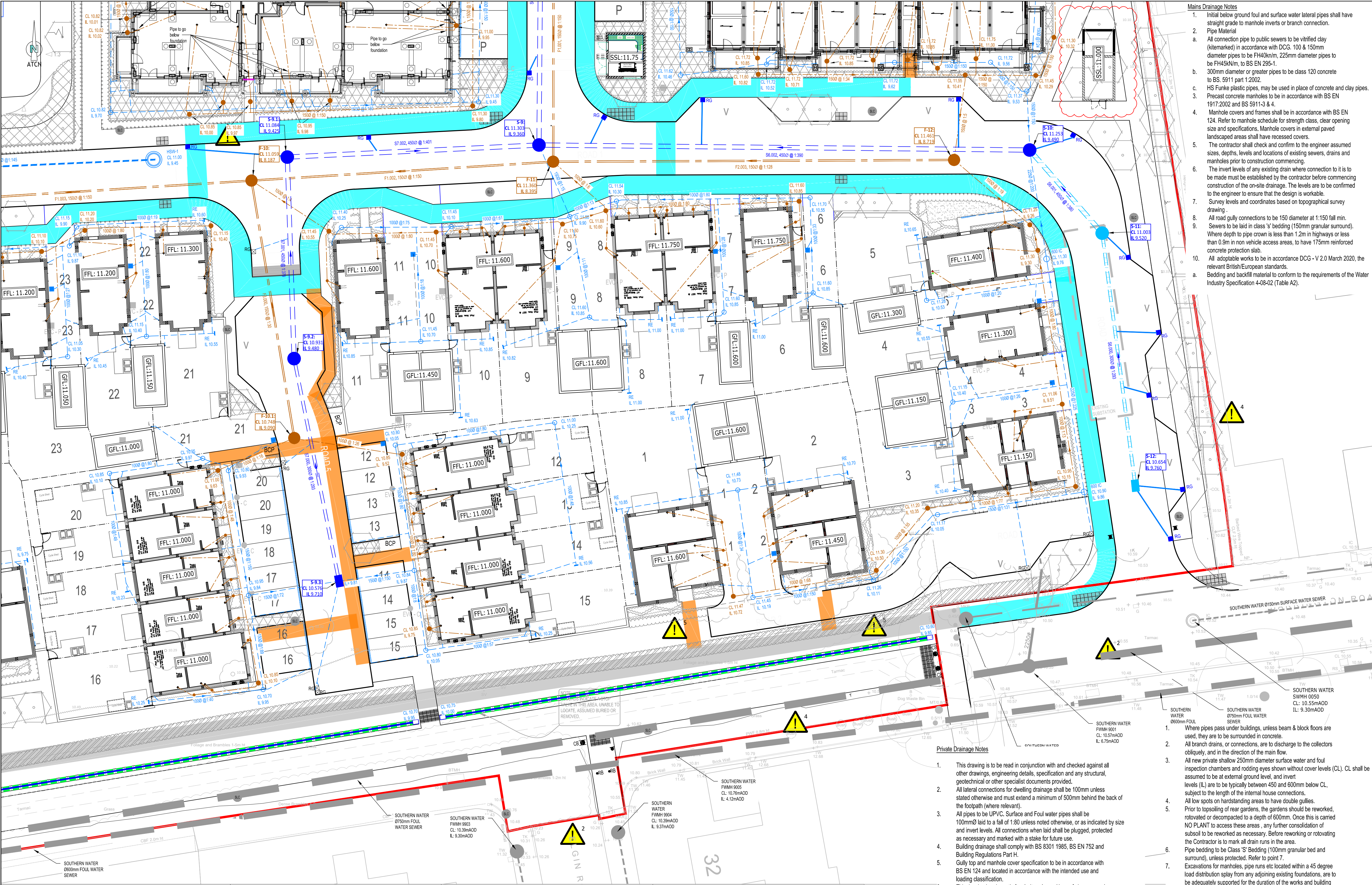




LEGEND

- Site Boundary
- Care Home Boundary
- Foul Water Mains Drainage, to be built in accordance with DCG March 2020.
- Private Foul Water Inspection Chamber, 250mm dia. polypropylene up to 600mm deep. Max. pipe diameter 100mm.
- Private Foul Water Inspection Chamber, 450mm dia. polypropylene up to 3000mm deep. Max. pipe diameter 150mm.
- Surface Water Mains Drainage, to be built in accordance with DCG March 2020
- Private Surface Water Inspection Chamber, 450mm dia. polypropylene up to 3000mm deep. Max. pipe diameter 150mm.
- WSSC Highway Gully Connection Drainage

- WSSC Highway Gully Connection Drainage
- WSSC Highway Mains Drainage
- Mains Drainage to have concrete surround.
- Adoptable Road Gully, 180m² max catchment as per WSSC standard.
- Private Road Gully
- Private Yard Gully
- Non Return Valve
- Private Rodding Eye
- Land Drains
- Private Channel Drain
- Perforated Pipe
- Private Rising Main
- Adoptable Permeable Paving

- Private Permeable Paving
- Cellular Crate Storage
- Aquell Plus Inspection cellular crate
- Existing Surface Water Drainage
- Existing Foul Water Drainage
- 2m Wide Site Services Corridor
- 1.5m Wide Site Services Corridor
- Existing Services Corridor
- Filter Drain

- Inspection Chamber
- Tree Pit Extent

Key Location Plan

General Notes

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Health & Safety Note

