

SURFACE WATER DRAINAGE STRATEGY (SWDS)

**MORRISONS WARMINSTER,
WEYMOUTH STREET
WILTSHIRE
BA12 9NT**

MARKS HEELEY LTD

July 2026

The Stables, Cannons Mill Lane, Bishop's Stortford, Hertfordshire, CM23 2BN
Tel: 01279 465900 Fax: 01279 465999

MARKS HEELEY

Surface Water Drainage Strategy (SWDS)

Morrisons Warminster, Weymouth Street, Wiltshire
BA12 9NT

July 2026

Marks Heeley Ltd

The Stables

Cannons Mill Lane

Bishop's Stortford

Hertfordshire

CM23 2BN

Written By	Arran Whyard	29 th July 2026	
Checked By	Mark Newman	31 st July 2026	
Authorised By	Adam Flack	31 st July 2026	

This report has been prepared for the exclusive use of the commissioning party and may not be reproduced without prior written permission from Marks Heeley Limited.

All work has been carried out within the terms of the brief using all reasonable skill, care and diligence.

No liability is accepted by Marks Heeley for the accuracy of data or opinions provided by others in the preparation of this report, or for any use of this report other than for the purpose for which it was produced.

CONTENTS

CONTENTS.....	1
1.0 SUMMARY.....	2
2.0 INTRODUCTION.....	3
3.0 GEOLOGY AND INFILTRATION POTENTIAL.....	8
4.0 SUSTAINABLE URBAN DRAINAGE SYSTEM (SUDS) ASSESSMENT	11
5.0 SURFACE WATER DRAINAGE STRATEGY	19
6.0 CONCLUSION.....	25

APPENDIX A

EXISTING SITE PLAN	i
--------------------------	---

APPENDIX B

PROPOSED SITE PLAN	ii
--------------------------	----

APPENDIX C

DRAINAGE STRATEGY.....	iii
------------------------	-----

APPENDIX D

SPEL ESR BYPASS CERTIFICATES.....	iv
-----------------------------------	----

APPENDIX E

SPEL ESR BYPASS DETAILS	v
-------------------------------	---

APPENDIX F

KLARGESTER SEPARATOR/SILT TRAP DETAILS	vi
--	----

APPENDIX G

MICRO DRAINAGE ATTENUATION SIZING	vii
---	-----

APPENDIX H

MAINTENANCE SHEETS.....	viii
-------------------------	------

APPENDIX I

DRAINAGE RECORD LOG SHEETS	ix
----------------------------------	----

1.0 SUMMARY

- 1.1 Marks Heeley Ltd has been appointed by the client to undertake a Surface Water Drainage Strategy for the proposed development at Morrisons Warminster, Weymouth Street, Wiltshire, BA12 9NT.
- 1.2 There is no proposed increase in hardstanding to the application site.
- 1.3 It is proposed that discharge to surface water sewers is the preferred method of the SuDS Drainage Hierarchy.
- 1.4 The existing drainage channel running through the application site is to remain.
- 1.5 A drainage channel is proposed along the front of the 3no jet wash bays, directing discharge through a SPEL ESR Bypass engineered solution, before being attenuated within wrapped crates.
- 1.6 Attenuation in the form of wrapped attenuation crates is proposed, with a volume exceeding 13.3m³.
- 1.7 To mitigate the risk associated with the unlikely event of an EV fire, it is proposed that an isolation valve is installed to intercept and contain potentially contaminated firefighting water, preventing discharge to the receiving watercourse and reducing the risk of contamination.
- 1.8 Outflow is to discharge via existing on-site SW drainage, with a hydrobrake acting as the flow device at a controlled outfall of 3 L/s.
- 1.9 To mitigate the risk associated with the unlikely event of an EV fire, it is proposed that an isolation valve is installed to intercept and contain potentially contaminated firefighting water, preventing discharge to the receiving watercourse and reducing the risk of contamination.
- 1.10 Each jet wash bay will be fitted with a Klargester CST1H silt trap to capture and retain sediments (such as sand, grit, and dirt). The flow will then pass through a proposed Klargester wash separator, which will progressively remove contaminants (including oils and hydrocarbons) prior to discharge the foul sewers.
- 1.11 Foul water from the 3no proposed jet wash bays is to drain via a proposed new connection to the existing foul water drainage network.

2.0 INTRODUCTION

- 2.1 Marks Heeley Ltd has been appointed by the client to undertake a Surface Water Drainage Strategy for the proposed development at Morrisons Warminster, Weymouth Street, Wiltshire, BA12 9NT.
- 2.2 The purpose of this report is to review and meet the requirements as set out by the local planning authority in terms of surface water drainage and to include a surface water drainage strategy that will consider the use of SuDS where possible.

Planning Policy

- 2.3 For this development, Wiltshire Council is the Local Planning Authority, with established requirements in relation to Sustainable Drainage Systems (SuDS) and surface water drainage strategies, which are to be considered.
- 2.4 Wiltshire Council's planning and flood risk guidance sets out requirements for the management of surface water and flood risk associated with development, with particular consideration given to sustainable drainage, climate change and the prevention of increased flood risk both on and around developments.
- 2.5 In particular, the Wiltshire Council Strategic Flood Risk Assessment (SRFA), the council's drainage and betterment guidance, together with national planning policy (the National Planning Policy Framework (NPPF), relevant national technical standards and the CIRIA SuDS Manual) establish the requirements for the management of surface water runoff and the implementation of SuDS.
- 2.6 The policy and supporting guidance state that:
- *Development should incorporate Sustainable Drainage Systems (SuDS) where appropriate to replicate natural drainage processes, reduce surface water runoff and minimise the impact of development on flood risk.*
 - *Surface water runoff from new development should be managed to ensure that post-development runoff rates and volumes do not increase flood risk on-site or elsewhere.*
 - *Surface water should be managed as close to its source as practicable through the use of the SuDS management train, incorporating measures such as infiltration, attenuation and treatment where feasible.*
- 2.7 The Lead Local Flood Authority (LLFA) for this development is Wiltshire Council.
- 2.8 In accordance with Wiltshire Council and their local SuDS design, all developments are encouraged to follow their SuDS design standards to ensure that SuDS are utilised to reduce flood risk and improve water quality consistent with existing national guidance (CIRIA) and local planning policy.

Existing Development and Location

- 2.9 Refer to Appendix 'A' for Existing Site Plan.
- 2.10 The site relates to a section of the Morrisons Warminster car park, located south of the store and adjacent to the Morrisons petrol filling station.
- 2.11 The application site consists of existing hardstanding ground and a small section of landscaping on the east boundary of the application site.
- 2.12 *Refer to Fig. 1 below for an aerial view of the site.*

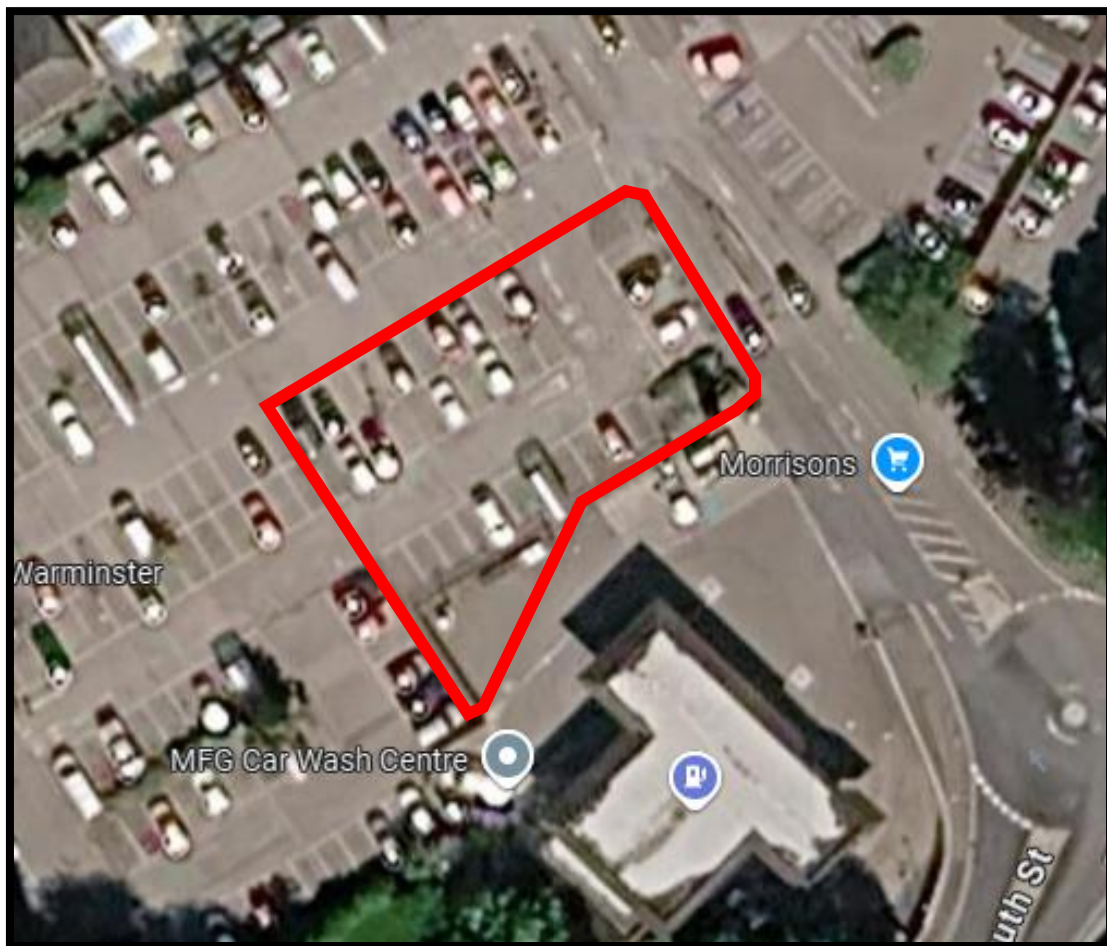


Figure 1: Aerial View of The Site (Source: Google Maps)

- 2.13 The area of the application site equates to 902m² (0.0902 ha).
- 2.14 The existing impermeable area of the application site equates to 879m² (0.0879 ha).

Proposed Development

- 2.15 It is understood that the proposed development is for the creation of 3no jet wash bays and 6no EV charging bays with a GRP enclosure, meter cabinet, valet units and associated works.
- 2.16 There is no proposed increase in hardstanding.
- 2.17 Refer to Appendix 'B' for the Proposed Site Plan.

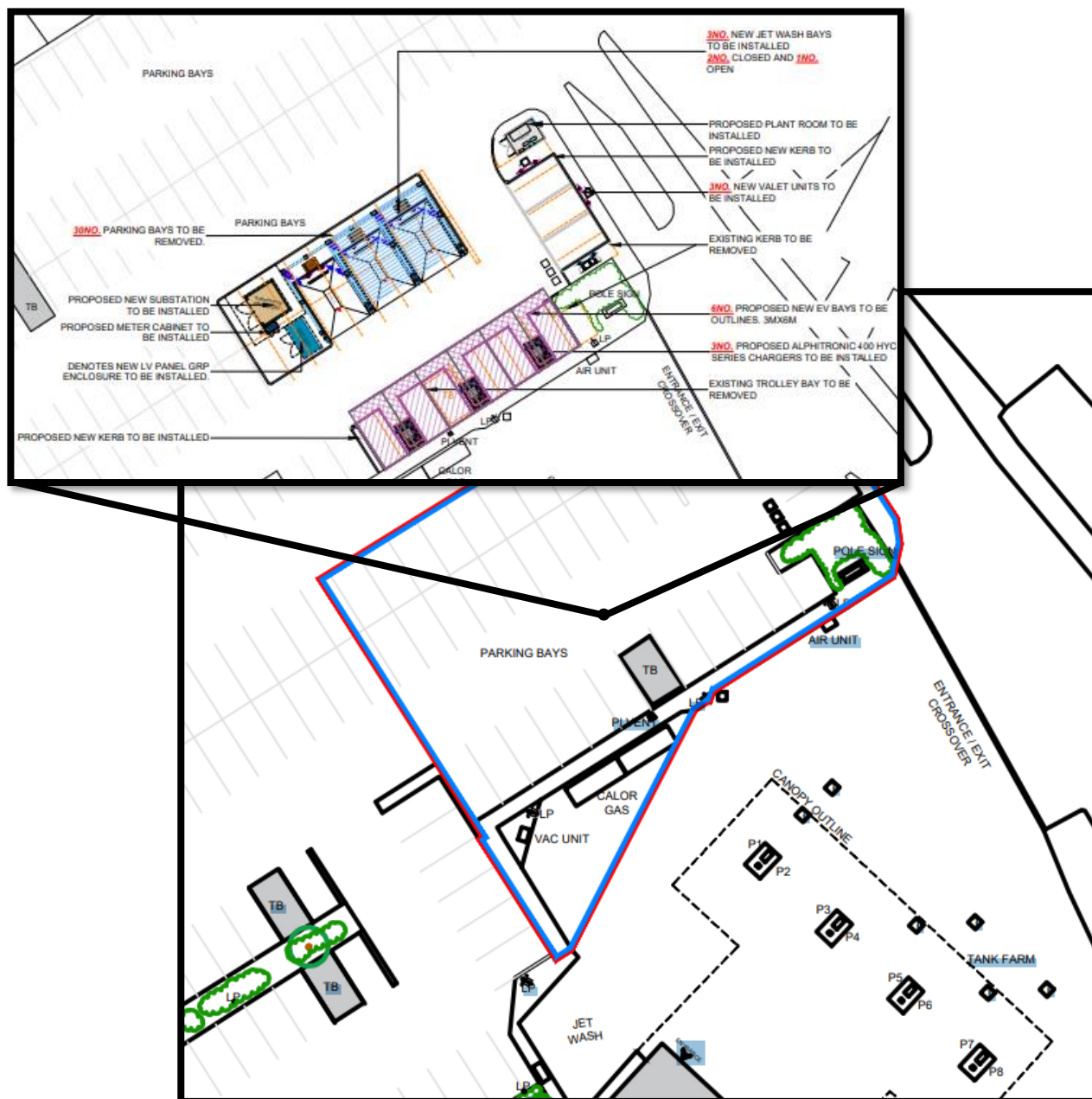


Figure 2: Block Plan and Proposed Site Layout

Nearby Watercourses

- 2.18 There is an open watercourse located within the surrounding area of the site, situated to the west of the application site.
- 2.19 After reviewing relevant maps of the area around the site, the closest known open watercourse in the surrounding area was found to be 'The Were (Swan River)', a tributary of the River Wylfe located approximately 68m southeast of the site (as seen in Fig. 4 below).

