

NEW BARN LANE
NORTH BERSTED
WEST SUSSEX

SUDS MANAGEMENT & MAINTENANCE PLAN

LINDEN HOMES SOUTH

APRIL 2018

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DOCUMENT CONTROL RECORD

Document Issue:

Rev	Date	Issue Status	Prepared by	Checked by
-	17.04.18	First Issue	K.Gebhart	C. Pendle
A	20.11.18	Added ditch right of way	S.Smith	C. Pendle
B	03.12.18	Ditch maintenance responsibility expanded	S.Smith	C. Pendle
C	16.01.19	Clauses 3.14 and 3.32 revised	J. Valadas	K.Gebhart
D	18.01.19	Sub clause 2.4 added to clause 2	J. Valadas	K.Gebhart
E	24.01.19	Sub clause 2.4 revised	J. Valadas	K.Gebhart
F	24.01.19	Sub clause 2.5 added to clause 2	J. Valadas	K.Gebhart
G	05.02.19	Word 'has' added to Clause 3.63	J. Valadas	K.Gebhart

References:

The SUDS manual – CIRIA C753 (2015) ISBN 9780-86017-760-9

National Planning Policy Framework (NPPF) – Communities and Local Government
Technical Guidance - Flood Risk & Coastal Change (March 2012)

1 Introduction

- 1.1 This document sets out the principles for the long term management and maintenance of the proposed surface water Sustainable Drainage Systems (SuDS) installed for the development at land west of New Barn Lane in Bersted, West Sussex.
- 1.2 The purpose of this document is to set out the basis of the development SuDS Maintenance Plan and to ensure that the adopting management company is entrusted with a robust inspection and maintenance programme, ensuring the optimum operation of the surface water drainage network is continually maintained for the lifetime of the development and to prevent the increased risk of flooding both on and off site in accordance with the National Planning Policy Framework (NPPF).
- 1.3 The activities listed in this document are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required. Specific maintenance needs of the SuDS elements should be monitored and maintenance schedules adjusted to suit requirements.
- 1.4 The installed SuDS system at this development are the initial responsibility of Linden Homes Southern.
Following installation and after an initial period (TBC) of operation, all SuDS are to be transferred to an appointed Management Company.
An agreement shall be set up by Linden Homes South, who shall confirm in writing to the Principle Planning Officer at Arun District Council when the maintenance agreement is completed and is operative.
- 1.5 The Management Company will then be responsible for maintaining the surface water system including all SuDS in perpetuity.
- 1.6 All those responsible for maintenance should follow relevant Health and Safety legislation (Health and Safety at Work Regulations, 1999) for all activities listed within this report including lone working, if relevant) and risk assessments should always be undertaken.
- 1.7 Any contractor employed by the Management Company shall carry out periodic maintenance of all such SuDS in accordance with the schedules listed in this report. Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.
- 1.8 This report is to read in conjunction with MJA drawing '5529:01/02 *Foul and Surface water Drainage Strategy*' for the location of all SuDS elements present within the development. Reference should also be made to the detailed landscape proposals for the proposed treatment / maintenance regime for all landscape features.
The operations contained within this plan shall (where feasible) be in conjunction with routine grounds maintenance operations to the surrounding landscape.

2 SuDS Layout & Design

- 2.1 The storm water drainage strategy for the proposed development is to utilise a range of SuDS features to attenuate all surface water runoff from impermeable areas, with a restricted discharge via flow controls into the existing watercourse that runs beyond the north eastern boundary of the site as well as the existing surface water network operated by Southern Water.
- 2.2 The proposed storm water system consists of the following SuDS components:
- Attenuation tank (cellular polypropylene cells)
 - Attenuation Basin
 - Storm water pipe work and road gullies
 - Flow control chambers
- 2.3 There are three categories of maintenance activities referred to in this report:
- **Regular maintenance** (including inspections and monitoring).
Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.
 - **Occasional maintenance**
Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).
 - **Remedial maintenance**
Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design.
Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.
- 2.4 The public open space (POS) areas will be initially maintained by Linden Homes. Upon completion of the development the POS areas could be offered to Arun District Council (ADC) although it is anticipated that ADC will not want adopt the POS onsite therefore, the POS will be maintained by a management company with a management charge levied on the residents of the development.
- 2.5 Notwithstanding the above all sewers on site except those adopted by Southern Water will be maintained by the management company via a charge levied on residents. For clarity, the offsite sewers from SWS 28 to SWS 26 and from F1 to F4 will be adopted by Southern Water, the sewers after these manholes (located on-site) will be the responsibility of the designated management company. The designated management company will also be responsible for the maintenance of the carriageways.