The details on this drawing have been prepared on the assumption that a competent contractor will be carrying out the works. If the contractor(s) considers that there is insufficient Health and Safety information on this drawing, this should immediately be brought to the attention of the designer.

HAZARD IDENTIFICATION BOX			
This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015			
Hazard Ref	Hazard Type	Hazard Description	Mitigation Measures/ Residual Risk
2	ALL	Working adjacent to live cartway	Contractor to install necessary traffic management.
3	ALL	Working with deep excavation	Safety MS, trenching/shoring, correct shoring & propping of excavation
4	ALL	Working near by steep banking	Contractors Safety Method Statement, Fencing, guarding and signage.
5	ALL	Live utilities including GASE/ELECTRICITY	Contractors Safety Method Statement, Scan/ Locate and mark all services prior to commencing work. Hand dig to locate services
Site Wide	ALL	Potential ground gases and elevated arsenic	Contractor to provide relevant PPE to workers, and hotspots marked out onsite.

Ref	Date	Description	dm / cm / s / App'd
C18	06/02/25	New RWMI Installed as Clouded	MSK/MAT
C17	11/12/24	Update Road Gully As Per Parkway Homes Comments, as Clouded	MSK/MAT
C16	10/12/24	Update Road Gully As Per Parkway Homes Comments, as Clouded	MSK/MAT
C15	11/11/24	Update Road Gully As Clouded	MSK/MAT
C14	12/01/24	Update Private FW Drainage For Apartment Block A1&B as Clouded	MSIA/AAA
C13	10/11/23	Approved for Construction	SMK/AAA
C12	10/11/23	Plan block C FW reviewed and updated, as clouded	KAMS/AA

Submittal:

A1 - Approved/Stage Complete

Client Logo:

