



Barratt David Wilson Southern Counties

Drove Lane, Yapton

Sustainable Drainage System (SuDS) Management Strategy

Project No.133647-R2(4)



JULY 2020

RSK GENERAL NOTES

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Client: Barratt David Wilson Southern Counties

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

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1 INTRODUCTION

This management strategy has been prepared by RSK Land and Development Engineering Ltd on behalf of Barratt David Wilson Southern Counties, to submit as part of the reserved matters planning application related to Drove Lane, Yapton (The Development).

The SuDS considered for the purposes of this statement, include drainage features that will be employed to reduce and manage surface water runoff from the development to a design return period of one hundred years plus climate change. This is required so that The Development will not increase the risk of flooding to the site and its environs. All drainage on site is taken to either the underlying strata via infiltration features or the outfall into the existing ditch adjacent to Drove Lane. Such features include the following:

- Permeable paving;
- Infiltration/Detention Basins and Swales
- Soakaways within private gardens for house roof drainage

This document outlines the long-term maintenance of the proposed surface water system and will refer to the following documents, some of which provide further detail on the maintenance operations required:

- CIRIA Report C753, '*The SUDS Manual*', 2015
- CIRIA Report C625, '*Model Agreements for Sustainable Water Management Systems*', 2004; and
- Interpave, '*Permeable pavements: Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements*', ed. 4, 2006.
- Design and Construction Guide (App C SSG), May 2021
- Building Regulations Part H

The proposed drainage network is subject to approval by Arun District Council with regards to the site wide drainage and discharge strategy under conditions set out under planning. All other drainage adoption agreements will be progressed with the relevant statutory undertakers.

2 MAINTENANCE RESPONSIBILITIES

Responsibility for drainage within England and Wales rests with various bodies. For the Development, the drainage responsibilities will be divided between the following:

- **Private Landowner** – each Householder will be responsible for the maintenance of drainage features within individual property curtilages.
- **Communal Areas** - A Management company will be set up for the Development to maintain all permeable paving within communal areas, stormwater attenuation tanks, detention basins, outfalls and any associated flow controls within communal areas. This company will be funded via a resident's service charge. However, it should be noted that if, the Flood and Water Management Act 2010 is ever fully implemented this allows a surface water drainage system to be vested to the SUDS approving body (SAB) in this case West Sussex County Council. This would be reviewed at the time of any implementation of the act.
- **Adoptable Drainage** – All drainage within the adoptable areas will be offered for Section 104 Agreement adoption under an inset agreement with Independent Water Networks Ltd (IWNL). All drainage will be designed and constructed to adoptable standards in accordance with Design and Construction Guidance (App C Sewerage Sector Guidance) and Southern Water's requirements.
- **Adoptable Highway** – All surface water highway drains, gullies and roadside highway swales within the adoptable highway will be maintained by West Sussex County Council under a Section 38 Agreement.
- **During Construction** – Until the drainage is approved and adopted by the adopting authorities, it is the responsibility of the groundworks contractor to protect the drainage system from construction run-off and effluent during the construction process. It will also be their responsibility to ensure that the drainage network is maintained, and functions as intended.

All parties responsible for the maintenance of the site drainage should refer to the following RSK drainage design drawings for information regarding the design and construction of the drainage network. Should any future maintenance or remedial works be required, they should be carried out in accordance with the approved design.

- Road Construction Details - CIV-1-4016
- Drainage Construction Details Sheet 1 - CIV-1-4018
- Drainage Construction Details Sheet 2 - CIV-1-4019
- Private Drainage Construction Details Sheet 1 - CIV-1-4020
- Private Drainage Construction Details Sheet 2 - CIV-1-4021
- Private Drainage Construction Details Sheet 3 - CIV-1-4022
- Site Drainage Sheet 1 - CIV-1-4024
- Site Drainage Sheet 2 - CIV-1-4025
- Site Drainage Sheet 3 - CIV-1-4026
- Site Drainage Sheet 4 - CIV-1-4027
- SuDS Sections Sheet 1 - CIV-1-4051
- SuDS Sections Sheet 2 - CIV-1-4052
- SuDS Sections Sheet 3 - CIV-1-4053

