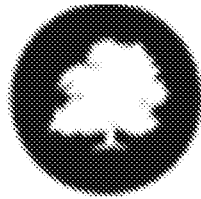


FELPHAM DEVELOPMENT PHASES 1 – 5

SUDS MANAGEMENT & MAINTENANCE PLAN



BARRATT
DEVELOPMENTS PLC

Date: 12th July 2017
Ref: 17/0480/4348
Rev: -

DOCUMENT CONTROL RECORD

Document Issue:

Rev	Date	Issue Status	Prepared by	Checked by
-	12.07.17	First Issue	A.Mcshane	

Appendices:

Appendix A: SUDS Management Layout Plan

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 at the residential development at Site 6, Felpham, Bognor Regis.
- 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 principle storm water drainage strategy for the proposed development is to utilise open attenuation features with a restricted Greenfield discharge to the existing watercourse which outfalls to the Lidsey Rife.
- 1.4 This document details the SuDS structures within the treatment train and their required maintenance processes. This plan has been comprised of and is directly referenced from the latest technical SuDS guidance within the *CIRIA Report C753 The SuDS Manual (2015)* and other applicable guidance.
- 1.5 The activities listed are specific 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.
Those responsible must keep a log, recording all inspection dates, observations, and maintenance activities undertaken.
- 1.6 All those responsible for maintenance should follow relevant health and safety legislation for all activities listed within this report (including lone working and confined space if relevant) and risk assessments for inspections and maintenance activities should always be undertaken.
- 1.7 This report is to read in conjunction with the development site engineering plans for the type and location of all SuDS systems present on this site.

2 SuDS Layout & Design

- 2.1 The installed SuDS system at this development are the responsibility of Barratt Homes and their appointed Management Company.
- 2.2 Following installation and after transfer, all SuDS are to be maintained in perpetuity by the Management Company and shall ensure that it or any contractor employed by it carries 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.
- 2.3 In terms of water quality, the proposed surface water system offers a suitable level of mitigation in accordance with the Environment Agency pollution prevention guidance GP3, NPPF, CIRIA C753 and DEFRA guidance.
- 2.4 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, inspections and sampling.
 - **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.
- 2.5 The main SuDS components with the surface water drainage strategy:
- Deep Trapped Road Gullies
 - Attenuation basins
 - Flow Control Chamber
 - Cellular Attenuation Tank (Phase 5C only)
 - Permeable paving (Phase 5D only)
- 2.6 The roads & storm water drainage within the development will be split between private areas and roads adopted by West Sussex District Council or drainage systems adopted by Southern Water. All management and maintenance of the adopted roads and drainage systems will accord with either Southern Water's or WSDC's standards and maintenance regime.
- 2.7 The areas of private road and drainage will be maintained by the management & Maintenance Company who will be employed in perpetuity to maintain the private roads, open space, storm drainage including gullies and attenuation basins. The installed systems at this development will be the responsibility of Barratt Homes and their appointed Management Company.

3 SUDS Management & Maintenance

3.1 Private Roads & Driveway Storm Water Pipework & Gullies,

Key Maintenance Requirements:

- Regular inspection of gullies including jetting and removal of sediment as required.
- Inspection of pipework including jetting and removal of sediment as required.

Regular inspection and maintenance is important for the effective operation of the main piped storm drainage system. Gullies should be inspected regularly with a minimum 6 monthly desilting programme to ensure effective pollution prevention.

The pipework sections should again have regular visual manhole inspections to ensure that flow characteristics are maintained.

The cleaning operation comprises removal of large debris and litter by hand picker and sucking out the sediment / oil contents of the gully into a tanker, ensuring that the outlet is clear and then re-filling the gully pot with clean water up to the level of the outlet.

During the first year of operation each gully should be inspected every 3 months, and every 6 months thereafter for structural integrity and cleaned out as required.

3.2 Cellular Attenuation Tank – (Phase 5C only)

Key Maintenance Requirements:

- Regular inspection of cellular attenuation units via access chambers to check for removal of sediment.

Catchpit chambers installed upstream of the attenuation tank to reduce the amount of silt entering the tank. Catchpits / silt traps to be checked for debris such as leaves or sediment.

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.

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.