Bellway

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Tel: 01753 708949

Client: **Bellway Homes Limited**

Job: **Barrington Road, Durrington**

Title: **Drainage Design Plan Sheet 6 of 6**

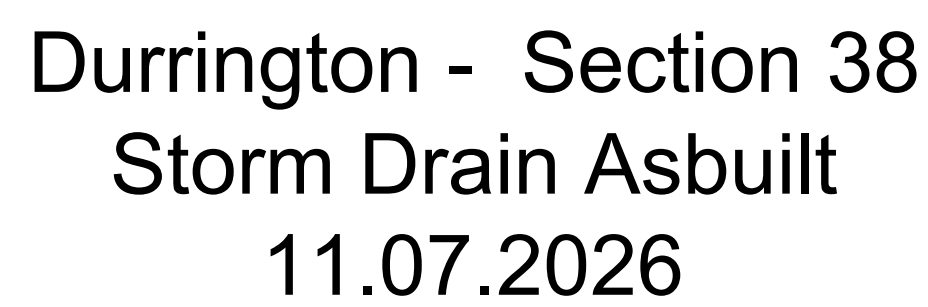
Classification: **FI 60 20**

Scale @ A1: **1:200**

Project: **K43058-ATCN-92-ZZ- DR-C-2106**

Revision: **C18**

Appendix B Site Team (HGH) As built(s)



Appendix C Ardent Drainage Strategy

Appendix D Drainage Management and Maintenance Plan

**Barrington Rd,
Durrington**
Drainage Management & Maintenance Plan

On behalf of **Bellway Homes LTD**



Document Control Sheet

Project Name: Barrington Rd, Durrington

Project Ref: K43058

Report Title: Drainage Management and Maintenance Plan

Doc Ref: K43058-ATCN-92-XX-RP-C-0001-P02

Date: 09/06/2023

	Name	Position	Signature	Date
Prepared by:	M. S. Al Menshawy	Assistant Engineer	M. S. A	09/06/2023
Reviewed by:	A Tahir	Director	A.T	12/06/2023
Approved by:	A Ahmed	Technical Director		2/06/2023
Initially Prepared For and on behalf of ATCN Consulting LTD				

Revision	Date	Description	Prepared	Reviewed	Approved
P01	09/06/2023	Preliminary Issue	MSA	AT	AA
P02	31/01/2024	Updated content	MSA	AT	AA
P03	26/07/2024	Estimated financial costs added	GPB	MSA	KM
P04	18/12/2024	Updated to suit current design (non infiltration system)	MSA	KM	AT

ATCN disclaims any responsibility to the Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence within the terms of the Contract with the Client and generally in accordance with the appropriate ACE Agreement and taking account of the manpower, resources, investigations and testing devoted to it by agreement with the Client. This report is confidential to the Client and ATCN accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

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1 Introduction

This SuDS Maintenance Plan has been prepared by ATCN Consulting LTD to support the discharge of planning conditions for the proposed development of 287 residential dwellings at Barrington Road, Goring-on-Sea, Worthing, West Sussex. The development comprises mostly housing but also includes 4 apartment blocks. The proposals are for the majority of the development's roads to be put forward for adoption by West Sussex County Council (WSCC) who are the Highway Authority. The main surface and foul water sewers are to be put forward for adoption by Independent Water Networks LTD (IWNL).

WSCC are also the Lead Local Flood Authorities (LLFA), who are a statutory consultee on drainage for planning applications concerning all major developments, defined as 10 or more dwellings or equivalent non-residential or mixed development (Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2015).

The purpose of this management and maintenance plan is to demonstrate how the drainage features, which have been implemented within the proposed development will be maintained in compliance with various requirements and best practice guidance, including but not limited to, the National Planning Policy Framework (NPPF), Sewer Sector Guidance and CIRIA SuDS Manual (C735).

This management and maintenance plan aims to: -

- Summarise the various drainage features used within the site.
- Establish who is responsible for the maintenance of the drainage components and financial management.
- Set out how to maintain the incorporated drainage components following construction.
- Ensure that all those involved in the maintenance and operation of the drainage system understand their functionality and maintenance requirements in terms of supporting long term performance.

A copy of the final/constructed drainage design plans should be kept with **Appendix A** of this report, to ensure that all parties responsible for drainage assets are aware of their location.

Maintenance inspections should be recorded in **Appendix B** of this report (or similar document) to ensure that the maintenance document stays up to date.