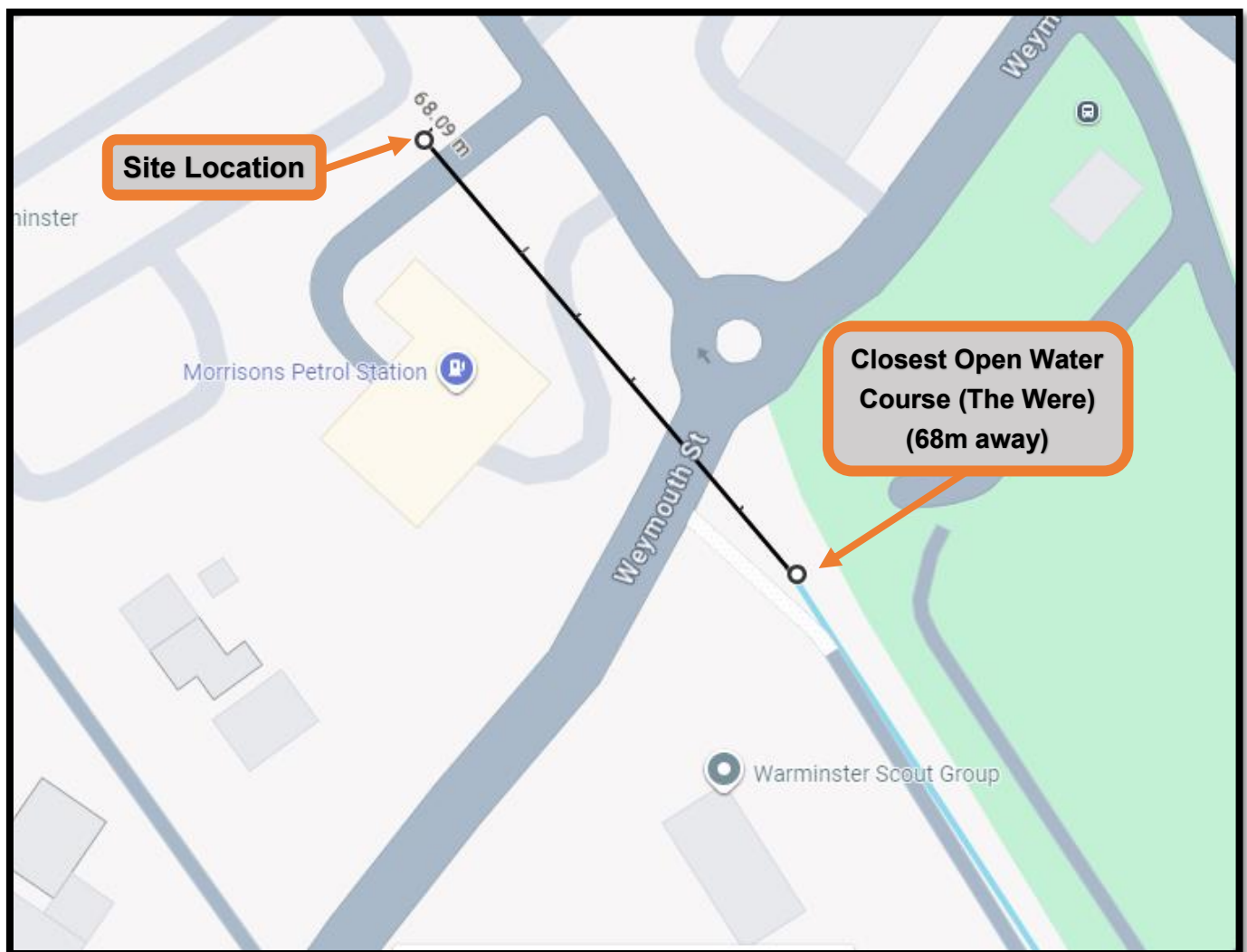


Figure 4: Nearest Watercourse (Source: Google Maps)

3.0 GEOLOGY AND INFILTRATION POTENTIAL

- 3.1 With reference to the BGS (British Geological Survey) online geology mapping, it is indicated that the geology underlying the site comprises superficial Alluvium-Clay, silt, sand and gravel deposits over solid geology of Shaftesbury Sandstone Member-Sandstone.
- 3.2 Refer to Fig. 6 for the 1:50,000 scale bedrock geology of the site location below.

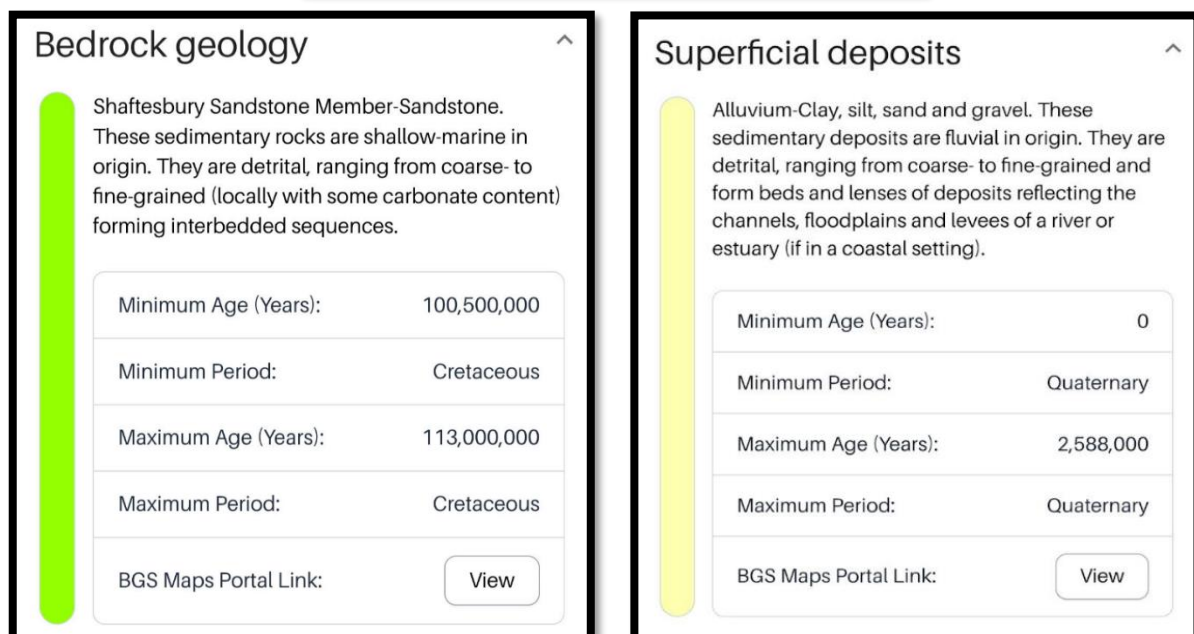
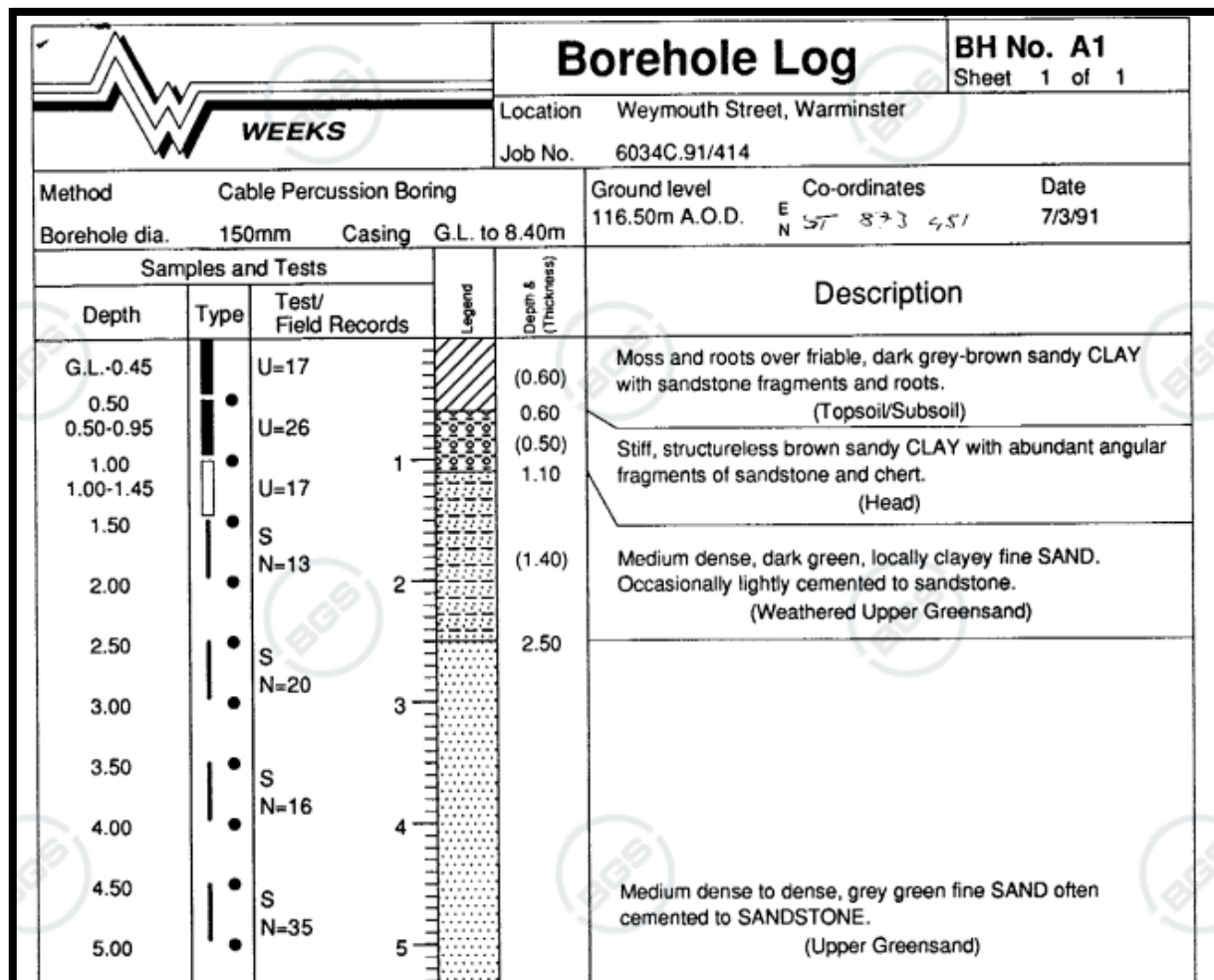


Figure 6: Geology of the site (Source: BGS Geology Viewer (Bedrock Geology 1:50000 scale))

Borehole

- 3.3 No recent site-specific ground investigation is available for the application site.
- 3.4 However, a BGS historical borehole record from 1991, located approx. 35m from the site (Ref: ST84SE52) has been reviewed to provide further indication of the underlying ground conditions.
- 3.5 This historical borehole suggests that underlying ground conditions consisted predominantly of sandy clayey conditions.
- 3.6 See Fig. 6 below for historic borehole record.



- 3.7 The underlying geology indicated by the historical borehole record, comprising of sandy clay conditions, may limit the infiltration potential.

Infiltration Potential

- 3.8 The site's underlying ground conditions suggested by the underlying geology of the site, suggested by historical borehole records, indicate a 'poor' level of infiltration media, as seen within an extract from Table 25.1, 'Typical Infiltration Coefficients based on Soil Texture' of the CIRIA SuDS Manual C753, below:

Soil type/texture	ISO 14688-1 description (after Blake, 2010)	Typical infiltration coefficients (m/s)
Good infiltration media		
• gravel	Sandy GRAVEL	$3 \times 10^{-4} - 3 \times 10^{-3}$
• sand	Slightly silty slightly clayey SAND	$1 \times 10^{-5} - 5 \times 10^{-5}$
• loamy sand	Silty slightly clayey SAND	$1 \times 10^{-4} - 3 \times 10^{-5}$
• sandy loam	Silty clayey SAND	$1 \times 10^{-7} - 1 \times 10^{-5}$
Poor infiltration media		
• loam	Very silty clayey SAND	$1 \times 10^{-7} - 5 \times 10^{-6}$
• silt loam	Very sandy clayey SILT	$1 \times 10^{-7} - 1 \times 10^{-5}$
• chalk (structureless)	N/A	$3 \times 10^{-8} - 3 \times 10^{-6}$
• sandy clay loam	Very clayey silty SAND	$3 \times 10^{-10} - 3 \times 10^{-7}$
Very poor infiltration media		
• silty clay loam	–	$1 \times 10^{-8} - 1 \times 10^{-5}$
• clay	–	$< 3 \times 10^{-8}$
• till	Can be any texture of soil described above	$3 \times 10^{-9} - 3 \times 10^{-5}$
Other		
• rock* (note mass infiltration capacity will depend on the type of rock and the extent and nature of discontinuities and any infill)	N/A	$3 \times 10^{-9} - 3 \times 10^{-5}$

- 3.9 The low infiltration potential of the underlying clayey conditions would limit the effective use of infiltration devices, such as soakaways.
- 3.10 On this basis, infiltration is not considered to be a suitable or effective primary SuDS mechanism for the management of surface water runoff from the proposed development site.

4.0 SUSTAINABLE URBAN DRAINAGE SYSTEM (SUDS) ASSESSMENT

- 4.1 Consideration of SuDS is a planning requirement for new developments. SuDS are designed to replicate the natural course of drainage as closely as possible with a view to reducing the impact of flooding, removing pollutants at source combining water management with green space where possible.
- 4.2 In accordance with the SuDS management train approach, the use of various SuDS measures to reduce and control surface water flows have been considered in detail for the development.
- 4.3 *The management of surface water has been considered in respect to the SuDS hierarchy (within Table 1 below) (as detailed in Building Regulations Part H and within the CIRIA SuDS Manual C753, Section 3.2.3):*

Table 1: SuDS Hierarchy

SuDS Drainage Hierarchy				
			Suitability	Comment
	1.	Infiltration	x	Not feasible due to the site's underlying clayey ground conditions.
	2.	Discharge to Surface Water	x	Nearest open watercourse is approx. 68m southeast of the site.
	3.	Discharge to Surface Water Sewer, Highway Drain or another Drainage System	✓	SW discharge will drain to the existing channel and proposed drainage channel, into the SPEL Treatment System engineered solution and wrapped attenuation crates before discharge to existing SW drain.
	4.	Discharge to Combined Sewer	-	
	5.	Discharge to a Foul Sewer (should not be considered as a possible option)	-	

SuDS Hierarchy Considerations

Infiltration:

- 4.4 The use of infiltration has been considered as a potential solution; however, it is deemed an unsuitable SuDS method due to the site's low infiltration potential.

Discharge to Surface Water:

Discharge to surface water body has been deemed implausible due to the location of the nearest watercourse, located approx. 68m southeast of the site.