3 SUDS Management & Maintenance

3.1 Storm water pipe work and road gullies

- 3.12 The key maintenance requirement for the upstream surface water drainage system includes the removal of sediments and debris from the system as required.
- 3.13 All storm water pipe work should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of once year.
As road gullies are the first on the treatment train and susceptible to higher silt loadings, these will need to be inspected a minimum of monthly for the first three months after installation and then a minimum of every four months.
- 3.14 During this inspection identify any gully pots or pipes that require remedial maintenance such removal of sediment, debris, leaves and litter as required. This involves the removal all protective covers and grids and the cleaning out of channels or gully pots by hand or with suitable jetting equipment.
CCTV inspection to be carried out and reviewed to confirm no root ingress from adjacent trees. Should roots be encountered then further investigation of the root barrier to be undertaken with the view to remedial action or replacement of the tree barriers in accordance with the tree root barrier manufacturer's requirements and specifications.
- 3.15 During the inspections the general operation and structural integrity of all components should be recorded and repaired as required.

3.2 Flow Control Chambers

- 3.2.1 The key maintenance requirement for the flow control chambers will be the inspection of the units for blockages of the vortex and orifice flow control units and silt removal from sump of chamber.
- 3.2.2 The hydraulic vortex and orifice flow control units have no moving parts and is self-activating, requiring minimal maintenance.
- 3.2.3 After initial installation, it is recommended that the unit be inspected monthly for three months.
Thereafter the manhole chamber and control device should be inspected at least every six months to verify the condition and operation of the unit and check for blockages within the inlet of the chamber and of the flow control device.
During these inspections, accumulated silts should be removed and the sump cleaned out using a conventional sump vacuum cleaner.
Vortex flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.

3.30 Cellular Attenuation Tank

- 3.31 The key maintenance requirement for the cellular attenuation tank will be the visual inspection of the internal units via built in access chambers and integral maintenance tunnel for the removal of sediment and jetting as required.
A visual inspection of the impermeable geomembrane that envelopes the structure should also be carried out to check for structural integrity.
- 3.32 The attenuation tank is to be constructed from cellular units that allow internal CCTV and jetting access for inspection and maintenance (Stormbloc® by Hydro International or similar approved).
CCTV to be reviewed to confirm no root ingress from adjacent trees. Should roots be encountered then further investigation of the root barrier to be undertaken with the view to remedial action or replacement of the tree barriers in accordance with the tree root barrier manufacturer's requirements and specifications.
The built in modular inspection unit and maintenance tunnels within the attenuation tank allow almost the entire volume of the structure to be inspected via CCTV camera and flushed through.
A catchpit chamber is to be installed immediately upstream of the attenuation tank to reduce the amount of silt entering the tank and it will generally only be necessary to ensure that the upstream catchpits / silt traps are free from debris such as leaves or sediment.
- 3.33 It is recommended that the attenuation tank system be inspected no less frequently than at monthly intervals for the first 3 months and thereafter at 6 monthly intervals.
In addition, it is suggested that the installation is inspected immediately following the first storm event, whenever this should occur post installation.
- 3.34 It should also be noted that more regular inspections may be required should the catchpit(s) fill more frequently and/or if the initial inspections reveal that maintenance / cleaning will be required more regularly than at six month intervals.
- 3.35 Flushing of the system can be achieved using a jetting system with a 150 bar pump pressure (ie. approximately 80 bar at the nozzle) at a discharge flow of 300 l/min.
The jet nozzle should be introduced to the system via the inspection manhole and the integral inspection / maintenance tunnel.
- 3.36 Any silt & debris should be flushed to the inspection or catchpit manhole and removed in accordance with the Management Company policy for waste management.

Cellular Systems - Operation and Maintenance Requirements

Maintenance schedule	Required action	Recommended Frequency
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

3.40 Attenuation Basin

Key Maintenance Requirements:

- Litter/trash removal
- Inlet/outlet headwall inspection and cleaning
- Vegetation management
- Sediment monitoring and removal when required

3.41 Regular inspection and maintenance is important for the effective operation of the attenuation Basin.

The basin will be subject to a routine monitoring and maintenance schedule as part of the general site management.

This will be carried out at intervals detailed below, and shall comprise of the following operations:

- Collection and removal of all litter/large debris from the attenuation pond, inlets, outflows, and water margins once a month.
- Monthly inspection of the attenuation ponds to check the following, and repair as necessary:
 - Any failure in the operation of the inlet and outlet headwalls unless adopted by others in which case they will be notified of any observed defect.
 - Any damage or erosion to the perimeter edges and slopes of the attenuation ponds.

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- 3.42 The attenuation basin will be sown with two grassland seed mixes to create a simple mosaic of grassland habitat. The floor of the basin will be seeded with a wet meadow mix (WF2), whilst the banks will be seeded with a standard wildflower meadow mix (WF1) as detailed on the landscape proposals drawings.
- 3.43 **Ground preparation**
Basin should be constructed of predominantly low fertility subsoil, with only a thin upper layer of topsoil to be left after ground modelling to take up in-perfections in the soil surface. Final surface to be harrowed / fully cultivated to break-up large soil clods.
Basin area should then be continually cultivated of a period of several weeks to remove unwanted surface vegetation and weeds prior to meadow seeding. No herbicide is to be used due to the sensitive location for the basin construction. The ground should be cultivated to form a medium tilth and basin to be seeded at the recommended sowing rate, followed by light rolling (if necessary) throughout the meadow area.
- 3.44 **Landscape Maintenance (Year 1)**
In the first year, meadow areas should be managed more intensively to prevent the intrusion of invasive ground flora and allow a diverse sward to develop. The first cut should occur when the grass reaches approximately 100mm, down to 50mm, followed by subsequent cuts every 4-6 weeks down to 50mm throughout the first growing season.

