the surface in pervious surfaces traps the majority of sediment in a relatively easily accessible location. Reconstruction of the surface layer and bedding layer is all that is required, rather than reconstruction of the whole pavement depth.

Major overhaul is most likely to be required on techniques that rely on filtration through soils or aggregates, such as sand filters and infiltration devices. Other SuDS techniques are unlikely to need major overhaul if routine maintenance is undertaken as required (for example ponds and wetlands). Rehabilitation activities for each SuDS component are described in the individual component chapters. The requirements should be identified in the owner's manual.

RAINWATER HARVESTING

DESCRIPTION

Rainwater harvesting (RWH) is the collection of rainwater runoff for use. Runoff can be collected from roofs and other impermeable areas, stored, treated (where required) and then used as a supply of water for domestic, commercial, industrial and for institutional properties.

OPERATION AND MAINTENANCE REQUIREMENTS

Any property with an RWH system installed should be provided with appropriate information as to what equipment has been installed, its purpose, its operation and maintenance requirements, the actions needed to address any potential failure and the expected performance of the system. Information on the options for external maintenance support should also be provided.

Most systems require periodic checking and maintenance to ensure trouble-free and reliable operation. There are wide differences in the extent of maintenance required for different systems, and manufacturers' guidelines should always be followed. Table 11.6 provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive, and some actions may not always be required.

Maintenance requirements are largely dependent on the runoff source and the runoff use (and thus treatment processes provided). This will range from weekly input through to rare intervention. Routine inspection of the fitter system at quarterly annual intervals is advised, even if they do not appear to need specific intervention. Pumps need very little attention, but their design life is generally regarded as only being 10 years. Where automatic provision of potable water occurs (if and when rainwater is either not available or the system has failed), it is useful to have sensor warnings relayed in such a manner as to inform the user of the current status of the system.

RWH systems should be designed so that when there is an absence of rain, or a need to disconnect the system for maintenance or repair, that potable water is safely available for all appliances to avoid inconvenience.

Tanks should be accessible for internal inspection, and the cover should preferably be lockable. For more guidance on operation and maintenance of RWH systems, see SS 8515:2009 + A1:2013.

The maintenance responsibility for an RWH system is usually with the owner of the property, but any communal systems require the participating community to be informed of the system, as detailed, but also be provided with information of who the organisation is that is maintaining the system and any financial commitments and any legally binding maintenance agreement.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspection of the tank for debris and sediment buildup, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually (and following poor performance)
	Cleaning of tank., inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional maintenance	Cleaning and/or replacement of any filters	Three monthly (or as required)
Remedial Actions	Repair of overflow erosion damage or damage to tank.	As required
	Pump repairs	As required

Rainwater Harvesting Operation and Maintenance Requirements

GEOCELLULAR/MODULAR SYSTEMS

DESCRIPTION

Modular plastic geocellular systems with a high void ratio, that can be used to create a below ground infiltration (soakaway) or storage structure.

OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is required to ensure the effective long-term operation of below ground modular storage systems. Maintenance responsibility for systems should be placed with a responsible organization. Maintenance requirements for modular systems are described in the table below. Maintenance plans and schedules should be developed during the design phase. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
	Debris removal from catchment surface (where may cause risks 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 overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

Modular Systems – Operation and Maintenance Requirements

FLOW CONTROL CHAMBERS AND DEVICES

DESCRIPTION

Flow control devices are usually installed in circular or rectangular manholes and are small orifice or vortex devices designed to hold back surface water and discharge at a low pre-specified rate. They are usually associated with up stream storage tanks or modular storage that accommodates the peak flow volume until drain down at the attenuated discharge rate controlled by the flow control device.

OPERATION AND MAINTENANCE REQUIREMENTS

Regular inspection and maintenance is required to ensure the effective long-term operation of flow control devices. Maintenance responsibility for systems should be placed with a responsible organization. Maintenance requirements are described in the table below. Maintenance plans and schedules should be developed during the design phase. Specific maintenance needs of the system should be monitored, and maintenance schedules adjusted to suit requirements.