Discharge to Surface Water Sewer:

- 4.5 It is suggested that discharge to surface water sewers is the most suitable of the SuDS methods in accordance with the CIRIA SuDS Manual (C753) drainage hierarchy.
- 4.6 The existing drainage channel within the application site and a proposed drainage channel along the front of the 3no jet wash bays to direct discharge through a SPEL ESR Bypass engineered solution, being temporarily stored within wrapped attenuation crates, before discharge.
- 4.7 Refer to Appendix 'C' for the proposed drainage strategy.

Discharge to Combined Sewer:

- 4.8 Not considered necessary for the development.

Discharge to Foul Sewer:

- 4.9 Not considered necessary for the development.

- 4.10 The suitability of SuDS components has been assessed (based on Table 2 below) and deemed appropriate to be used in the following SuDS management train.

Table 2: Suitability of SuDS Components

Suitability of SuDS Components		
Component	Description	Suitability
Infiltrating SuDS	Infiltration can contribute to reducing runoff rates and volumes while supporting baseflow and groundwater recharge processes. The suitability and infiltration rate depend on the permeability of the surrounding soils.	X
Permeable Pavement	Pervious surfaces can be used in combination with aggregate sub-base and/or geocellular/modular storage to attenuate and/or infiltrate runoff from surrounding surfaces and roofs. Liners can be used where ground conditions are not suitable for infiltration.	X
Green Roofs	Green Roofs provide areas of visual benefit, ecological value, enhanced building performance and the reduction of surface water runoff. If afforded may provide many long-term benefits and reduce the on-site storage volumes. However, they are generally considered more costly to install and maintain than conventional roofs.	X
Rainwater Harvesting	Rainwater Harvesting is the collection of rainwater runoff for use. It can be collected from roofs or other impermeable area, stored, treated (where required) and then used as a supply of water for domestic, commercial and industrial properties.	X
Swales	Swales are designed to convey, treat and attenuate surface water runoff and provide aesthetic and biodiversity benefits. They can replace conventional pipework as a means of conveying runoff; however, space constraints of some sites can make it difficult incorporating them into the design.	X
Rills and Channels	Rills and Channels keep runoff on the surface and convey runoff along the surface to downstream SuDS components. They can be incorporated into the design to provide a visually appealing method of conveyance; they also provide effectiveness in pre-treatment removal of silts.	X
Bioretention Systems	Bioretention systems can reduce runoff rates and volumes and treat pollution through the use of engineer soils and vegetation. They are particularly effective in delivering interception but can also be an attractive landscape feature whilst providing habitat and biodiversity.	X
Retention Ponds and Wetlands	Ponds and Wetlands are features with a permanent pool of water that provide both attenuation and treatment of surface water runoff. They enhance treatment processes and have great amenity and biodiversity benefits. Often a flow control system at the outfall controls the rates of discharge for a range of water levels during storm events.	X
Detention Basins	Detention Basins are landscaped depressions that are usually dry except during and immediately following storm events and can be used as a recreational or other amenity facility. They generally appropriate to manage high volumes of surface water from larger sites such as a neighbourhoods.	X
Geocellular Systems	Attenuation storage tanks are used to create a below-ground void space for the temporary storage of surface water before infiltration, controlled release or use. The inherent flexibility in size and shape means they can be tailored to suit the specific characteristics and requirements of any site.	✓
Proprietary Treatment Systems	Proprietary treatment systems are manufactured products that remove specific pollutants from surface water runoff. They are especially useful where site constraints preclude the use of other methods and can be useful in reducing the maintenance requirements of downstream SuDS.	✓
Filter Drains and Filter Strips	Filter drains are shallow trenches filled with stone, gravel that create temporary subsurface storage for the attenuation, conveyance and filtration of surface water runoff. Filter strips are uniformly graded and gently sloping strips of grass or dense vegetation, designed to treat runoff from adjacent impermeable areas by promoting sedimentation, filtration and infiltration.	X

Water Quality

- 4.11 Adequate treatment must be delivered to the water runoff to remove pollutants through SuDS devices, which are able to provide pollution mitigation. Pollution Hazards and the SuDS Mitigation have been indexed in the CIRIA 753 'The SUDS Manual'.
- 4.12 The Pollution Hazard Indices are identified in Tables 3 and 4 – Summary of Pollution Hazard Indices for different Land Use below (reference: Table 26.2. CIRIA SuDS Manual 2015).

Table 3: Summary of Pollution Hazard Indices for Different Land Use

POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS				
Landuse	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Commercial/Industrial Roofs	Low	0.3	0.2	0.05
Non-residential car parks	Medium	0.7	0.6	0.7

- 4.13 The contamination risk associated with this site is considered to be 'Medium'.
- 4.14 To manage the contamination risk, an engineered solution in the form of a SPEL ESR Bypass Treatment System is to be installed to manage and treat surface water before passing into wrapped attenuation crates to be discharged to watercourse (River Medway) via a Hydrobrake flow control device at a rate of 3L/s.

SPEL ESR Bypass Treatment System (Model: 210C1/ESR)

- 4.15 A SPEL ESR Bypass Treatment System (Model: 210C1/ESR) engineered solution is to be used to mitigate the site's medium level contamination risk (as seen in Table 4 below).

Table 4: Site Pollution Hazard Indices

POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS				
Landuse	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Non-residential car parks	Medium	0.7	0.6	0.7

- 4.16 The mitigation indices of the proposed SPEL ESR Bypass Treatment System (Model: 210C1/ESR) are summarised in Fig. 8 below.

SPEL ESR Bypass	
Certified Mitigation Index	
TSS	0.8
Metals	0.6
Hydrocarbons	0.9*
*HR Wallingford test results to BS EN 858	

Figure 8: Mitigation Indices

- 4.17 The mitigation provided by the SPEL Treatment System is sufficient to mitigate the contamination risk at the site of the proposed development before discharge to surface water sewers as proven below.

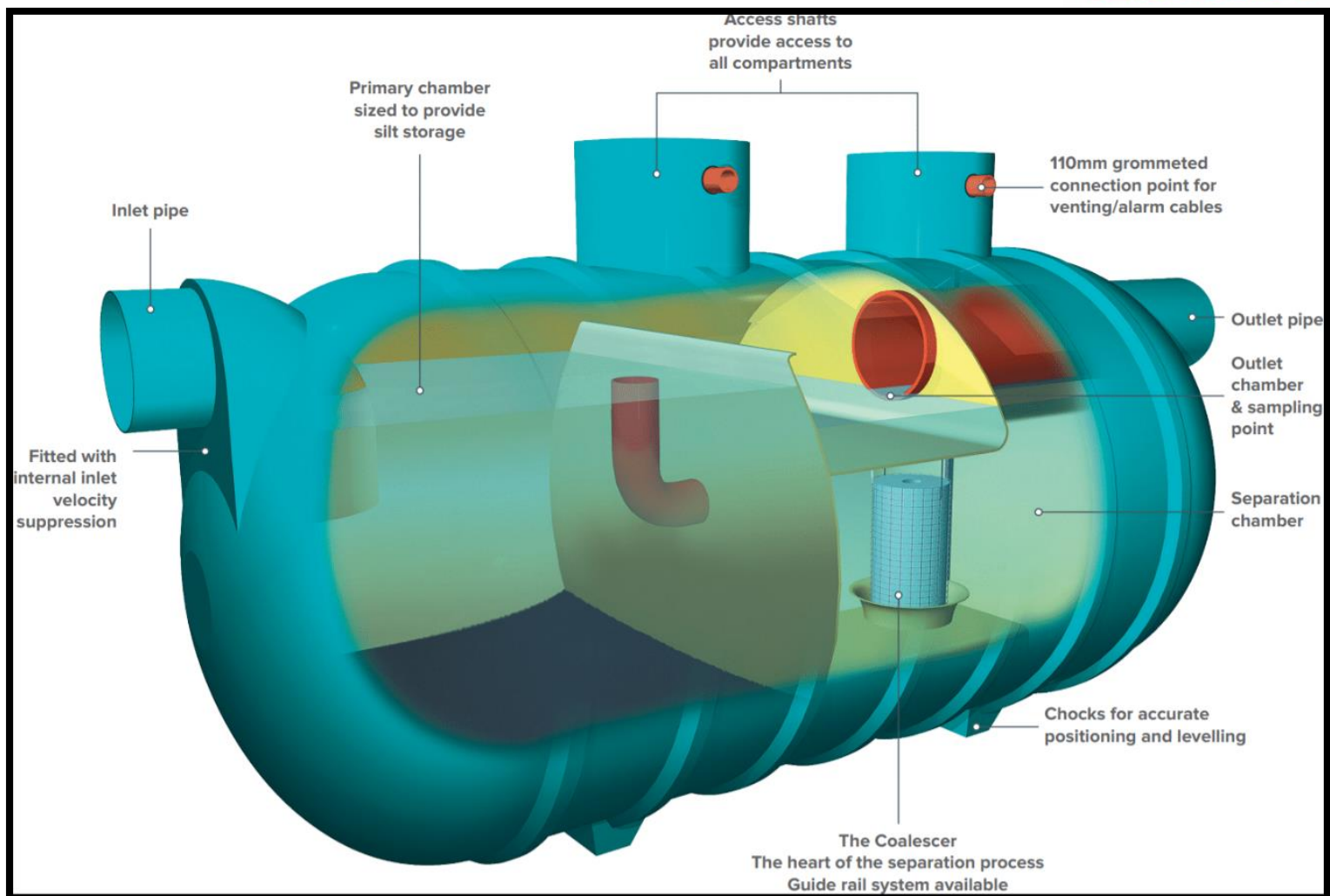


Figure 9: ESR Treatment System Diagram

4.18 All tank shells carry the SPEL 25 Year Warranty and life expectancy in excess of 50 years.

4.19 SPEL specifies the applications in the product details of their ESR Bypass:

The ESR Bypass will treat up to the 1 in 1-year storm event for surface water runoff to a Pollution Hazard Index of 'Medium'. This covers surfaces such as:

- Roofs Private and public car parks
- Residential roads and drives
- Low and medium use roads
- Commercial yards and delivery areas

4.20 See Appendix 'D' for SPEL ESR Bypass certification.

4.21 See Appendix 'E' for SPEL ESR Bypass details drawing.

Foul Water (Jet Wash Bays)

- 4.22 The proposed drainage arrangement for the jet wash bays has been designed in accordance with the principles of the drainage hierarchy and pollution prevention best practice, ensuring that potentially contaminated runoff is appropriately managed prior to discharge.
- 4.23 The proposed 3no jet wash bays will need to drain to foul water sewers.
- 4.24 This is due to the presence of detergents and cleaning chemicals within the jet wash runoff, which could pose a risk of contaminating watercourses they may be discharged to if drained via surface water drains instead of foul.
- 4.25 *Below is an extract from Table 4.1 within the CIRIA SuDS Manual (C753):*

TABLE 4.1 Sources of pollution from impermeable surfaces (after Wilson et al, 2004)		
Source	Typical pollutants	Source details
Cleaning activities	Sediment, phosphorous, nitrogen, detergents, hydrocarbons	Washing vehicles, windows, bins or pressure washing hardstandings leads to silt, organic matter, detergents and hydrocarbons (mobilised by the detergents) entering the surface water drainage.

- 4.26 It is proposed that each jet wash bay will be fitted with a Klargester CST1H silt trap to capture and retain sediments (such as sand, grit, and dirt).
- 4.27 All runoff from the jet wash bays will then pass through the proposed Klargester wash separator which will progressively remove any potential contaminants (including oils and hydrocarbons) prior to discharge to foul sewers.
- 4.28 The wash separator will be maintained in accordance with the manufacturer's recommendations to ensure continued operational efficiency and pollutant removal performance throughout the lifetime of the development.
- 4.29 *Refer to Appendix 'F' for Klargester operation guidance.*

Risks and Management of Contamination in the Event of an EV Fire

- 4.30 In the unlikely event of an EV fire, appropriate measures should be in place to manage the associated risks and mitigate the potential environmental impacts arising from contaminated firewater runoff.
- 4.31 Lithium-ion batteries used in EVs can undergo thermal runaway when exposed to extreme heat or damage, causing them to melt. This may result in the release of hazardous substances containing metals and a mixture of toxic chemicals from the battery components.
- 4.32 Due to the watertight nature of lithium-ion batteries used in EVs, relatively large amounts of water may be required to eventually cool and extinguish.
- 4.33 Consequently, firefighting water has the potential to become contaminated and, if uncontrolled, may enter the surface water drainage network and pose a risk to receiving watercourses and groundwater.
- 4.34 To intercept, contain and manage potentially contaminated runoff generated during an unlikely fire event, the following measure is proposed:
- Installation of an isolation valve:
 - In the event of an EV fire, the isolation valve can be closed to isolate the drainage system, preventing potentially contaminated firefighting water from discharging to the receiving surface water network
 - This enables the runoff to be temporarily retained within the on-site drainage system and allows for subsequent removal to be disposed in accordance with Environment Agency requirements

5.0 SURFACE WATER DRAINAGE STRATEGY

- 5.1 In order to mitigate any flood risk posed by the development, appropriate control measures are required to be considered. These measures will ensure that surface water runoff is dealt with at source and the flood risk on/off site is not increased over the lifetime of the development.

Existing runoff Rates

- 5.2 The most common method of hardstanding run off is the Wallingford Procedure which is detailed below:

$$QP = 2.76 \times Ap \times I$$

Where:

QP = Peak discharge (litres/sec)

Ap = Impermeable Area (hectares)

I = Rainfall intensity (mm/hr)

- 5.3 The existing impermeable area of the planning boundary site equates to 879m² (0.0879ha).

$$2.76 \times 0.0879 \times 50 = 12.13 \text{ L/s}$$

$$\text{Attenuated area} = 485\text{m}^2$$

$$2.76 \times 0.0485 \times 50 = 6.69 \text{ L/s}$$

$$50\% \text{ Betterment} = 3 \text{ L/s}$$

To reach a 50% betterment, a rate of **3 L/s** is proposed.

Climate Change

- 5.4 The Department for Environment Food and Rural Affairs (DEFRA) climate change allowance mapping has been reviewed for the area of Warminster and a CC allowance of 45% has been adopted for this plan.
- 5.5 See Fig. 10 below for the DEFRA Climate Change Allowances map.