- Land Drainage Layout - CIV-1-4054
- Typical SuDS Details Sheet 1 - CIV-1-4058
- Typical SuDS Details Sheet 2 - CIV-1-4059
- SuDS Feature Liner Layout - CIV-1-4080
- Pond 2 Basin Setting Out and Details - CIV-1-4081
- Pond 3 Basin Setting Out and Details - CIV-1-4082
- Pond 4 Basin Setting Out and Details - CIV-1-4083
- Pond 5 Basin Setting Out and Details - CIV-1-4084
- Pond 6 Basin Setting Out and Details - CIV-1-4085
- Pond 7 Basin Setting Out and Details - CIV-1-4086
- Pond 7A Basin Setting Out and Details - CIV-1-4087
- Storage Tank Setting Out and Details Sheet 1 - CIV-1-4088
- Storage Tank Setting Out and Details Sheet 2 - CIV-1-4089
- Enhanced Swale 3 Setting Out and Details - CIV-1-4090
- Enhanced Swale 4 Setting Out and Details - CIV-1-4091
- Enhanced Swale 5 Setting Out and Details Sheet 1 - CIV-1-4092
- Enhanced Swale 5 Setting Out and Details Sheet 2 - CIV-1-4093
- Enhanced Swale 5 Setting Out and Details Sheet 3 - CIV-1-4094
- Enhanced Swale 5 Setting Out and Details Sheet 4 - CIV-1-4095

3 MAINTENANCE REGIME

As the maintenance of the communal SUDS features will be carried out via a Management Company, the form of agreement should include the required maintenance listed below. Should the maintenance be transferred at a later date to a public body, then the model agreement SUDS MA1 should be used, details of which can be found in the CIRIA guidance C625.

All drainage is proposed to be standard “off the shelf” products which will be subject to the manufacturers guidelines and recommendations for maintenance which will be undertaken by the parties listed in section 2 of this document.

It should be noted in general that concrete elements will have 50 years life span as per the Eurocode requirements and that maintenance of these elements will not be frequent. The lifespan of liners for the detention basins and geo-cellular storage tanks will be as stated by the manufacturer and that the future maintenance of the produce will need to be in accordance with the manufacturer's guidelines. The geo-cellular storage crates have a lifecycle of approximately 60 years however due to these products being relatively new it is believed that the lifespan is longer than this.

The following section describes the required maintenance for each feature in turn. The SUDS maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features. Records of the maintenance carried out shall be prepared by the Management Company.

3.1 Permeable Paving

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper	Every 10 to 15 years or as required (if

Maintenance schedule	Required action	Typical frequency
	substructure by remedial sweeping.	infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

3.2 Detention Basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), as or required
	Cut grass – 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)
	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 facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), the annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually
	Inspect liner and concrete surround for defects	Annually or as required
	Remove tree saplings	Annually or as required
Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
	Concrete element remedial works	As required
	Liner remedial/replacement works	As required and in accordance with manufacturers guidelines
Remedial actions	Repair erosion or other damage by reseeding or re turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Maintenance schedule	Required action	Typical frequency
	Remediation/replacement of concrete elements or liner	As required

3.3 Swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass- to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for >48 hours	Monthly or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspection inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
	Inspect liner and concrete surround for defects	Annually or as required
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
	Concrete element remedial works	As required
	Liner remedial/replacement works	As required and in accordance with manufacturers guidelines
Remedial actions	Repair erosion or other damage by re-turfing or reseeded	As required
	Relevel uneven surfaces and reinstate design level	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of soil surface	As required
	Remove build up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required
	Remediation/replacement of concrete elements or liner	As required

3.4 Storage Tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, the annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from	Annually

Maintenance schedule	Required action	Typical frequency
	above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
	Inspect liner and concrete surround for defects	Annually or as required
Occasional maintenance	Concrete element remedial works	As required
	Liner remedial/replacement works	As required and in accordance with manufacturers guidelines
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
	Remediation/replacement of concrete elements or liner	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

3.5 Soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year then annually
	Check soakaway to ensure emptying is occurring	Annually

3.6 Infiltration Basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter, debris and trash	Monthly
	Cut grass-for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass-meadow in and around basin	Half yearly: spring (before nesting season) and autumn

Maintenance schedule	Required action	Typical frequency
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
Occasional maintenance	Reseed 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 erosion or other damage by reseeded or re-turfing	As required
	Realign the rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate 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 silty accumulation; establish appropriate silt removal frequencies	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly

3.7 Operation and Maintenance Requirements for Trees

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly or as required
	Manage other vegetation and remove nuisance plants	Monthly
	Inspect inlets and outlets	Monthly
Occasional maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually
	Water	As required
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

3.8 Operation and maintenance requirements for watercourse

Maintenance schedule	Required action		Typical frequency
Regular Maintenance	Remove litter and debris		Monthly (or as required)
	Cut the grass – public areas		Monthly (during growing season)
	Cut the meadow grass		Half yearly (spring, before nesting season, autumn)