	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly
Regular maintenance	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Inspection of flow control chamber to assess if system is draining down correctly and that the orifice or flow control device is not blocked. Assess if there are any silt accumulations in the chamber sump.	Monthly (and after large storms)
	Removal of accumulated silt from silt trap and catchpit sumps	Annually, or as required
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

Silt Traps And Catchpits – Operation And Maintenance Requirements

Monitoring and Maintenance Record

A record of the checks completed that are set out in the checklist below needs to be maintained along with any additional checks you have made. If a maintenance contract is in place with a contractor a record of any work carried out by them should be kept. If invoices state the work carried out, these will be sufficient.

Check records should include:

- The check or maintenance job
- Who did it;
- The result (for example when abnormal noise heard, called in specialist to investigate).

Action	Date and Time	Carried out by	Result
For example, inlet and outlet pipes checked	06/04/2012 09:30	Mr A N Other	Obstruction cleared.

Accident and Incident record

You should record any accidents, other incidents or near misses relating to the operation of the SUDS system and also to record health and safety incidents.

"Other incidents" covers impacts on the environment that are not accidents, such as failing to maintain the system, or vandals causing damage to the detention pond.

Date and time of the incident	
What happened, what was it about?	
Was anyone else aware of this – other witnesses? If so who?	
What caused it?	
What action did you take to fix the problem?	
What have you done to make sure that it does not happen again?	
Was there any significant pollution – for example: untreated sewage being discharged into a drain, river or stream? Yes / No If yes, what pollution occurred?	
If there was significant pollution, then you must notify the Environment Agency on 0800 807060 as soon as possible. Have you done so?	Yes/No/not applicable At what time did you phone? EA Incident reference no.
You must also write or send an email to confirm this to the local office (see your accident management plan for the address). Have you done so?	Yes/No/not applicable
Please print your name, sign and date.	

Key Site and Emergency Contacts

This table contains information and contacts you may need in an emergency

SITE DETAILS			
Address:			
Postcode:			
Site access grid reference:			
SITE CONTACTS		Office Hours (specify)	Out of hours
Owner:			
General manager:			
Site manager:			
Site supervisor:			
Security contact:			
Landowner / agent:			
EMERGENCY SERVICES		Office Hours	Out of hours
Emergency			)
Medical:			
Police:			
Fire:			
REGULATORS		Office Hours	Out of hours
Health and Safety Executive (HSE):			
Local Authority:			
Environment Agency	General number:	08708 506 506	
	24 hour emergency hotline:	0800 80 70 60	0800 80 70 60
Natural England/Countryside Council for Wales			
OTHER KEY CONTACTS		Office Hours	Out of hours
Adjacent landowners:			
Neighbours:			
Specialist advisors:			

SuDS Hierarchy		
SuDS Technique	**Utilised**	**Comments**
A. Storage of rainwater for later use.	✓	Rainwater harvesting used for irrigation pruposes. Located beneath garden shed at rear of property.
B. Use infiltration techniques.	✗	Sub-strata not suitable for infiltration systems
C. Attenuate rainwater in ponds or open water features for gradual release.	✗	Insufficient space in which to locate open water feature
D. Attenuate rainwater by storing in tanks or sealed water features for gradual release.	✓	Attenuation tank located below ground to store rainwater. Discharge from tank will be limited to 5 l/s into downstream sewer network. The tank is designed to accommodate the critical 100 year storm event including a 40% allowance for climate change.
E. Discharge rainwater direct to a watercourse.	✗	No water courses within the vicinity
F. Discharge surface water to a surface water sewer/drain.	✗	No surface water sewers within the vicinity
G. Discharge rainwater to the combined sewer.	✓	Rainwater discharged to combined water sewer at limited rate of 5 l/s in accordance with the approved surface water drainage strategy
H Discharge rainwater to the foul sewer.	✗	No foul water sewers within the vicinity

S1
Rainwater Harvesting Unit
Located under garden shed
Graf Carat 2700 or similar
Optimax Pro filter
CL: 102.59
Inlet IL: 101.20
Outlet IL: 101.03

S2
450Ø PPIC
CL 102.59
IL 101.02

S3
450Ø PPIC
CL 102.39
IL 100.90

S4
450Ø PPIC
CL 100.63
IL 99.70

S5
450Ø PPIC
CL 100.78
IL 100.08

S6
450Ø PPIC
CL 100.45
IL 99.75

S7
12000 Flow Control Chamber
Hydrobrake Optimum
Discharge rate: 5 l/s
CL 100.40
Outlet IL: 99.12