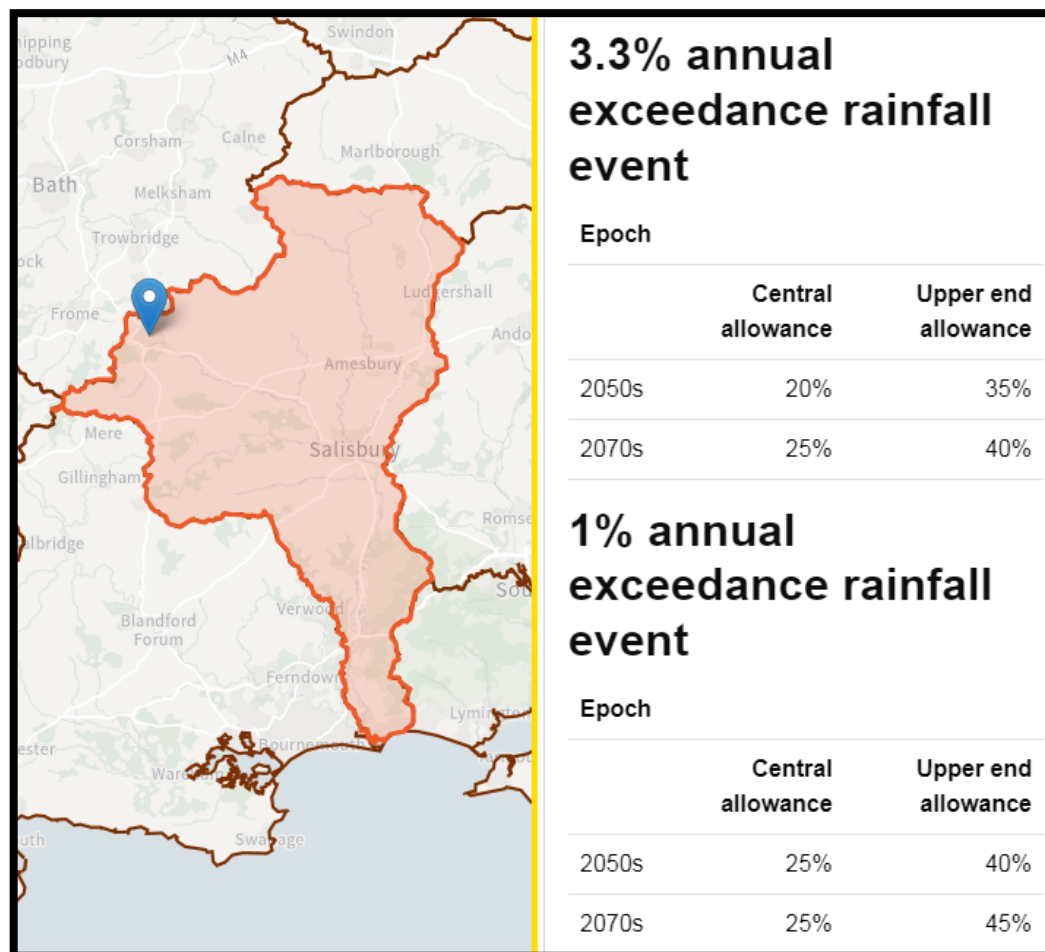


Figure 10: Climate Change (Source: Department for Environment Food and Rural Affairs)

- 5.6 The SuDS system proposed for the new development will consist of below ground attenuation, which is required to manage the additional runoff generated from the proposals, and to provide a betterment over existing in line with the Long Plan 2015.
- 5.7 The final proposed design runoff rate may vary depending on the size and capacity of the existing surface water drainage network and final hard surface area.

Attenuation Storage

- 5.8 Attenuation storage is needed to temporarily store water during periods when the runoff rates from the development site exceed allowable/feasible discharge rates.
- 5.9 Rainfall depths for the 1 in 100 years Return Period plus 45% climate change allowance were produced using Micro drainage software in order to estimate the largest volume, critical storm, for typical storm durations.
- 5.10 Refer to Appendix 'G' for Micro Drainage Storage calculations.
- 5.11 In terms of storage, for a 100 years storm event with a 45% Climate Change allowance, requires 13.3m³ of attenuation, as noted below there will be:
- *Drainage channel*
 - *SPEL ESR Bypass Treatment System*
 - *Wrapped attenuation crates*
- 5.12 Runoff will be regulated at the outfall site using a Hydro-Brake as a flow device, limited to a discharge rate of 3 L/s.

Table 5: Drainage Plan Summary

Parameter	Value
Discharge Rate (L/s)	3 L/s
Total Attenuation Volume (m ³)	13.3m ³
Storage Type	Attenuation Crates
Climate Change Allowance (%)	45%

Design Exceedance

- 5.13 In the event of drainage system failure under extreme rainfall events or blockage, flooding may occur within the site. In the event of the development's drainage system failure, the runoff flow should be dictated by topography on site.

Adoption and Maintenance

- 5.14 An Outline maintenance regime for below ground drainage on site is included in (See Table 6).

Table 6: Schedule of Maintenance for Drainage

Item	Visual Inspection	Cleanse / De-sludge	CCTV Survey	Comments
Surface Water Drainage System (pipework, chambers etc.)	5 years	10 years	10 years	Cleansing to be carried as necessary.
Gullies/Channels	1 year	1 year	N/A	Cleansing to be carried as necessary.
Flow Control Devices Orifice Plate or Similar flow control	Six Monthly	As required	N/A	Inspect and remove blockage, hose down as required, check flow.
Storm Crates	Six Monthly	2 years	5 years	Sediment and debris to be removed, if required flush with jetting.

- 5.15 All onsite SuDS and drainage systems will remain private and be privately maintained.
- 5.16 A long-term maintenance regime should be arranged by the site owners with a managing agent for all common areas before implementation.
- 5.17 In addition to a long-term maintenance regime, it is recommended that all drainage elements implemented on site should be inspected following the first rainfall event post construction and monthly for the first quarter following construction.

Catchpit Manholes and Gullies

- 5.18 Catchpit manholes and gullies need to be inspected on a monthly basis except during the autumn leaf fall when they may require inspections to be increased to fortnightly.
- 5.19 Equipment required for inspection includes moveable barriers and cones to guard openings, manhole keys, gloves and a torch. A minimum of two people is required.
- 5.20 Catchpit manholes and gullies need to be emptied once the sump becomes half full. Emptying should be performed using a gulley emptying vacuum truck or similar device which does not require man entry.

Foul Water Manholes and Inspection Chambers

- 5.21 Foul water manholes and inspection chambers need to be inspected on a monthly basis or immediately if foul odours are present or there is a suspected blockage.
- 5.22 Equipment required for inspection includes moveable barriers and cones to guard openings, manhole keys, gloves and a torch. A minimum of two people is required.
- 5.23 If manholes show any signs of blockage, specialist contractors should be called for clearance work, without delay.

Drainage Channel Outlets

- 5.24 Drainage channel outlets need to be inspected on a monthly basis except during the autumn when leaf fall, may require inspections to be increased to fortnightly.
- 5.25 Equipment required for inspection includes moveable barriers and cones to guard openings, lifting tools, gloves, and a torch. A minimum of two people is required.
- 5.26 Silt, leaves, and debris should be cleared from the channel outlets during each inspection.

SPEL ESR Bypass/Attenuation Crates/Hydro-Brake/Isolation Valve

- 5.27 These are specialist engineering solutions.
- 5.28 In accordance with the SuDS hierarchy, infiltration was considered as the preferred drainage option. However, due to the site's underlying ground conditions infiltration is not considered feasible.
- 5.29 It is proposed that an engineered treatment and attenuation system with controlled discharge is proposed.
- 5.30 The maintenance regimes will be carried out in accordance with Appendix 'H'.

Drainage Inspection and Maintenance Records

- 5.31 Appendix 'I' includes the annual drainage record log sheet. Copies should be taken of the log sheet for use for each year's records. Each inspection should be recorded on the log sheet for that year by site owner. The log sheet shall be kept with this maintenance plan in the site owner's office for inspection.

6.0 CONCLUSION

- 6.1 Marks Heeley Ltd has been appointed by the client to undertake a Surface Water Drainage Strategy for the proposed development at Morrisons Warminster, Weymouth Street, Wiltshire, BA12 9NT.
- 6.2 There is no proposed increase in hardstanding to the application site.
- 6.3 It is proposed that discharge to surface water sewers is the preferred method of the SuDS Drainage Hierarchy.
- 6.4 The existing drainage channel running through the application site is to remain.
- 6.5 A drainage channel is proposed along the front of the 3no jet wash bays, directing discharge through a SPEL ESR Bypass engineered solution, before being attenuated within wrapped crates.
- 6.6 Attenuation in the form of wrapped attenuation crates is proposed, with a volume exceeding 13.3m³.
- 6.7 To mitigate the risk associated with the unlikely event of an EV fire, it is proposed that an isolation valve is installed to intercept and contain potentially contaminated firefighting water, preventing discharge to the receiving watercourse and reducing the risk of contamination.
- 6.8 Outflow is to discharge via existing on-site SW drainage, with a hydrobrake acting as the flow device at a controlled outfall of 3 L/s.
- 6.9 To mitigate the risk associated with the unlikely event of an EV fire, it is proposed that an isolation valve is installed to intercept and contain potentially contaminated firefighting water, preventing discharge to the receiving watercourse and reducing the risk of contamination.
- 6.10 Each jet wash bay will be fitted with a Klargester CST1H silt trap to capture and retain sediments (such as sand, grit, and dirt). The flow will then pass through a proposed Klargester wash separator, which will progressively remove contaminants (including oils and hydrocarbons) prior to discharge the foul sewers.
- 6.11 Foul water from the 3no proposed jet wash bays is to drain via a proposed new connection to the existing foul water drainage network.

- 6.12 We can conclude that, providing the development adheres to the conditions advised in the conclusions of this report, the development can be accommodated without increasing flood risk within the locality in accordance with objectives set within the NPPF and published guidance.
- 6.13 The findings and recommendations of this report are for the use of the client who commissioned the assessment, and no responsibility or liability can be accepted for the use of the report or its findings by any other person or for any other purpose.

Author:	Co-Author/Checked:
	
Mark Newman <i>BSc (Hons) (Eng.)</i>	Adam Flack <i>BSc (Eng.)</i>

APPENDIX A – EXISTING SITE PLAN



COPYRIGHT ©
This drawing and the details herein are the copyright of MBH Design Studio Ltd. and must not be reproduced, altered or passed to any third party without prior written consent.

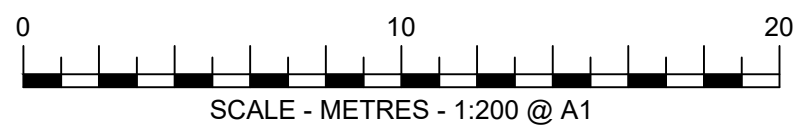
This drawing has been produced for the project listed below, is submitted in support of this application application to the Local Planning Authority and is not intended for use by any other person or for any other purpose.

Every effort has been made to ensure the accuracy of these drawings, however MBH Design Studio Ltd. accept no responsibility for any discrepancies arising from the reuse of survey information and preliminary drawings commissioned by the Applicant from others.

1. This drawing has been prepared for the sole purpose of obtaining planning permission.
2. This drawing is to be read in conjunction with drawings numbered:

14313-3340-1P	Location Plan
14313-3340-BP	Block Plan
14313-3340-200	Existing Site Plan
14313-3340-201	Proposed Site Plan
14313-3340-206	EV Canopy and Charger Details
14313-3340-207	Substation Enclosure Details
14313-3340-208	LV Enclosure Details
14313-3340-209	Meter Cabinet Details
14313-3340-210	Jet Wash Plan and Elevations
14313-3340-211	Air/Water and Vac Details
14313-3340-212	Plant Room Elevations

3. Any advertisements are indicative and are subject to a separate advertisement application
4. Any neighbouring buildings shown on the elevations are diagrammatic and have been extrapolated from site photographs. They have not been measured.



REV	DATE	DESCRIPTION	DRAWN/CHECKED
REVISION NOTES			

MBH Design Studio Ltd.
Rosemount House, Rosemount Avenue, West Byfleet, Surrey, KT14 6LB
www.mbhLtd.com t: 01932 352 727 f: 01932 351 545