Maintenance schedule	Required action		Typical frequency
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)		Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage		Monthly
	Inspect water body for signs of poor water quality		Monthly (May-October)
	Inspect silt accumulation rates in any forebay and in main body of the watercourse and establish appropriate removal frequencies; undertake contamination testing once build-up has occurred to inform management and disposal options		Half yearly
	Check any mechanical devices, e.g. penstocks		Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)		Annually
	Remove 25% of bank vegetation from water's edge to minimum of 1m above water level		Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)		Annually
	Remove sediment from any forebay		Every 1-5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays		Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%		With effective pre-treatment, this will only be required rarely, e.g. every 25-50 years
Remedial actions	Repair erosion or other damage		As required
	Replant where necessary		As required
	Aerate watercourse when signs of eutrophication are detected		As required
	Realign rip-rap or repair other damage		As required
	Repair/rehabilitate inlets, outlets and overflows		As required

3.9 Catchpit Manhole

Maintenance schedule	Required action	Typical frequency
Occasional maintenance	Remove litter, debris, and detritus that enters the drainage system	Annually, or as required

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Maintenance schedule	Required action	Typical frequency
	Inspect inlets, outlets and overflows for blockages, and clear if required	Annually, or as required
	Inspection inlets and sump for silt accumulation, establish appropriate silt removal frequencies	Annually, or as required
Remedial actions	Remove and dispose of silt	Annually, or as required
	Remove and dispose of oils or petrol residues using safe standard practices	Annually, or as required

3.10 Sewer Mains

Maintenance schedule	Required action	Typical frequency
Monitoring & Occasional maintenance	CCTV Survey pipe network to check system is functioning correctly and that there are no cracks in the pipework.	Every 5 years
	Removal of blockages reported in the pipe network will also require a full CCTV Survey of the pipe network afterwards to confirm there are not any other blockages.	As required

3.11 Gullies & Linear Drainage Channels

Maintenance schedule	Required action	Typical frequency
Regular inspections	Remove litter, debris, and detritus that enters the gullies or linear drainage channels	Six monthly, or as required
	Inspect inlets and outlets for blockages, and clear if required	Six monthly, or as required
	Inspection of sump for silt accumulation, establish appropriate silt removal frequencies	Six monthly, or as required
Remedial actions	Remove and dispose of silt	Six monthly or as required
	Remove and dispose of oils or petrol residues using safe standard practices	Six monthly or as required

3.12 Headwall

Maintenance schedule	Required action	Typical frequency
Occasional Monitoring & Maintenance	Check for cracking or other damage to headwall structure	Annually or as required
	Check for erosion of the spillway	Annually or as required
Remedial actions	Repair cracking or other damage to headwall structure	As required
	Repair excessive erosion of spillway if it detrimentally affects	As required

3.13 Hydrobrake Manhole

Maintenance schedule	Required action	Typical frequency
Occasional maintenance	Remove litter, debris, and detritus that enters the drainage system	Six monthly, or as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Six monthly, or as required
	Inspection Hydrobrake bypass door, open and close door, greasing of door to prevent mechanism from	Six monthly, or as required

Maintenance schedule	Required action	Typical frequency
	seizing	
Remedial actions	Replace components of Hydrobrake if faulty in line with manufacturers guidance.	As required
	Replace entire Hydrobrake if components cannot be replaced in accordance with manufacturers guidance.	As required

APPENDIX A

INSPECTION CHECKLIST

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (e.g. biodiversity, wildlife and visual aspects)	

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
General inspection items								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours or nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Silt/Sediment accumulation								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with (consult environmental regulator)								
Is surface clogging visible potentially problematic where water has to soak into the underlying construction or ground (e.g. underdrained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to								

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Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
remove silt?								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging or blockage of outlets or drainage paths?								
Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (check against approved planting regime)								
Does any part of the system require weeding, pruning or mowing? (check against maintenance frequency state in approved design).								
Is there any evidence of invasive species becoming established? If yes, state action required								
Are any check dams or weirs in good condition?								
Is there any evidence of any accidental damage to the system (e.g. wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow control?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual								

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Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
aspects?								
Other observations								
Information appended (e.g. photos)								
Continue as current Increase maintenance Decrease maintenance								
Proposed date for next inspection								

APPENDIX B

DRAWINGS

RSK Drawing - PLN-1-4084_Roads and Sewers_DAR_Surface Water Drainage Strategy Sheet
5_M (Site Wide Layout)