2 Drainage Management

2.1 General

- 2.1.1 The proposed development comprises both adoptable and private foul and surface sewers. The surface water design also includes several Sustainable Drainage Systems (SuDS).
- 2.1.2 See drainage design plans in **Appendix A**.

2.2 Foul Water Drainage

- 2.2.1 The main foul water sewers are to be submitted for adoption under a Section 104 Agreement with IWNL. They will then be the responsibility of IWNL to manage and maintain.
- 2.2.2 The on-plot foul water drainage consists of individual plot drainage within plot boundaries and shared drainage runs mostly along the front of a row of houses. Where the foul water drainage is not shared, it is the responsibility of the dwelling owner to manage and maintain. Where the foul water run is shared, it will be the responsibility of an appointed Management Company.
- 2.2.3 Drainage serving the apartment blocks will be the responsibility of an appointed Management Company.

2.3 Surface Water Drainage

- 2.3.1 The main surface water sewers are to be submitted for adoption under a Section 104 Agreement with IWNL. They will then be the responsibility of IWNL to manage and maintain. The majority of the site discharges via gravity, however a small catchment area in the northeast (Blocks A & A1) is collected into a private package pumping station and discharged via rising main into the next gravity surface water chamber.
- 2.3.2 The on-plot surface water drainage consists of individual plot drainage within plot boundaries and shared drainage runs mostly along the front of a row of houses. Where the surface water drainage is not shared, it is the responsibility of the dwelling owner to manage and maintain. Where the surface water run is shared, it will be the responsibility of an appointed Management Company.
- 2.3.3 Drainage serving the apartment blocks will be the responsibility of an appointed Management Company.
- 2.3.4 WSCC who are the highway authority will be adopting the majority of the roads throughout the site. This will include the road gullies and the associated lateral connections to the main surface water sewers. Several perforated highway drainage runs with permeable paved roads are also present. The management and maintenance responsibilities for the gullies, the lateral connection pipes and perforated highway drainage runs will be that of WSCC.
- 2.3.5 Several SuDS features have been incorporated within the development site. SuDS are intended to mimic natural drainage processes and treat run-off within and around the development. This is achieved by slowing and holding back the surface water run-off, allowing for pollutants to break down, whilst controlling peak run-off volume. In doing so, SuDS facilitate the achievement of four main categories of benefits: water quantity, water quality, amenity and biodiversity.
- 2.3.6 The detailed drainage design for the site provides a SuDS management train consisting of several components with specific functions:
 - Swale– landscape features intended to enhance ecology, to store and treat surface water run-off, allowing the controlled discharge of flows within the surface water drainage network, evaporation of surface water to the air.
 - Attenuation Basin – Landscape features intended to store and treat surface water run-off; allowing the controlled discharge of flows within the surface water drainage network; evaporation. They also assist in improving the ecology of the area.

- Tanked Permeable Paving – hard landscaping features intended to store and treat surface water run-off, slowing flows within the surface water drainage network.
 - Package Pumping Station – Due to the existing ground topography, a private package pumping station is required to discharge a catchment area in the northwest to next proposed gravity surface water sewer, at 20 l/s.
 - Attenuation Tank – A below ground storage structure, that allows the controlled discharge of flow within the surface water drainage network.
- 2.3.7 For the proposed strategy, all SuDS features will be managed and maintained by an appointed Management Company.
- 2.3.8 The remaining features of the proposed drainage strategy (e.g. pipes, manholes, inspection chambers, gullies) have been designed to enable maintenance over the lifetime of the development.

3 Drainage Maintenance

3.1 Adoptable Main Sewer Network

- 3.1.1 As the main surface and foul sewer network will be offered for adoption to IWNL, they will maintained in accordance with the adopting authorities maintenance regime. The main sewer network will be subjected to a full S104 technical audit following planning approval.