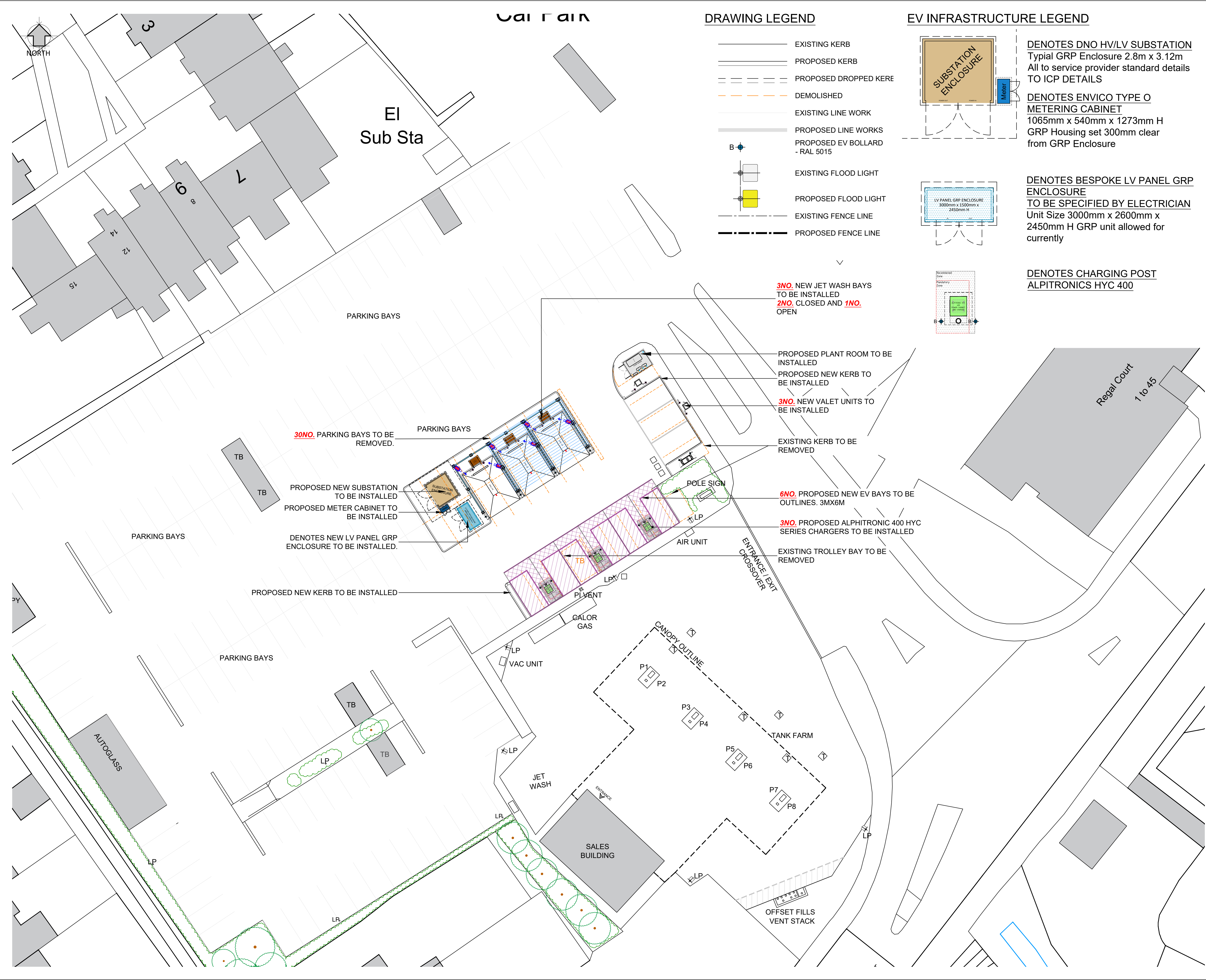
PROJECT
FS3340 - WARMINSTER MORRISONS
WEYMOUTH STREET,
WARMINSTER,
BA12 9NT

DRAWING TITLE

EXISTING SITE PLAN

DRAWN BY	DATE	SCALE	PAPER SIZE
KL	20.07.2026	1:200	A1
CHECKED BY	DRAWING NUMBER		REV.
RRB/RRB	14313-3340-200		-

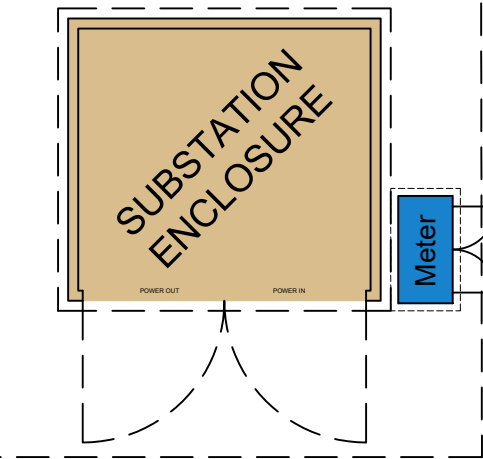
APPENDIX B – PROPOSED SITE PLAN



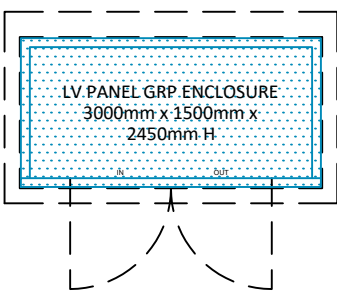
DRAWING LEGEND

- EXISTING KERB
- PROPOSED KERB
- PROPOSED DROPPED KERE
- DEMOLISHED
- EXISTING LINE WORK
- PROPOSED LINE WORKS
- PROPOSED EV BOLLARD - RAL 5015
- EXISTING FLOOD LIGHT
- PROPOSED FLOOD LIGHT
- EXISTING FENCE LINE
- PROPOSED FENCE LINE

EV INFRASTRUCTURE LEGEND

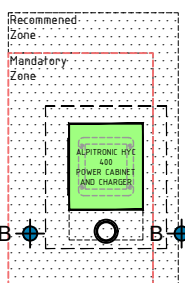


DENOTES DNO HV/LV SUBSTATION
Typical GRP Enclosure 2.8m x 3.12m
All to service provider standard details
TO ICP DETAILS



DENOTES ENVICO TYPE O
METERING CABINET
1065mm x 540mm x 1273mm H
GRP Housing set 300mm clear
from GRP Enclosure

DENOTES BESPOKE LV PANEL GRP
ENCLOSURE
TO BE SPECIFIED BY ELECTRICIAN
Unit Size 3000mm x 2600mm x
2450mm H GRP unit allowed for
currently



DENOTES CHARGING POST
ALPITRONICS HYC 400

3NO. NEW JET WASH BAYS
TO BE INSTALLED
2NO. CLOSED AND **1NO.**
OPEN

PROPOSED PLANT ROOM TO BE
INSTALLED
PROPOSED NEW KERB TO
BE INSTALLED

3NO. NEW VALET UNITS TO
BE INSTALLED

EXISTING KERB TO BE
REMOVED

6NO. PROPOSED NEW EV BAYS TO BE
OUTLINES. 3MX6M

3NO. PROPOSED ALPHITRONIC 400 HYC
SERIES CHARGERS TO BE INSTALLED

EXISTING TROLLEY BAY TO BE
REMOVED

30NO. PARKING BAYS TO BE
REMOVED.

PROPOSED NEW SUBSTATION
TO BE INSTALLED
PROPOSED METER CABINET TO
BE INSTALLED

DENOTES NEW LV PANEL GRP
ENCLOSURE TO BE INSTALLED.

PROPOSED NEW KERB TO BE INSTALLED

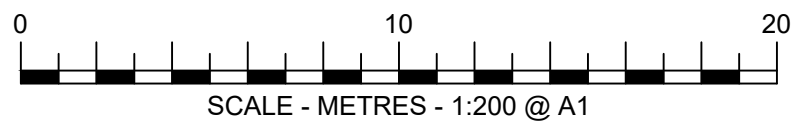
DRAWING NOTES

COPYRIGHT ©
This drawing and the details herein are the copyright of MBH Design Studio Ltd. and must
not be reproduced, altered or passed to any third party without prior written consent.
This drawing has been produced for the project listed below, is submitted in support of this
application application to the Local Planning Authority and is not intended for use by any
other person or for any other purpose.
Every effort has been made to ensure the accuracy of these drawings, however MBH Design
Studio Ltd. accept no responsibility for any discrepancies arising from the reuse of survey
information and preliminary drawings commissioned by the Applicant from others.

GENERAL NOTES

- This drawing has been prepared for the sole purpose of obtaining
planning permission.
- This drawing is to be read in conjunction with drawings numbered:

14313-3340-LP	Location Plan
14313-3340-BP	Block Plan
14313-3340-200	Existing Site Plan
14313-3340-201	Proposed Site Plan
14313-3340-206	EV Canopy and Charger Details
14313-3340-207	Substation Enclosure Details
14313-3340-208	LV Enclosure Details
14313-3340-209	Meter Cabinet Details
14313-3340-210	Jet Wash Plan and Elevations
14313-3340-211	Air/Water and Vac Details
14313-3340-212	Plant Room Elevations
- Any advertisements are indicative and are subject to a separate
advertisement application
- Any neighbouring buildings shown on the elevations are
diagrammatic and have been extrapolated from site photographs.
They have not been measured.



REV	DATE	DESCRIPTION	DRAWN/CHECKED
REVISION NOTES			

PLANNING

MBH Design Studio Ltd.
Rosemount House, Rosemount Avenue, West Byfleet, Surrey, KT14 6LB
www.mbhstd.com t: 01932 352 727 f: 01932 351 545

CLIENT

PROJECT

FS3340 - WARMINSTER MORRISONS
WEYMOUTH STREET,
WARMINSTER,
BA12 9NT

DRAWING TITLE

PROPOSED SITE PLAN

DRAWN BY	DATE	SCALE	PAPER SIZE
KL	20.07.2026	1:200	A1
CHECKED BY	DRAWING NUMBER		REV.
RRB/RRB	14313-3340-201		-

APPENDIX C – DRAINAGE STRATEGY



- GENERAL NOTES:
1. This drawing is copyright (C).
 2. This drawing is to be read in conjunction with all relevant drawings and specifications.
 3. This drawing shall not be scaled. Use only figured dimensions. All dimensions are shown in millimetres and levels in metres above OS Datum.
 4. Dimensions and conditions shall be verified on site. Any discrepancies between this drawing and site conditions shall be brought to the attention of the Engineer for resolution prior to placing orders or construction.
 5. All work shall comply with the Building Regulations and the requirements of the Local Authority, current Codes of practice and British Standards.
 6. Dimensions indicated thus: - are to be confirmed on site.
 7. For remainder of notes see drg no. H18140-CG-60.
 8. Our design is based upon the assumptions: Existing blockwork is assumed to be 100mm 3.5N in 1:8 mortar. Existing brickwork to be 20.5N in 1:8 mortar. Existing timbers to be grade C16. Unites assumed to exist over all existing openings. Wall ties assumed to be in good condition. Assumed minimum party wall thickness to be 220mm solid masonry wall construction.
 9. Waterproofing details shown are indicative only. Architect to confirm final details.
 10. Splice requirements to new steel beams to be allowed for by contractor as required. Splice design assumed responsibility of fabricator, unless specifically requested of S.E.M.
 11. All structural steelwork shall be to BS EN 10025 & BS EN 10210, Grade S355 unless noted otherwise. All beams to be CE marked.
 12. High risk of saturation and freezing (masonry most vulnerable is situated 150mm above and 150mm below finished ground level) durability classification to be a MX3.2, F2, S2 or S1*.

DRAINAGE KEY

— > — > — > — PROPOSED SURFACE WATER DRAIN

— > — > — > — PROPOSED FOUL WATER DRAIN

== == == == == EXISTING DRAINAGE CHANNEL

==== PROPOSED DRAINAGE CHANNEL

→ DIRECTION OF FALL

PRELIMINARY

Rev	Description	By	Date	Ch'd	Auth
1	Issue for Client	JB	31.07.26		
2	Issue for Client	JB	31.07.26		
3	Issue for Client	JB	31.07.26		
4	Issue for Client	JB	31.07.26		
5	Issue for Client	JB	31.07.26		
6	Issue for Client	JB	31.07.26		
7	Issue for Client	JB	31.07.26		
8	Issue for Client	JB	31.07.26		
9	Issue for Client	JB	31.07.26		
10	Issue for Client	JB	31.07.26		
11	Issue for Client	JB	31.07.26		
12	Issue for Client	JB	31.07.26		
13	Issue for Client	JB	31.07.26		
14	Issue for Client	JB	31.07.26		
15	Issue for Client	JB	31.07.26		
16	Issue for Client	JB	31.07.26		
17	Issue for Client	JB	31.07.26		
18	Issue for Client	JB	31.07.26		
19	Issue for Client	JB	31.07.26		
20	Issue for Client	JB	31.07.26		
21	Issue for Client	JB	31.07.26		
22	Issue for Client	JB	31.07.26		
23	Issue for Client	JB	31.07.26		
24	Issue for Client	JB	31.07.26		
25	Issue for Client	JB	31.07.26		
26	Issue for Client	JB	31.07.26		
27	Issue for Client	JB	31.07.26		
28	Issue for Client	JB	31.07.26		
29	Issue for Client	JB	31.07.26		
30	Issue for Client	JB	31.07.26		
31	Issue for Client	JB	31.07.26		
32	Issue for Client	JB	31.07.26		
33	Issue for Client	JB	31.07.26		
34	Issue for Client	JB	31.07.26		
35	Issue for Client	JB	31.07.26		
36	Issue for Client	JB	31.07.26		
37	Issue for Client	JB	31.07.26		
38	Issue for Client	JB	31.07.26		
39	Issue for Client	JB	31.07.26		
40	Issue for Client	JB	31.07.26		
41	Issue for Client	JB	31.07.26		
42	Issue for Client	JB	31.07.26		
43	Issue for Client	JB	31.07.26		
44	Issue for Client	JB	31.07.26		
45	Issue for Client	JB	31.07.26		
46	Issue for Client	JB	31.07.26		
47	Issue for Client	JB	31.07.26		
48	Issue for Client	JB	31.07.26		
49	Issue for Client	JB	31.07.26		
50	Issue for Client	JB	31.07.26		
51	Issue for Client	JB	31.07.26		
52	Issue for Client	JB	31.07.26		
53	Issue for Client	JB	31.07.26		
54	Issue for Client	JB	31.07.26		
55	Issue for Client	JB	31.07.26		
56	Issue for Client	JB	31.07.26		
57	Issue for Client	JB	31.07.26		
58	Issue for Client	JB	31.07.26		
59	Issue for Client	JB	31.07.26		
60	Issue for Client	JB	31.07.26		
61	Issue for Client	JB	31.07.26		
62	Issue for Client	JB	31.07.26		
63	Issue for Client	JB	31.07.26		
64	Issue for Client	JB	31.07.26		
65	Issue for Client	JB	31.07.26		
66	Issue for Client	JB	31.07.26		
67	Issue for Client	JB	31.07.26		
68	Issue for Client	JB	31.07.26		
69	Issue for Client	JB	31.07.26		
70	Issue for Client	JB	31.07.26		
71	Issue for Client	JB	31.07.26		
72	Issue for Client	JB	31.07.26		
73	Issue for Client	JB	31.07.26		
74	Issue for Client	JB	31.07.26		
75	Issue for Client	JB	31.07.26		
76	Issue for Client	JB	31.07.26		
77	Issue for Client	JB	31.07.26		
78	Issue for Client	JB	31.07.26		
79	Issue for Client	JB	31.07.26		
80	Issue for Client	JB	31.07.26		
81	Issue for Client	JB	31.07.26		
82	Issue for Client	JB	31.07.26		
83	Issue for Client	JB	31.07.26		
84	Issue for Client	JB	31.07.26		
85	Issue for Client	JB	31.07.26		
86	Issue for Client	JB	31.07.26		
87	Issue for Client	JB	31.07.26		
88	Issue for Client	JB	31.07.26		
89	Issue for Client	JB	31.07.26		
90	Issue for Client	JB	31.07.26		
91	Issue for Client	JB	31.07.26		
92	Issue for Client	JB	31.07.26		
93	Issue for Client	JB	31.07.26		
94	Issue for Client	JB	31.07.26		
95	Issue for Client	JB	31.07.26		
96	Issue for Client	JB	31.07.26		
97	Issue for Client	JB	31.07.26		
98	Issue for Client	JB	31.07.26		
99	Issue for Client	JB	31.07.26		
100	Issue for Client	JB	31.07.26		

APPENDIX D – SPEL ESR BYPASS CERTIFICATES



Surface Water Treatment Device Performance Declaration

Product Details	Description
Manufacturer	SPEL Products
Treatment Device Name/Model	Stormceptor Type 210 C1/SC
General description	Class 1 By-pass Separator with Silt Capacity
Envisaged application	Treatment of Surface Water Run-off
Pollutant(s) captured	Suspended Solids

Test	Value	Unit
Treatment device capacity	3200	litres
Sediment Storage capacity	1000	litres
Treatment Flow rate	10	l/s
Connected Area	1,333	m ²
Pollution retention flow rate	10	l/s

Parameter	Value	Unit
Maximum capacity flow rate	100	l/s
Device head loss (at treatment flowrate)	0.15	m
Device head loss (at maximum capacity treatment flowrate)	–	m
TSS capture and retention efficiency (Milisil W4 test sediment)	82	%
Zinc capture efficiency (if tested)	Not tested for dissolved metals	%
Zinc retention efficiency (if tested)	Not tested for dissolved metals	%
Copper capture efficiency (if tested)	Not tested for dissolved metals	%
Copper retention efficiency (if tested)	Not tested for dissolved metals	%
Dissolved Metals reduction	0.0	%
Particulate metals reduction*	61.5*	%
Total Metals reduction*	61.5*	%
Total Metals Mitigation Index	0.615*	–

* Extrapolated value in accordance with British Water How to Guide: Applying the CIRIA The SuDS Manual (C753) Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. Version 7, Section 4.3, (2021- under pre-publication review).