EX IC [MH-1]
CL 100.20
IL 98.05
depth 2.15m

EX IC [MH-2]
CL 100.62
IL 98.41
depth 2.32m

EX IC [MH-3]
CL 101.52
IL 99.00
depth 2.52m

EX IC [MH-3a]
CL 48.162
IL unknown
depth unknown

EX IC [MH-4]
CL 99.68
IL99.12
depth 0.56m

Wastop inline check valve
Ref: ws110pvc-55

Vent pipe

Storm water attenuation tank
Wavin Q-Bic Plus or similar
6.00 x 1.80 x 0.63m
Effective volume: 6.53m³
Base of tank: 99.12
Top of tank: 99.75

NOTE: Existing drains to be cleaned and, where necessary, roots to be removed.

1372 x 914 combined water sewer

Assumed route to connection with sewer

IL 41.85 (assumed)

*Position and levels of existing sewer obtained from Thames Water sewer asset plan. Accuracy cannot be guaranteed.

FFL: 102.00

EXIT FROM EASEMENT
GARDEN
Garden Shed
Summer House
ROOF LIGHT
TERRACE
SOFT LANDSCAPE
STAFF & DELIVERY ENTRANCE
PARKING DISABLED
PARKING
Parking bay 4800 x 2400
Parking bay 4000 x 2400 for wheelchair accessibility
LIGHT WELL
MAIN ENTRANCE
CAR LIFT
SECURITY ACCESS ENTRANCE
64

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. All drainage works to 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 any addendums as appropriate.
3. 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.
4. All drainage shall comply with the typical details and the requirements of BS EN 752 and Part H of the Building Regulations.
5. 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.
6. For setting-out dimensions of SVPs, RWPs etc, refer to the Architect's or Mechanical Engineer's drawings. Positions shown are indicative only.
7. All pipework shall be 100mm diameter unless otherwise noted.
8. All precast concrete units used in the drainage works shall be manufactured using sulphate resisting cement.
9. 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 be in accordance with the FACTA association gradings.
10. Cover levels shown are approximate only and are to be adjusted 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 225mm.
13. All drain runs from SVPs, stub stacks, or FW gullies to be laid at 1:40 gradient unless otherwise noted. All RWPs to be laid at minimum 1:60 gradient unless otherwise stated.
14. Access panels are to be provided to all rainwater pipes, max 60mm above finished ground level.
15. All manholes / inspection chambers in block paved areas to have recessed covers. MH covers in paved areas to have cover and frame orientated 'square' with paving to minimise cut slabs or blocks.
16. All gradients on drainage runs are indicative. Runs to be laid soffit to soffit.
17. Generally pipes to have granular bed and surround in accordance with the manufacturers recommendations, ensuring adequte protection with respect to depth and location.
18. 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.
19. Rodding eyes are to be laid to manufacturers minimum cover and depth to allow adequate fall from adjoining unit.
20. Where new sewers are to be constructed within 5m of a new or existing tree, the sewer shall be encased in concrete against root intrusion.
21. All new drainage to be jetted and CCTV surveyed on completion. Contractor to ensure that the drainage is fully operational.
22. All runs connecting into public drainage network to be extra strength clayware to BS EN 295 or BS65 with plain sleeved or socketed flexible joints.
23. Before commencing any sewer or drainage works, the groundworker is to satisfy himself, the Client and the Local Authority of actual levels and conditions of existing sewers/drains.
24. 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.

Rev	Date	Description	By
P3	28/05/19	Pumping station removed; drainage amended to suit; CCTV survey details added.	JG
P2	21/05/19	Rainwater havesting tank relocated under garden shed; pipe work amdended to suit.	JG
P1	07/05/19	PRELIMINARY ISSUE	JG

Drawing Status
PRELIMINARY

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W mbp-uk.com

Job
62 AVENUE ROAD
LONDON
NW8 6HT

Title
BELOW GROUND DRAINAGE
GROUND FLOOR LEVEL

Scale	Date	By	Checked
1:100 @ A1	MAY '19	PTW	MB/JG

Drawing Number: MBP / 7764 / 500
Revision: P3