Meadow areas should be monitored to assess the growth of any invasive species and grassland areas should be hand-weeded or spot swiped for any perennial weeds such as docks, nettles and ragwort.
- 3.45 **Landscape Maintenance (Year 2 onwards)**
Meadow areas will be maintained with a bi-annual cuts in May / June and after seed has dropped in late September. Meadow grassland should be cut to a height of approximately 100mm. All arising should be allowed to lay in-situ for 24 hours before being removed from site in order to allow any wildlife using the basin to disperse.
No fertiliser should be added to the grassland at any time and an annual monitoring visit to the grassland should be conducted to inform management that may be required.
- 3.46 An annual check carried out by a suitably qualified person, to assess the condition and operation of the attenuation basin inlet and outflow, and the accumulation of silt/sediment.
- 3.47 A record of maintenance visits and remedial operations shall be maintained.
- 3.48 The above operations shall (where feasible) be in conjunction with routine grounds maintenance operations to the surrounding landscape.

Basin Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Litter, debris and trash removal.	Monthly.
	Grass cutting – for landscaped areas and access routes.	Monthly (during growing season), or as required.
	Grass cutting – meadow grass in and around basin.	Half yearly (spring – before nesting season, and autumn).
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Occasional maintenance	Re-seed areas of poor vegetation growth.	Annually, or as required.
	Prune and trim trees and remove cuttings.	As required.
	Remove sediment from pre-treatment system when 50% full.	As required.
Remedial actions	Repair of erosion or other damage by re-seeding or re-turfing.	As required.
	Realignment of rip-rap.	As required.
	Repair/rehabilitation of inlets, outlets and overflows.	As required.
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates.	As required.
	Re-level uneven surfaces and reinstatate design levels.	As required.
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly.
	Inspect banksides, structures, pipework, etc for evidence of physical damage.	Monthly.
	Inspect inlets and pre-treatment systems for silt accumulation.	Half yearly.
	Establish appropriate silt removal frequencies.	
	Inspect infiltration surfaces for compaction and ponding.	Monthly.

3.50 Outfall Headwalls

- 3.51 Outfall headwalls should be visually inspected a minimum of monthly for the first three months after installation and then a minimum of once a year. Accumulated sediments, debris and any overgrown vegetative material should be removed from the culvert and margins of the outlet headwalls as necessary.
- 3.52 During the inspections the general operation, and structural condition of the headwall and any erosion of banks or scour control features should be identified and rehabilitated as required.

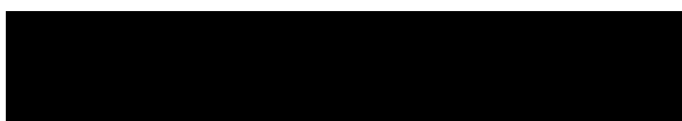
3.60 Existing Watercourse

- 3.61 Note: The Environment Agency are responsible for carrying out inspection and maintenance of main rivers.
- 3.62 However the existing ordinary watercourse should be visually inspected at least twice a year and any physical obstructions such as accumulated sediments at the outfall headwall, large rocks, rubble, fallen trees and branches and other waste materials (litter, grass cuttings etc) removed so that water can flow freely.
- 3.63 Linden Homes has riparian responsibility for the southern ditch. Any maintenance will be carried out via the Public Right of Way. The ditch will be cleared of vegetation and debris by the developer. Linden Homes also has riparian responsibility of the culvert linking the two ditches in the South Western Corner of the site and as such maintenance and clearance of the culvert will be undertaken as required. The ditch will be maintained by the developer and ultimately the management company for the lifetime of the development.
- 3.64 Linden Homes has riparian responsibility for the culvert under the footpath in the south-western corner. They will ensure its clearance and structural integrity to maintain its functionality and that of the ditch. The management company will be responsible for its maintenance for the lifetime of the development.
- 3.65 The ditch, or series of ditches, that run along the southern boundary will be checked to ensure conveyance of water between and through them is possible. These ditches will be regraded/connected if necessary. These ditches will be maintained by the developer and ultimately the management company for the lifetime of the development.

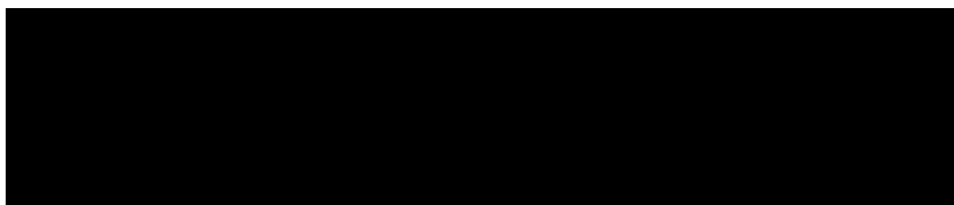
4 Contact Information

For further information on the management and maintenance of SuDS on the development please contact:

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