CERTIFICATE

LIGHT LIQUID SEPARATOR TEST PERFORMANCE CERTIFICATE

Compliance with Clause 8.3.3 of BS EN 858

Separator make and model number: SPEL STORMCEPTOR 330C1/SC NSB30
As detailed in SPEL Drawing SSP 9076

The separator tested complied with the drawing provided by the manufacturer and no additional features were noticed

Test date: 12 October 2006

Designated/nominal flow rate, Qw (litres/second): 30 litres/s

Net capacity of separator (excluding any allowance for silt storage), Vk (litres): 5050 litres

Total duration of test (minutes): 20 min

Running-in period (≥ 15 minutes): 15 min

Sampling period (minutes): 5 minutes common to all tests

Oil flow rate (based on 0.5% of water flowrate, litres/second): 0.15 litres/s

Temperature of oil ($^{\circ}\text{C}$): 16.2

Temperature of water ($^{\circ}\text{C}$): 15.6

Temperature of air ($^{\circ}\text{C}$): 16.8

Analysis of samples by IR spectroscopy carried out by: Intertek Caleb Brett Testing Services*

Date of results: 16 October 2006

Sample	Oil concentration (mg/l)**
--------	----------------------------

1	0.1
---	-----

2	0.5
---	-----

3	<0.1
---	------

4	0.6
---	-----

5	0.2
---	-----

Resulting average:	0.3mg/l
--------------------	---------

Name

Date

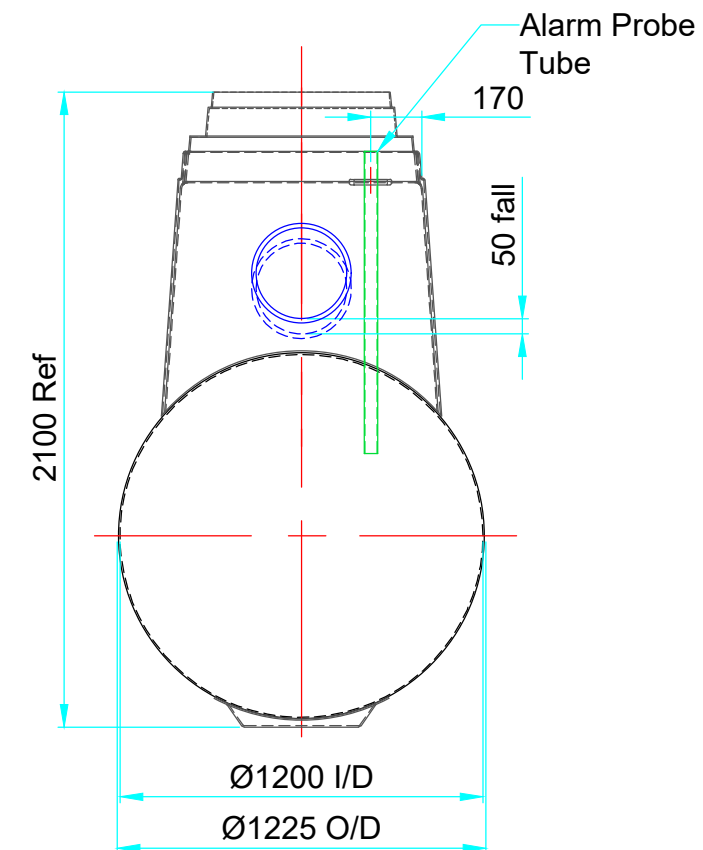
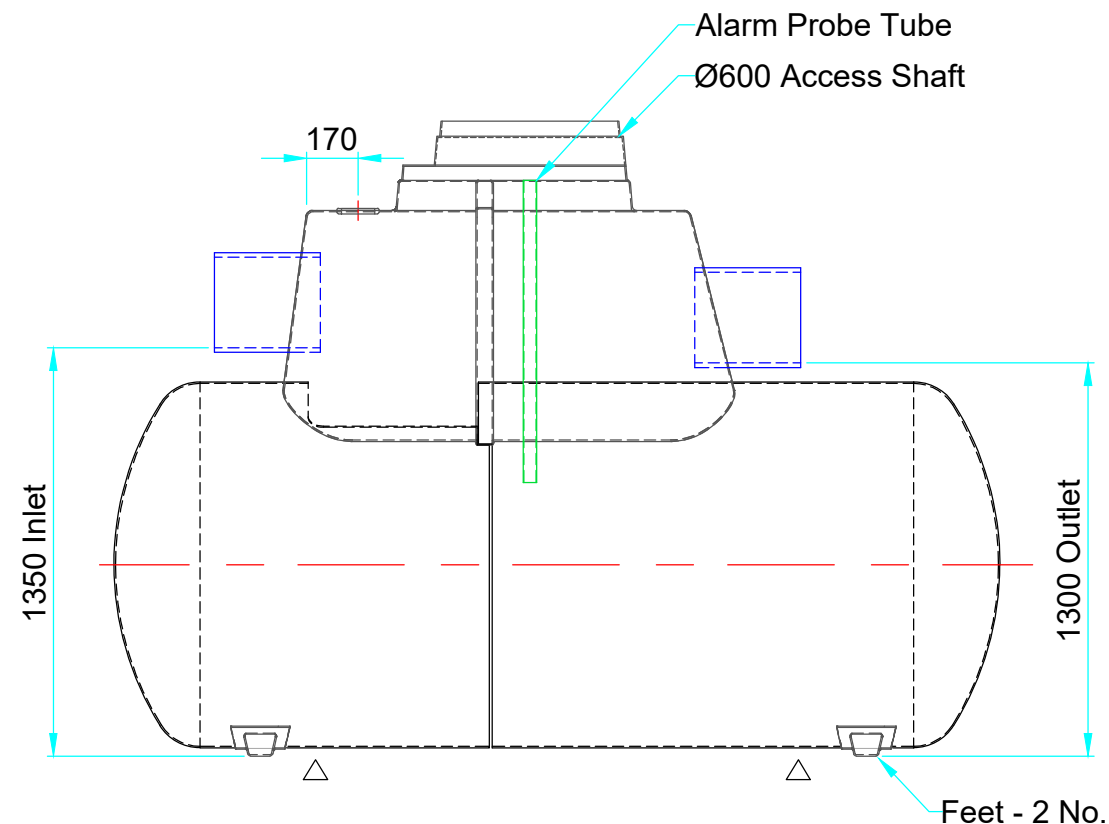
Manuela Escarameia 17/10/06

For and on behalf of HR Wallingford Ltd.

* NAMAS accredited laboratory

** Value of baseline concentration deducted

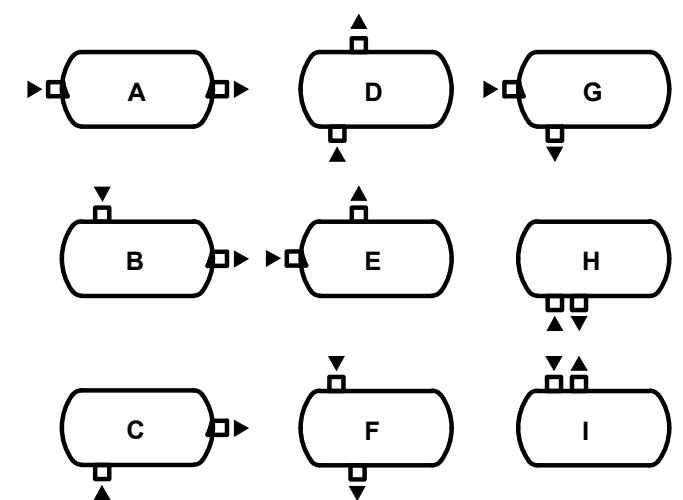
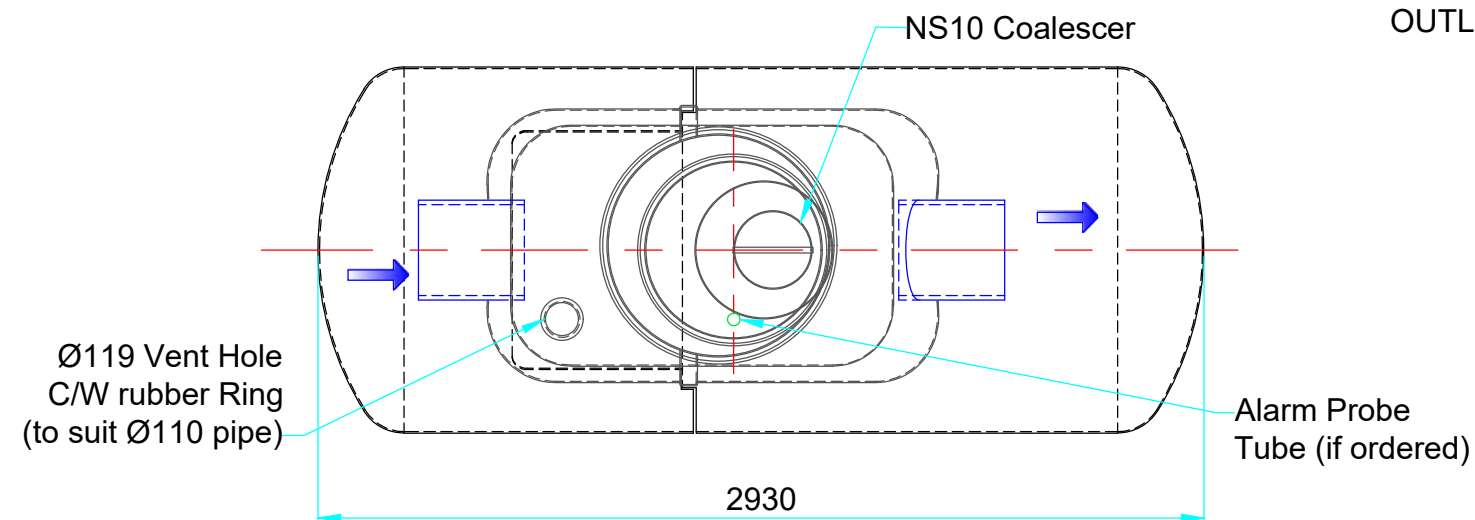
APPENDIX E – SPEL ESR BYPASS DETAILS



Orientation - A

INLET - Ø300 Quantum Plain Spigot

OUTLET - Ø300 Quantum Plain Spigot



Nine Inlet/Outlet options are available to assist with design and installation

Key to Symbols: △ Lifting Point

○ Hold-down strap rib locations where mechanical anchoring is required

— Manufacturing Joint

○ BoQ's reference no.

This drawing is confidential and must not be copied, reproduced or passed to a third party without written permission from
SPEL PRODUCTS

DIMENSIONS ARE SUBJECT TO DIMENSIONAL TOLERANCES. If critical, check physically prior to installation

Water table & Burial Depth:
The customer must check tank specification is compatible with ground water table level (in winter) and burial depth. If in doubt refer to SPEL Data Manual Section 7 or contact SPEL Products Sales or Technical Department

Title: **SPEL 200 Series ESR Bypass Treatment System 210C1/ESR Orientation (A-I)**

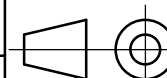
Contract:

Capacity

--

Tank Specification

Laminate Specification



All sizes in mm
If in doubt ASK!



Lancaster Road, Shrewsbury
Shropshire, SY1 3NQ, England
Telephone: +44 (0)1743 445200
www.spelproducts.co.uk

Drawn

Checked

Date

Scale 1:25 Sheet A3

TANK SERIAL No.

INTERNAL ORDER No.

Revision

A

APPENDIX F – KLARGESTER SEPARATOR/SILT TRAP DETAILS

012582
Washdown & Silt Separator
Installation & Operation Guidelines



Kingspan Environmental Service Contact Numbers:

GB: 0844 846 0500

NI: 028 3025 4077

IRL: 048 3025 4077

HEALTH & SAFETY

These warnings are provided in the interest of safety. You must read them carefully before installing or using the equipment.

It is important that this document is retained with the equipment for future reference. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied in order that the new owner can be acquainted with the functioning of the equipment and the relevant warnings.

Installation should only be carried out by a suitably experienced contractor, following these guidelines.

We recommend the use of a dust mask and gloves when cutting GRP components.

Electrical work should be carried out by a qualified electrician.

Contaminated surface water can contain substances harmful to human health. Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.

Access covers should be selected with reference to the location of the unit and traffic loads to be accommodated. These are not (normally) part of the Separator supply.

When covers are removed precautions must be taken against personnel falling into the unit.

Should you wish to inspect the operation of the equipment, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.

Ensure that you are familiar with the safe working areas and accesses. Ensure that the working area is adequately lit.

Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary. Keep proper footing and balance at all times. Avoid any sharp edges.

Issue	Description	Date
02	CC1090	September 2012

CONTENTS

	Page
HEALTH & SAFETY.....	1
1.0 Introduction.....	2
2.0 Handling & Storage	2
3.0 Site Planning	3
4.0 Installation – General.....	3
5.0 Separator Installation	4
6.0 Operation.....	6
7.0 Maintenance	6
8.0 Emergencies.....	6
9.0 Warranty	6

1.0 Introduction

These Guidelines represent Best Practice for the installation of the above Kingspan Separator Units. Many years of specialist experience has led to the successful installation of thousands of separator units. It must be noted, however, that these Guidelines are necessarily of a general nature. It is the responsibility of others to verify that they are appropriate for the specific ground conditions and in-service loads of each installation. Similarly, any information or advice given by employees or agents of Kingspan regarding the design of an installation must be verified by a qualified specialist (e.g. Civil engineering consultant).