3.2 Adoptable Highway Drainage

- 3.2.1 WSCC will be the adopting highway authority and will take ownership of the adoptable roads, including the road gullies and lateral connections. The highway authority will implement their own maintenance regime, which will include street sweeping, litter picking and cleaning out of gully sumps using drainage vacuum cleaners.

3.3 Adoptable Swales

- 3.3.1 A set of swales are proposed along the shared cycle and footway path that follows from east to west along the southern site boundary.
- 3.3.2 Table 1 below provides the minimum operation and maintenance requirements required for the wetland conveyance swales, in accordance with the CIRIA SuDS Manual C753: -

Table 1: Operation and Maintenance Requirements for Swales

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris and large weeds.	Monthly, or as required.
	Cut grass to retain grass height within acceptable range.	Monthly during growing season, or as required.
	Manage other vegetation and remove nuisance plants	Monthly (at start of operation, then as required)

	Tidy all dead growth before start of next growing season.	Annually
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly thereafter.
Occasional Maintenance	Reseed areas of poor vegetation growth.	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required.
Monitoring	Repair erosion or other damage by reseeding or re-turfing.	As required.
	Relevel uneven surfaces and reinstate design levels	As required.

3.4 Private SuDS Features

- 3.4.1 The private SuDS features of the development consist of tanked permeable paving, attenuation basins, cellular crate storage and under drained swales.
- 3.4.2 The maintenance regime has been based on information provided in the CIRIA SuDS Manual C753 (2015).
- 3.4.3 An initial pre-handover inspection will be required to ensure that the SuDS features have been constructed in accordance with the design.
- 3.4.4 All inspections and maintenance shall be carried out by staff with an appropriate level of experience in SuDS maintenance. All inspections shall be recorded, and records kept for future reference.
- 3.4.5 During the first year of operation, inspections shall be carried out after significant storm events, to ensure correct functionality of all components.
- 3.4.6 The Management Company will be required to carry out the maintenance regime as provided below for the proposed SuDS features, and maintain a yearly log of maintenance, inspections and works carried out.

3.5 Tanked Permeable Paving

- 3.5.1 Before permeable paving is handed over to the party responsible for maintenance, it should be inspected for clogging, litter, weeds and water ponding, and any failures should be rectified by the developer. After handover, the pavement should be inspected regularly, particularly after heavy rainfall.
- 3.5.2 Weeds are to be removed by hand and not with a chemical weed killer.
- 3.5.3 Materials removed from the voids or layers below the surface may contain heavy metals and hydrocarbons and may need to be disposed of as controlled waste. Waste disposal must be carried out by a competent contractor, who must hold the relevant permits to transport and dispose of the waste.

- 3.5.4 The operation and maintenance requirements for the permeable paving is provided in Table 2 below, in accordance with the CIRIA SuDS Manual C753.

Table 2: Operation and Maintenance Requirements for Tanked 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 the pervious surface from adjacent impermeable areas, as this area is likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weeds or management using glyphosate 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 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 substructure by remedial sweeping.	Every 10 to 15 years or as required
Monitoring	Initial inspection	Monthly for 3 months after installation.
	Inspect for evidence of poor operation and/ or weed growth – if required, take remedial action.	Three-monthly, 48 hours after large storms in the first 6 months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually

3.6 Attenuation Basins

- 3.6.1 The operation and maintenance requirements for the Green Roof is provided in Table 3, in accordance with the CIRIA SuDS Manual C753.

Table 3: Operation and Maintenance Requirements for Attenuation 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), or as 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
	Check any mechanical devices, such as flow controls	Annually
	Tidy all dead growth before start of next growing season.	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool.	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth.	As required
	Prune and trim any trees and remove cutting	Every 2 years, or as required.
	Remove sediment from inlets, outlets forebay and main basin when required.	Every 5 years, or as required.
Monitoring	Repair erosion or other damage by reseeding or re-turfing.	As required.
	Repair/ rehabilitation of inlets, outlets and overflows.	As required
	Relevel uneven surfaces and reinstate design levels	As required.