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

3.3 Permeable Block Paving – (Phase 5D only)

Key Maintenance Requirements:

- Sweeping
- Regular brushing and vacuuming

Regular inspection and maintenance is important for the effective operation of permeable pavements and should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

Permeable block paving needs to be regularly cleaned of silt and other sediments to preserve infiltration capability and should have a minimum of three surface sweepings per year.

Care should be taken in adjusting vacuuming equipment to avoid removal of jointing Material and any lost material should be replaced.

To ensure the continual optimal performance of the permeable paving, it is recommended that the following maintenance should be carried out:

The following guidelines are offered as an initial regime, but maybe either increased or decreased depending on the local environment and any external contributing factors:

- A visual inspection of the paving may be carried out on a regular basis. This will confirm the effectiveness of the agitation maintenance due to variations between sites and allow any refinement of the regular agitation activity if necessary.

- The paving should be agitated (e.g. brushed, vacuumed, etc.) at least twice a year. This is to ensure no vegetation of any sort is allowed to grow and develop in the joints. Ideally, this activity should be carried out in the spring and autumn seasons.
- The paving should be inspected after any heavy precipitation to ensure no displacement of any organic matter onto the surface of the pavement.
- For winter maintenance, the controlled use of de-icing may be used without causing significant detrimental effects towards the permeable pavements performance. When used carefully, the use of these chlorides will not result in an increase in the chloride levels in the local ground.
- Weed growth – when sedimentation occurs in areas of permeable paving then there is the potential for weed growth, this will typically occur where there are overhanging trees or soft landscaping slopes down on to the paving or in areas which do not receive over run from vehicles particularly frequently. Weeds can be removed from the surface through the controlled application of proprietary non-persistent contact herbicides. Those containing Glyphosate are the most suitable.

Materials removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and may need to be disposed of as controlled waste. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

3.4 Attenuation Basins

Key Maintenance Requirements:

- Litter/debris and sediment removal.
- Grass mowing of swale embankments and removal of cuttings / weeding.
- Clearing of inlets and outlets from debris and sediment.
- Repair of eroded or damaged areas.

Attenuation basins accumulate silt naturally due to their primary position in the SUDS 'management train' sequence.

Generally the accumulation of silt occurs slowly and sediments excavated from the basin that receive runoff from residential or standard road and roof areas are generally not toxic or hazardous material.

Regular inspections should be undertaken, particularly during the initial vegetation establishment period and after significant storm events to:

- identify areas of erosion and scour particularly at inlet and outlet headwalls
- identify locations of high silt deposits
- determine the health of the vegetation and soil
- identify areas of excessive waterlogging or other damage

Maintenance schedule	Required action	Frequency
Regular maintenance	Litter and debris removal.	Monthly (or as required).
	Grass cutting – to retain grass height within specified design range.	Monthly (during growing seasons), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Occasional maintenance	Check for poor vegetation growths due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where possible.	Annually.
	Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required.	Annually, or if bare soil is exposed over 10 % or more of the swale treatment area.
Remedial actions	Repair erosion or other damage by re-turfing or re-seeding.	As required.
	Re-level uneven surfaces and reinstate design levels.	As required.
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the 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.
Monitoring	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 inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Half yearly.

3.5 Flow Control Chamber

Key Maintenance Requirements:

- Check for blockages of vortex unit and silt removal from sump.

The hydraulic vortex flow control unit has no moving parts and is self-activating, requiring minimal maintenance.

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.