2.0 Handling & Storage

- 2.1. Care must be taken to ensure that units are not damaged during delivery and handling on site. Please take care and place unit so that it cannot fall and become damaged
- 2.2. The design requirements of Kingspan products will frequently mean that the centre of gravity of the unit is “offset”. Care must therefore be taken to ensure that the unit is stable when lifting. Rainwater may also collect inside units, particularly if they have been stored on site prior to installation, adding weight and increasing instability. Check units before lifting and pump out any excess water.
- 2.3. When lifting units, use webbing slings of a suitable specification. Do not use chains.
- 2.4. A suitable spreader bar should be used to ensure that units are stable and that loads are evenly distributed during lifting. When lifting separators, a spreader bar should be used where the slings would otherwise be at an angle > 30 degrees to the vertical.
- 2.5. Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.
- 2.6. Kingspan Environmental accepts no responsibility for the selection of lifting equipment.
- 2.7. Whenever Kingspan units are stored or moved on site, ensure that the storage location is free of rock, debris and any sharp objects which may damage the unit. The units must be placed on ground which is flat and level and the unit orientated onto its side with even support. Do not roll separators.

3.0 Site Planning

The following points should be considered before installation of the equipment:

- 3.1. The discharge must have the consent of the relevant Environmental Regulator.
- 3.2. The installation should have Planning and Building Control approval.
- 3.3. Consider installing flow cut-off valves to isolate the separator in an emergency or during site cleaning operations. See Environment Agency Guidelines PPG3.
- 3.4. Consider installation of a sampling point downstream of the separator. There is no suitable facility to effectively sample the waste water from inside the unit..
- 3.5. Uncontaminated run off such as roof water should be excluded from separators. (EA Guidelines PPG3.)
- 3.6. Ground conditions and water table level should be assessed. If the water table will be above the base of the units at any time of the year, adequate concrete backfill must be provided to avoid flotation. In poorly draining ground, consideration should also be given to the likelihood of flotation due to surface water collecting in the backfill, and an appropriate installation method devised to avoid this.
- 3.7. The separator must be installed at a level which will allow connection to the incoming drain and a free discharge at the system outlet. The water table must be below the discharge outlet.
- 3.8. Do not install the unit deeper than necessary, ensure that you purchase extension shafts. The minimum invert depth of the unit is shown on the customer drawing.
- 3.9. Adequate access must be provided for routine maintenance. Vehicles should not be permitted within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation.
- 3.10. There must be at least 1 metre of clear, level ground all around the access covers to allow for routine maintenance.
- 3.11. It is essential that a mains water supply is accessible for routine cleansing and refilling after removal of waste material and liquid.

4.0 Installation – General

- 4.1. When units are installed in unstable ground conditions where movement of the surrounding material and/or unit may occur, the connecting pipework should be designed to minimise the risk of damage from differential movement of the unit(s) and/or surrounding material.
- 4.2. For separators with burial depths greater than 1000mm from cover level to the top of the unit, specific site conditions should be taken into consideration and the backfill designed to bear any loads which may be applied during and after installation to prevent the tank being subjected to these loads.
- 4.3. The excavation must be deep enough to provide bedding and cover depth as determined by the type of surface pavement and loading. Asphalt and concrete pads should extend a minimum of 300mm horizontally beyond the unit in all directions.
- 4.4. In situations where the excavation will not maintain a vertical wall, it will be necessary to shore up the side walls of the excavation with suitable trench sheets and bracing systems to maintain a vertical wall from the bottom to the top of the excavation. DO NOT completely remove the shoring system until the backfilling is complete, but before the concrete fully hardens.
- 4.5. In areas where the water table is above the bottom of the excavation and/or the excavation is liable to flood, the excavation should be dewatered using suitable pumping equipment and this should continue until the installation is complete.
- 4.6. During installation care must be taken to ensure that the body of the unit is uniformly supported so that point loads through the unit are avoided.

4.7. Concrete Specification is a *general* specification. It is not a site-specific installation design.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)		
TYPE OF MIX		(DC) DESIGN
PERMITTED TYPE OF CEMENT		BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE (coarse & fine)		BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm
GRADES: C25 /30 C25 /30 C16 /20		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C30 C20	270 - 280 Kg/M ³ 220 - 230 Kg/M ³
SLUMP CLASS		S1 (25mm)
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1
NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER		

5.0 Separator Installation

- 5.1. Excavate a hole of sufficient length and width to accommodate the tank and a minimum 225mm concrete surround and to a depth which allows for the burial depth of the unit plus concrete base slab and haunch.
- 5.2. Construct a suitable concrete base slab appropriate to site conditions. Ensure that the slab is flat and level.
- 5.3. When the concrete base slab has set enough to support the installed load, add a concrete haunch so as to provide even support under the unit, then lower the unit onto the haunch using suitable webbing slings and lifting equipment.
- 5.4. **Pour no more than 300 mm depth of clean water into the unit, avoiding shock loads. For units with more than one chamber, add water to each chamber simultaneously. DO NOT OVERFILL, the unit is not designed to hold water whilst unsupported.**
- 5.5. **Place concrete backfill to approximately 250mm depth under and to the sides of the tank ensuring good compaction to remove voids. DO NOT use vibrating pokers. Continue adding concrete backfill, simultaneously keeping the internal water level no more than 200 mm above the backfill level at all times, until the backfill is just below the underside of the outlet drain, giving sufficient room to connect the inlet and outlet pipework.**
- 5.6. Connect inlet and outlet drains and vent pipes when safe access to the backfill can be gained.

PIPEWORK CONNECTIONS

In all cases, ensure that the outlet pipework level is maintained for correct operation. (Unless specified on the order, the fall across the unit will be as per the customer drawings).

Small units are generally fitted with **PVCu spigots** to both the outlet and the inlet.

Connect using the same size PVCu socket or a suitable reducer.

Larger units are generally fitted with **Kingspan GRP** manufactured sockets.

The connecting pipework should be pushed into the socket and a joint made to fill in the gap using rope/hemp with a cement mortar or bonding mix. Ensure that the seal is secure and watertight before backfilling the pipe.

Alternatively, proprietary **flex seal couplings** can be obtained to fit over the outside of the site pipework and the outside of the GRP socket. When using this connection method, please be aware that the outside GRP laminate is not perfectly regular and that you may need to use a sealant on the outside diameter of the GRP. Take care not to over tighten the coupling when connecting to the GRP and ensure that the seal is secure before backfilling the pipe. A drawing can be provided to show the ID of our GRP sockets. The OD is variable, as the wall thickness can be up to 15-20 mm. If purchasing a flexseal coupling for use with clay /concrete, we suggest that a size 110 mm larger than the ID is selected.

- 5.7. Continue backfilling with concrete over the tank body to the required level. Build up a shell of concrete, minimum 225mm thick, around the access shaft(s). Temporarily strut the access shaft to avoid distortion.
- 5.8. It is advisable to seal the joints on the extension shafts (particularly on sites with high ground water) with proprietary sealant or by GRP lamination. Temporarily strut the extension neck(s) to avoid distortion during back filling. Where more than one neck section is required to suit a deep invert, consider back-filling section by section. If the extension neck is too long, it can be trimmed using a fine-toothed saw.
- 5.9. Ensure that the vent socket if cut out, is replaced elsewhere. The maximum recommended inlet invert is 2000mm (using 500mm long extension sections).
- 5.10. Continue back-filling, ensuring minimum 225mm concrete thickness around the access shaft/ extension neck and alarm access tube (as applicable).
- 5.11. In traffic areas a suitable top slab must be constructed. The top slab should bear on a suitable foundation to prevent superimposed loads being transmitted to the unit and access shafts. Loads applied to covers and frames must bear on the top slab, not the access shaft.
- 5.12. The unit should be filled with clean water up to the invert level of the outlet pipe. Ensure the unit identification is placed/ marked inside the neck for future information. The unit is now ready for use.

Unit	Total Capacity (Litres)	Max. Recommended Silt Volume
W1/012	1200	600
W1/020	2000	1000
W1/030	3000	1500
W1/040	4000	2000
W1/060	6000	3000
W1/080	8000	4000
W1/100	10000	5000
W1/120	12000	6000
W1/150	15000	7500
W1/190	19000	9500

The units above all include a single chamber, (W1) but on request, we may be able to provide with 2 or 3 chambers. If you require larger units, these are also available. Please contact us to discuss your specific application

Invert depths (E) can be supplied in additional increments of 500mm from the minimum stated above. Please indicate the inlet drain invert required when specifying units. Maximum 2.0 m.

6.0 Operation

As contaminated water passes through the separation chamber, it is retained long enough to allow settleable solids to sink to the bottom of the unit. Our design uses a maximum of 6 minutes retention time, at the flow rate given. The separator water is able to discharge safely without the risk of pollution to the municipal plant.

The nature of the silt varies depending on either the ground or surface receiving the flow. These aspects should be considered when selecting the size of the unit in relation to the flow being treated. .

7.0 Maintenance

Waste Removal and Servicing

7.1 Separators should be inspected at least every six months or more frequently if experience dictates. A log should be maintained detailing any silt removal or cleaning carried out. A specimen maintenance log is included in the appendices.

7.2 Every site is different, in respect to the amount and type of silt generated by the drain design and installation. Frequently, the construction programme itself generates large and perhaps unusual quantities of silt and grit. We do recommend that following the initial installation, an inspection of the separator contents be made to check that building rubble has not entered the unit. Further inspections at 3 and 6 months should be made so as to be able to assess the volumes of silt accumulated. The inspection and emptying programme can then be defined following the first 6 months site experience. We recommend leaving a maximum interval between inspections of 6 months.

Waste Removal Procedure –Silt

7.3 Remove the access cover and lower the desludging hose in to the separation chamber.

7.4 Lower the desludging hose to the base of the tank and withdraw any grit or sludge that may be present. Do not remove more water than is necessary. Ensure that you access and clean both compartments.

8.0 Emergencies

At sites where there is a high risk of spillage, spill kits containing drain seals, absorbent materials, disposal containers and other appropriate equipment should be held. In the event of a spillage on site, the material should be contained, (if a spill kit is not available, sand or soil may be used) and the Environment Agency notified immediately using the appropriate emergency hotline number listed in the Agency Guideline PPG3. Year 2012 - **0800 80 70 60**

9.0 Warranty

Taken from 'Kingspan's Terms & Conditions of Sale'

The company will replace or, at its option, properly repair without charge any goods which are found to be defective and which cause failure in normal circumstances of use within a period of twelve months from the date of delivery.

This warranty is conditional upon:

- (a) the Buyer notifying the Company of any claim within Seven days of the failure becoming discernible.
- (b) the Company being allowed a reasonable opportunity to inspect the goods so as to confirm that they are defective.
- (c) the goods not having been modified, mishandled or misused and being used strictly in accordance with any relevant instructions issued by the Company.

The Company's liability under this Clause is limited to the repair or replacement of the defective goods, and does not cover costs of transport, installation or associated site costs, if applicable.

The Company's liability to replace or repair the goods is in lieu of and excludes all other warranties and conditions, and in particular (but without limitation) the Company shall have no liability of any kind for consequential loss or damage.

For any further advice, please contact us.

Our service provider: Kingspan Environmental Services: 0844 846 0500

SEPARATOR MAINTENANCE LOG



Site address/location
.....

Separator location
.....

Type of separator
Nominal Flow
Total capacity

Inspection/ Maintenance Date	Comments	Waste Volumes Removed (if appropriate)

TDS0037P

WASH DOWN & SILT SEPARATORS



INTRODUCTION

Separators serving wash-down areas such as car washes and other cleansing facilities must discharge directly into a foul drain, which feeds to a municipal treatment facility.

Such wash down facilities must not be allowed to discharge directly into surface water or into an oil/water separator discharging into surface water. Washdown separators utilise emulsifiers, soaps and detergents, which dissolve and disperse oils

Silt separators can be used as a supplementary unit to remove additional silt before other Separators or treatment units. If emulsifiers are present the discharge must not be allowed to enter NS or NSB class 1 or class 2 Oil/water separator units.

APPLICATIONS

These units can be used to serve vehicle wash down areas and car wash facilities, although it should be noted that the prime function of such separators is for the removal of silt.

Typical locations using wash down separators are; -

Car wash, tool hire depots, truck cleansing, construction compounds cleansing points.

Locations requiring silt separators are; -

Highly silted sites where NS separators are used, i.e. works constructions sites and temporary work compounds.

OPERATION

As contaminated water passes through the separation chamber, it is retained long enough to allow solids to sink to the bottom of the unit. Our design uses a maximum of 6 minutes hydraulic retention time, at the flow rate given. The separator water is then able to discharge safely.

The nature of the silt varies depending on either the ground or surface receiving the flow. These aspects should be considered when selecting the size of the unit in relation to the flow being treated.

CONSTRUCTION

Our Washdown and Silt Separators are manufactured from durable, rot and corrosion proof glass reinforced polyester combining lightweight with outstanding strength. The units are delivered complete with inlet and outlet pipework as well as factory fitted access shafts to ensure quick and easy installation on site.

INSTALLATION

The unit should be installed on a suitable concrete base slab and surrounded with a concrete backfill.

If the unit is to be installed within a trafficked area a suitable cover slab must be designed to ensure that superimposed loads are not transmitted to the top or sidewalls of the unit.

Washdown and Silt Separators should be vented in accordance with EN752:Building Drainage or Health and Safety Guidance Note HS(G)41 for filling stations subject to Local Authority requirements.

Detailed installation guidelines are provided with the unit and are available separately on request.

The unit retains mainly silt which collects within the separator. It should be removed periodically to ensure that maximum effectiveness of the unit is maintained. The amount of silt collected varies in relation to the source of silt and the use of the separator, and maintenance intervals should take these factors into account.

Oil may also accumulate, if there are no emulsifiers and should be periodically removed. In the event of a major oil spillage the separator should be emptied immediately.

QUALITY

Our Washdown and Silt Separators are widely used and specified by Local Authorities, National Environmental Regulatory bodies and Licensing Authorities, including the London Fire & Civil Defence Authority.

All Kingspan products are manufactured under BS EN ISO 9001-2000 Quality Management System accreditation.

PRODUCT SELECTION

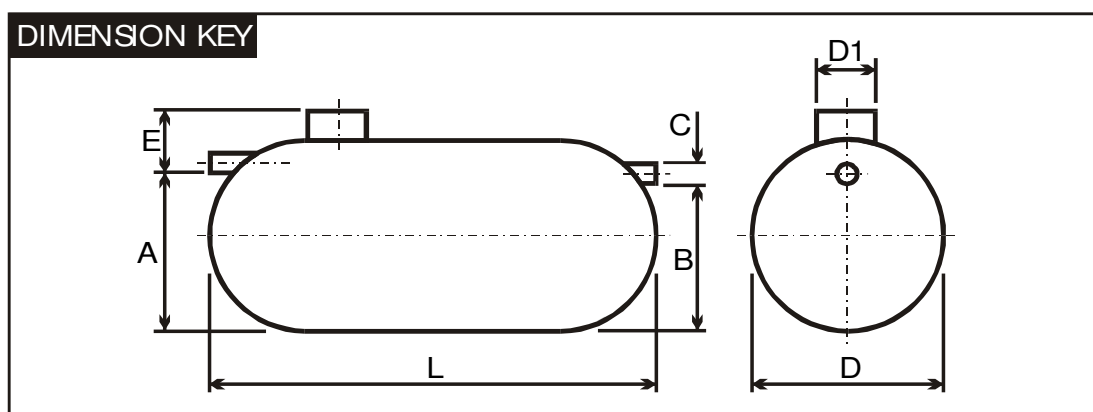
To select the correct Washdown and Silt Separator for your application turn to the table overleaf or alternatively consult our Technical Sales Department at our head office, details overleaf.