3.7 Cellular Crate Storage Tanks

- 3.7.1 Cellular storage systems may require specific maintenance as advised by the manufacturer. Maintenance contracts are commonly available from the manufacturer.
- 3.7.2 The operation and maintenance requirements for the attenuation storage tanks is provided in **Error! Reference source not found.**, in accordance with the CIRIA SuDS Manual C753.

Table 4: Operation and Maintenance Requirements for Attenuation 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, then annually
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and/ or internal forebays.	Annually, or as required
Remedial Actions	Repair/ rehabilitate inlets, outlet, overflows and vents.	As required
Monitoring	Inspect/ check all inlets, outlets, vents and overflows to ensure 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.

3.8 Under Drained Swales

- 3.8.1 A set of under drained swales are proposed along the shared cycle and footway path adjacent to Flat Blocks A and A1 and have a carrier pipe below.
- 3.8.2 The swales are to take runoff from the adjacent path, as well as conveying apartment block roof drainage through the carrier pipe below.
- 3.8.3 Table 5 below provides the minimum operation and maintenance requirements required for the wetland conveyance swales, in accordance with the CIRIA SuDS Manual C753: -

Table 5: Operation and Maintenance Requirements for Swales

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter, debris and large weeds.	Monthly, or as required.
	Cut grass to retain grass height within acceptable range.	Monthly during growing season, or as required.
	Manage other vegetation and remove nuisance plants	Monthly (at start or operation, then as required)
	Inspect inlets, outlets, for debris and silt accumulation and clear if required.	Quarterly
	Tidy all dead growth before start of next growing season.	Annually
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly thereafter.

Occasional Maintenance	Reseed areas of poor vegetation growth.	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required.
Monitoring	Repair erosion or other damage by reseeding or re-turfing.	As required.
	Relevel uneven surfaces and reinstate design levels	As required.

3.9 Flow Control Chambers

- 3.9.1 Surface water runoff from the development ultimately discharges to a vortex flow control chambers, before being discharged at a restricted rate to existing Southern Water SW manhole.
- 3.9.2 It is important that all upstream pipes are jetted and catch pits cleared prior to the flow control chamber becoming operational.
- 3.9.3 The operation and maintenance requirements for the flow control chambers is provided in Table 6, in accordance with the CIRIA SuDS Manual C753.

Table 6: Operation and Maintenance Requirements for Flow Control Chambers.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect chamber for debris and sediment build-up.	Monthly for the first 6 months, then Annually and after severe storms thereafter.
	Checking of bypass mechanism	Monthly for the first 6 months, then Annually and after severe storms thereafter.
Remedial Actions	Replacement/repair of vortex flow control	As required

3.10 Package Pumping Station

- 3.10.1 Surface water runoff from the development ultimately discharges to the package pumping station, before being discharged at a specified rate to the outfall via rising main.
- 3.10.2 It is important that all upstream pipes are jetted and catch pits cleared prior to the pumping station coming online.
- 3.10.3 The operation and maintenance requirements for the package pumping station is provided in Table 7, in accordance with the CIRIA SuDS Manual C753.

Table 7: Operation and Maintenance Requirements for pumping station.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect pumping chamber for debris and sediment build-up.	Annually and after severe storms.
	Cleaning of pumping chamber.	Annually
Remedial Actions	Replacement/repair of pumps	As required

3.11 Private Pipe Network, Catch Pits, Gullies, channel drains, and Manholes

3.11.1 Whilst the drainage system has been designed to operate with as little maintenance as possible, there are key operations that must regularly be undertaken to ensure that the pipe networks remain in optimal condition. The majority of these actions are routine and should be carried out upon all drainage systems.