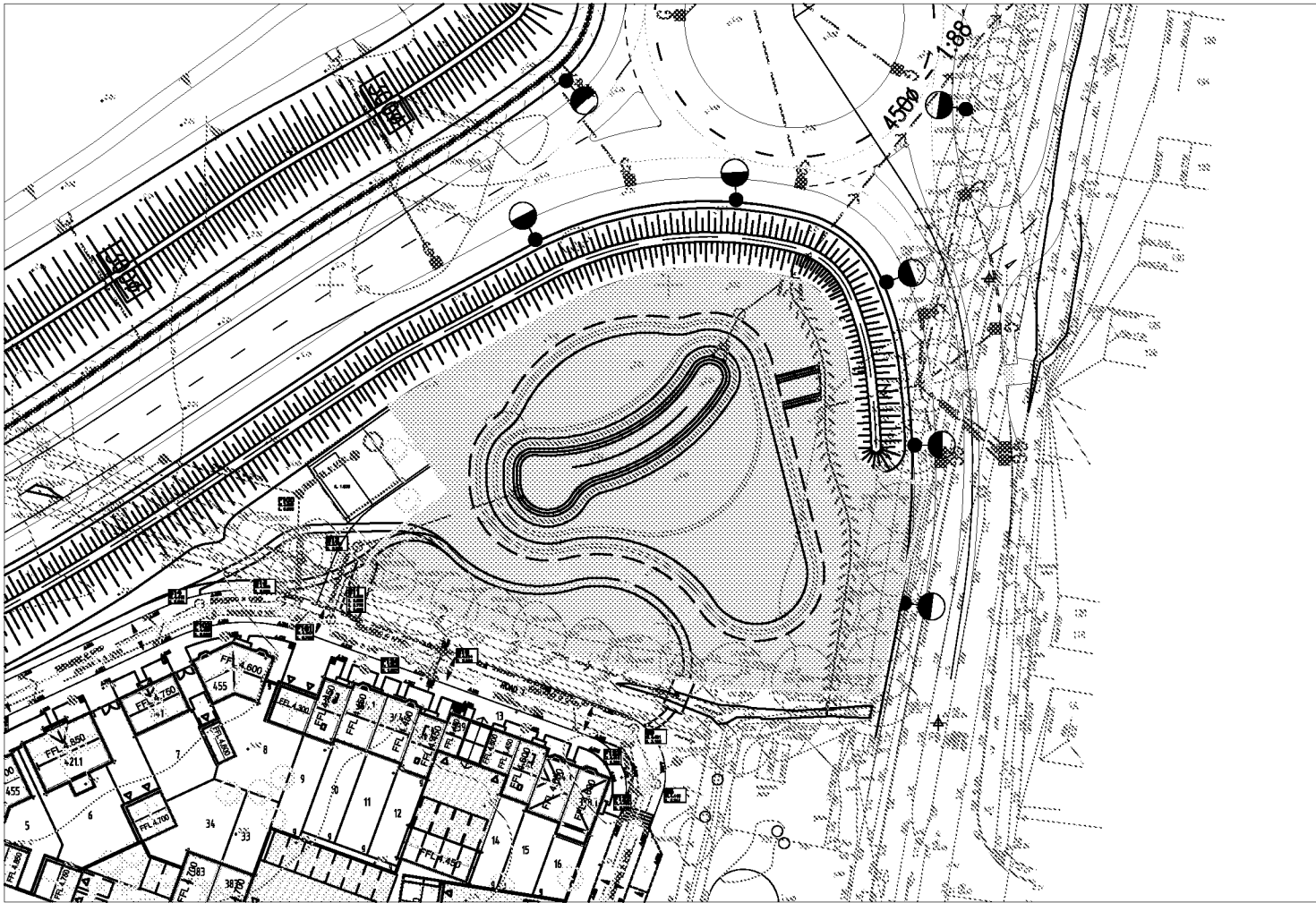
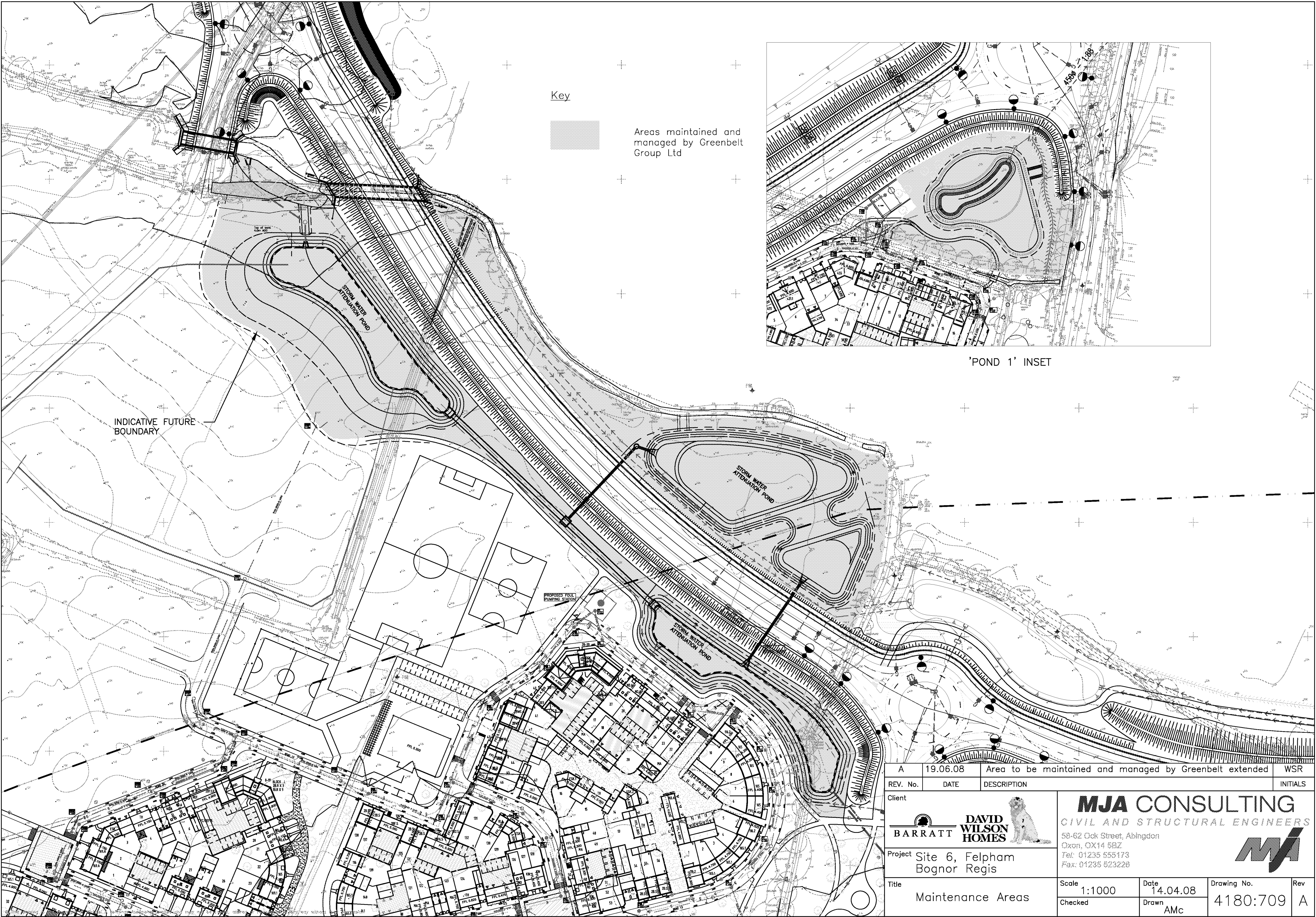
During these inspections, accumulated silts should be removed and the sump cleaned out using a conventional sump vacuum cleaner.