3.11.2 The recommended maintenance requirements are outlined within Table 8 below.

Table 8: Private Pipe Network Maintenance Requirements

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Check the drainage for blockages and damage. Clean and repair if required.	Monthly for the first 3 months of installation, then every 6 months thereafter.
Occasional Maintenance	Desilting gullies	As required
	Grating on gullies to be kept clear of debris	As required or after large storm events.
Remedial Actions	Jetting of pipework to clear blockages	As required
Monitoring	Inspect for evidence of poor operation and/or damage at manholes, gullies, etc.	Monthly for the first 3 months of installation, then every annually thereafter.
	Inspect inlets and outlets for blockages, and clear as required.	Annually

3.11.3 The maintenance of the SuDS components will include an inspection of any upstream catch pits and the removal of silt/ debris.

3.11.4 The on-plot surface and foul water pipe network will stay private and maintenance responsibilities will be transferred to the Management Company appointed before final commission of the drainage network.

3.11.5 Any drainage components beneath public open space are easily accessible for the purposes of maintenance.

3.11.6 Manhole lids should be kept as lightweight as practicable for ease of maintenance and inspection.

- 3.11.7 Frequent litter picking will prevent rubbish limiting the effective operation of catch pits.
- 3.11.8 The sump of the catch pits should be cleaned using a conventional sump vacuum cleaner, at least annually in most cases.
- 3.11.9 Frequent street sweeping in the catchment areas of catch pits will reduce the frequency at which the system requires cleaning.
- 3.11.10 Headwalls are located at the inlet and outlet of detention basins and the wetlands conveyance swales and at the site outfalls to the Northlands Brook.
- 3.11.11 Headwalls will be checked monthly for blockages and silt accumulation. They will be cleared if required and an appropriate silt removal frequency will be established
- 3.11.12 Sediment will be cleared from headwalls annually, or as required. Any repair or rehabilitation works will be carried out as required.

3.12 Contact

- 3.12.1 In the event of concern over any matter concerning the private drainage network and private SuDS features, please contact the Management Company.

3.13 Record of maintenance and photographic evidence

- 3.13.1 A record of all inspections undertaken together with photographic evidence should be attached to **Appendix B** of this document.

4 Financial Management

4.1.1 The table provides a summary of the drainage features, the allocated management and maintenance responsibility, and estimated financial costs associated with each feature.

Drainage Feature	Management & Maintenance Responsibility	Estimated Financial Costs for maintaining/replacing at end of design life.
SW & FW Adoptable Mains Drainage Sewers	Independent Water Networks Limited	£ 3,000,000
SW & FW Private Plot Drainage	Owner of individual Plot	£ 2,000,000
SW & FW Private Shared Drainage	Appointed Management Company	£ 2,000,000
Highways Drainage	West Sussex County Council	Inc. above
Attenuation Basin	Appointed Management Company	£ 250,000
Swale	Appointed Management Company	£ 75,000
Filter Drain	West Sussex County Council	£ 75,000
Permeable Paving	Appointed Management Company	£ 3,600,000
SW Pumping Station	Appointed Management Company	£ 50,000
SW Rising Main	Appointed Management Company	£ 50,000
Cellular Crate Storage	Appointed Management Company	£ 300,000
Hydrobrake Flow Control	Independent Water Networks Limited	£ 5,000

5 Conclusion

- 5.1.1 The site wide main surface and foul water sewers are to be adopted by IWNL.
- 5.1.2 The majority of the development roads are to be adopted by the highway authority, which will include the road gullies and connections.
- 5.1.3 The SuDS features will be cleaned and inspected by the principal contractor before handover to the client and residents. A report shall be provided following this inspection.
- 5.1.4 An appointed Management Company shall maintain the private on-plot surface and foul water networks and SuDS features in accordance with the operation and maintenance requirements provided in Section 3 of this maintenance plan.
- 5.1.5 A record of maintenance inspections including photographic evidence is to be kept with this document, under **Appendix B**.

Appendix E Site Photos of Attenuation Basin