Flow Controls are fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.



Appendix A

SUDS Management Layout Plan



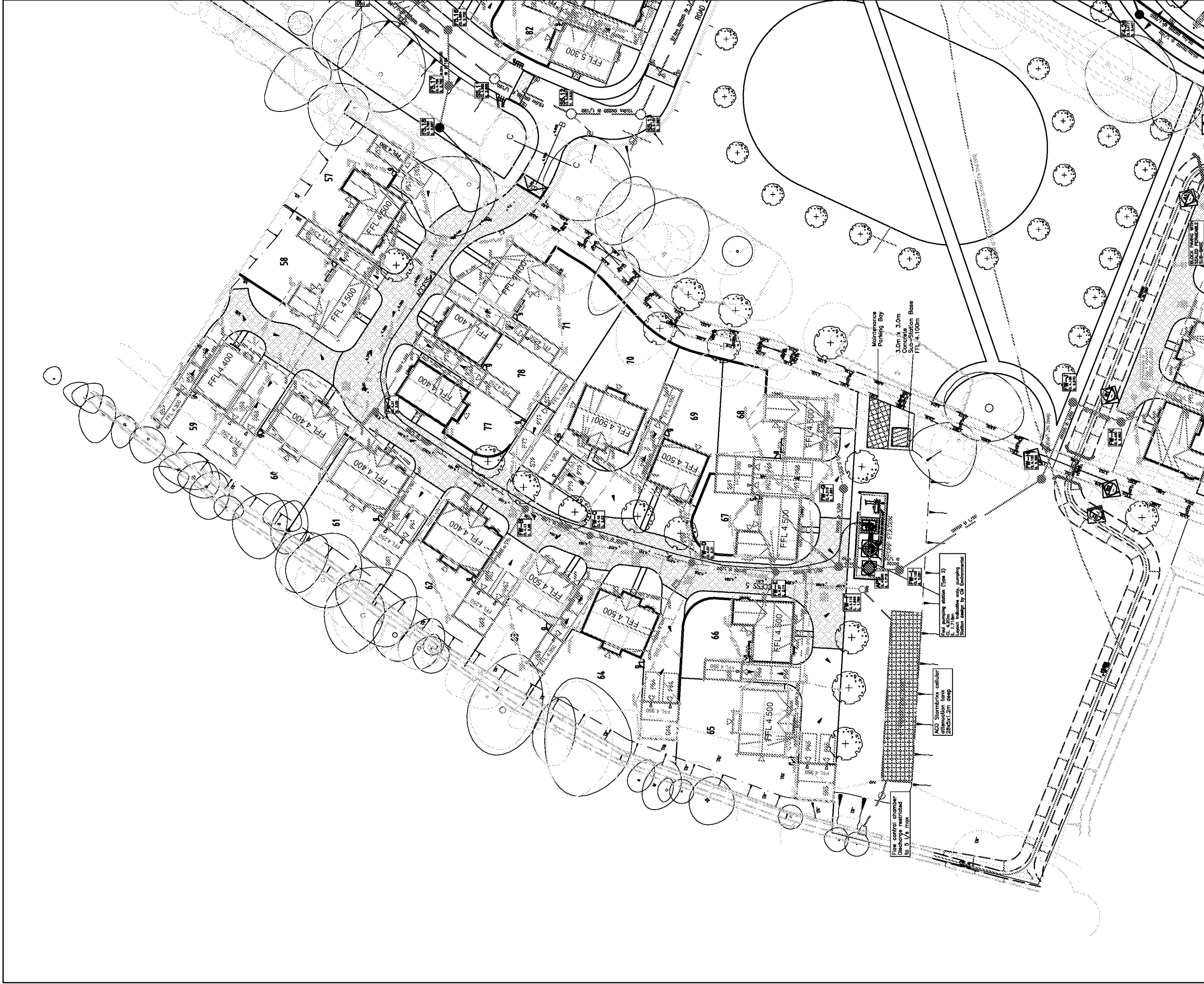
'POND 1' INSET

A	19.06.08	Area to be maintained and managed by Greenbelt extended	WSR
REV. No.	DATE	DESCRIPTION	INITIALS
Client			
 DAVID WILSON HOMES		MJA CONSULTING CIVIL AND STRUCTURAL ENGINEERS 58-62 Oak Street, Abingdon Oxon, OX14 5BZ Tel: 01235 555173 Fax: 01235 523228	
Project		Site 6, Felpham Bognor Regis	
Title		Maintenance Areas	Scale 1:1000
		Checked	Date 14.04.08
		Drawn AMc	Drawing No. 4180:709
			Rev A



Client BDW Southampton	MJA CONSULTING CIVIL AND STRUCTURAL ENGINEERS Monarch House, Barton Lane, Abingdon, Oxon, OX14 3NB Tel: 01235 555173 Fax: 01235 523226 			
Project Phase 5D Felpam	Scale NTS Checked	Date July '17 Drawn	Drawing No. —	Rev
Title Permable Paved Management Area				

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Client			MJA CONSULTING CIVIL AND STRUCTURAL ENGINEERS Monarch House, Barton Lane, Abingdon, Oxon, OX14 3NE Tel: 01235 555173 Fax: 01235 523226 	
Project				
Title			Rev	
SUDs Maintenance Layout Cellular Attenuation Tank			Scale	Drawing No.
			NTS	—
			Date	
			July '17	
			Checked	Drawn

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