If a Nominal Size Full Retention or Bypass Class 1 or Class 2 unit is required, please see alternative data sheets.

We have fully trained technical representatives operating throughout the UK who can offer on-site advice on request.

Issue	Description	Date
04	CC1179 - Change To New Ø1.8 Cases	Oct 2014

WASH DOWN & SILT SEPARATORS



Ref.	Total Capacity (Litres)	Maximum Rec. Silt Volume	Maximum Flow Rate (l/s)	Main Dimensions (mm)								
				Length (L)	Diameter (D)	Access Shaft Dia. (D1)	Base to Inlet Invert (A)	Base to Outlet Invert (B)	Standard Fall Across Unit	Min. Inlet Invert (E)	Standard Pipework Diameter (C)	Approx. Empty Weight (Kg.)
W1/010	1000	500	3	1123	1225	460	1150	1100	50	500	160	60
W1/020	2000	1000	5	2074	1225	460	1150	1100	50	500	160	120
W1/030	3000	1500	8	2952	1225	460	1150	1100	50	500	160	150
W1/040	4000	2000	11	3898	1225	460	1150	1100	50	500	200	180
W1/060	6000	3000	16	4272	1420	600	1470	1420	50	500	200	320
W1/080	8000	4000	22	3230	1917	600	2005	1955	50	500	250	585
W1/100	10000	5000	27	3960	1917	600	2005	1955	50	500	250	680
W1/120	12000	6000	33	4755	1917	600	2005	1955	50	500	300	770
W1/150	15000	7500	41	5780	1917	600	2005	1955	50	500	300	965
W1/190	19000	9500	52	7355	1917	600	2005	1955	50	500	300	1200

The units above all include a single chamber, (W1) but on request, we may be able to provide with 2 or 3 chambers. If you require larger units, these are also available. Please contact us to discuss your specific application

Invert depths (E) can be supplied in additional increments of 500mm from the minimum stated above. Please indicate the inlet drain invert required when specifying units. Maximum 2.0 m.

To purchase or specify the Separator you require, the following information is needed.

- The number of chambers and type of separator. Prefix Reference (see table) with:
W1 – If you require a single chamber separator
W2 – If you require a 2 chamber separator (1000 litre not available)

W3 – If you require a 3 chamber separator (1000 litre not available)

- The capacity of the separator in litres (see table),
- Drain inlet invert depth
- Inlet & outlet Pipework size if not the standard 160 mm PVCu

Note: We will assume that you require the standard unit unless you have specified differently. Additional charges may apply to alternate specifications

Non-standard inlet/outlet pipe sizes and reduced falls across the unit may be provided but please note we do not alter internal pipework dimensions. Please contact the Technical Sales Department for advice and to discuss your requirements available.

Kingspan Environmental
College Road North, Aston Clinton, Aylesbury, Bucks, HP22 5EW
Tel: +44 0 1296 633014 ~ Fax+ 44 0 1296 633001
<http://www.kingspanenv.com>

Manufacturing and distribution units also at:
East Kilbride: ☎ +44 0 13552 48484 Ireland: ☎ +44 0 28302 66799



APPENDIX G – MICRO DRAINAGE ATTENUATION SIZING

Marks Heeley Limited

The Stables

Cannons Mill Lane

Bishops Stortford CM23 2BN

Date 30/07/2026 12:45

File Morrisons Warminster.srcx

XP Solutions

Source Control 2016.1

Page 1



Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 50 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	99.798	0.398	0.0	2.9	2.9	9.1	Flood Risk
30 min Summer	99.873	0.473	0.0	2.9	2.9	10.8	Flood Risk
60 min Summer	99.894	0.494	0.0	2.9	2.9	11.3	Flood Risk
120 min Summer	99.873	0.473	0.0	2.9	2.9	10.8	Flood Risk
180 min Summer	99.828	0.428	0.0	2.9	2.9	9.8	Flood Risk
240 min Summer	99.776	0.376	0.0	2.9	2.9	8.6	Flood Risk
360 min Summer	99.675	0.275	0.0	2.9	2.9	6.3	O K
480 min Summer	99.567	0.167	0.0	2.9	2.9	3.8	O K
600 min Summer	99.488	0.088	0.0	2.9	2.9	2.0	O K
720 min Summer	99.437	0.037	0.0	2.9	2.9	0.9	O K
960 min Summer	99.400	0.000	0.0	2.9	2.9	0.0	O K
1440 min Summer	99.400	0.000	0.0	2.1	2.1	0.0	O K
2160 min Summer	99.400	0.000	0.0	1.5	1.5	0.0	O K
2880 min Summer	99.400	0.000	0.0	1.2	1.2	0.0	O K
4320 min Summer	99.400	0.000	0.0	0.9	0.9	0.0	O K
5760 min Summer	99.400	0.000	0.0	0.7	0.7	0.0	O K
7200 min Summer	99.400	0.000	0.0	0.6	0.6	0.0	O K
8640 min Summer	99.400	0.000	0.0	0.5	0.5	0.0	O K
10080 min Summer	99.400	0.000	0.0	0.4	0.4	0.0	O K
15 min Winter	99.860	0.460	0.0	2.9	2.9	10.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	131.324	0.0	11.8	17
30 min Summer	88.267	0.0	16.0	30
60 min Summer	56.615	0.0	20.4	48
120 min Summer	35.051	0.0	25.3	82
180 min Summer	26.079	0.0	28.0	118
240 min Summer	20.989	0.0	30.2	152
360 min Summer	15.437	0.0	33.4	218
480 min Summer	12.404	0.0	35.7	276
600 min Summer	10.458	0.0	37.6	330
720 min Summer	9.093	0.0	39.3	382
960 min Summer	7.284	0.0	42.0	0
1440 min Summer	5.319	0.0	46.0	0
2160 min Summer	3.876	0.0	50.2	0
2880 min Summer	3.092	0.0	53.4	0
4320 min Summer	2.245	0.0	58.2	0
5760 min Summer	1.786	0.0	61.7	0
7200 min Summer	1.495	0.0	64.6	0
8640 min Summer	1.295	0.0	67.1	0
10080 min Summer	1.146	0.0	69.3	0
15 min Winter	131.324	0.0	13.1	17

©1982-2016 XP Solutions

[illegible]

Marks Heeley Limited		Page 3
The Stables Cannons Mill Lane Bishops Stortford CM23 2BN		
Date 30/07/2026 12:45 File Morrisons Warminster.srcx	Designed by A.Flack Checked by	
XP Solutions Source Control 2016.1		

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.048

Time (mins)		Area
From:	To:	(ha)
0	4	0.048

©1982-2016 XP Solutions

Marks Heeley Limited		Page 4
The Stables Cannons Mill Lane Bishops Stortford CM23 2BN		
Date 30/07/2026 12:45 File Morrisons Warminster.srcx		
Designed by A.Flack Checked by		
XP Solutions		Source Control 2016.1

Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 99.400 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	24.0	24.0	1.100	0.0	44.0
1.000	24.0	44.0			

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0082-3000-1000-3000
 Design Head (m) 1.000
 Design Flow (l/s) 3.0
 Flush-Flo™ Calculated
 Objective Minimise upstream storage
 Application Surface
 Sump Available Yes
 Diameter (mm) 82
 Invert Level (m) 99.000
 Minimum Outlet Pipe Diameter (mm) 100
 Suggested Manhole Diameter (mm) 1200

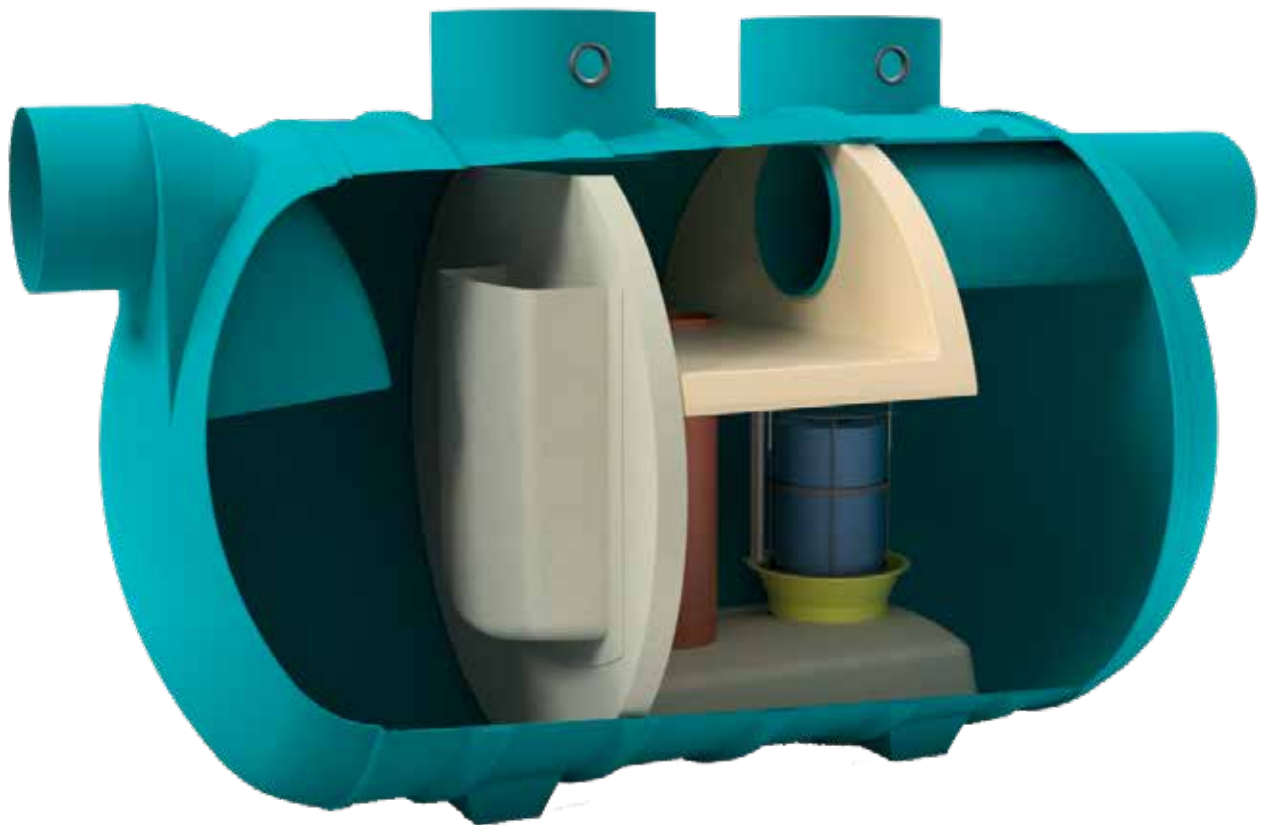
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.0
Flush-Flo™	0.297	3.0
Kick-Flo®	0.623	2.4
Mean Flow over Head Range	–	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	3.3	3.000	5.0	7.000	7.4
0.200	2.9	1.400	3.5	3.500	5.4	7.500	7.7
0.300	3.0	1.600	3.7	4.000	5.7	8.000	7.9
0.400	2.9	1.800	3.9	4.500	6.0	8.500	8.2
0.500	2.8	2.000	4.1	5.000	6.3	9.000	8.4
0.600	2.5	2.200	4.3	5.500	6.6	9.500	8.6
0.800	2.7	2.400	4.5	6.000	6.9		
1.000	3.0	2.600	4.7	6.500	7.2		

©1982-2016 XP Solutions

APPENDIX H – MAINTENANCE SHEETS



SPEL ESRTM Bypass

SuDS Treatment System

Operation & Maintenance Manual

SPEL ESR™ Bypass Operation & Maintenance

Introduction

With correct and consistent care, and by following a few simple guidelines, your system will give you many years of dependable service.



Installation

For installation guidance, see SPEL Data Manual, Section 7.

All applicable health and safety regulations must be followed.

IMPORTANT

In the unlikely event of the chamber having to be entered ensure absolutely that all Workplace Health & Safety directives and Confined Space Regulations are strictly adhered to.

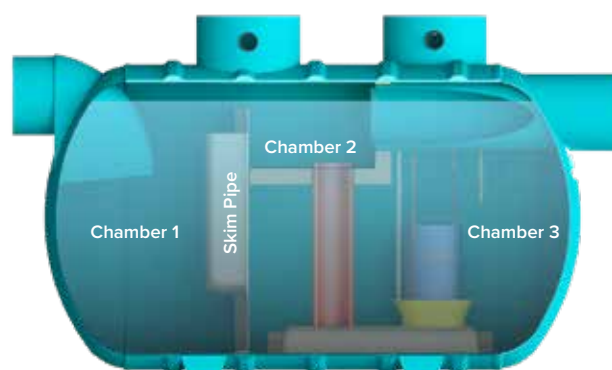
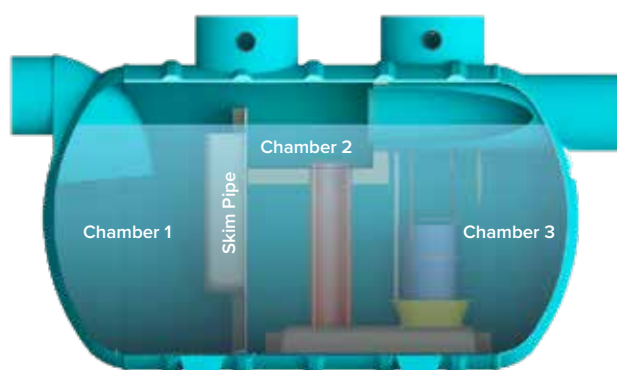


SPEL ESR™ Bypass SuDS Treatment System

Operation

The SPEL ESR™ Bypass system is a SuDS Compliant treatment device designed to treat up to the 1 in 1 year return storm event with the excess flow being allowed to bypass the treatment stage (see diagrams below). Engineers will have specified our ESR Bypass System to cope with and treat the flow from the connected catchment area, with the complete operation being contained within the SPEL system.

The installation of your SPEL ESR™ system should have included commissioning by a qualified person, SPEL can offer a full commissioning service and/or a post-commissioning system check, together with relevant certification.



Flows according to nominal size (NSB)

The polluted surface water first enters the primary chamber where silt settles out and is retained. The fuel, oil and other pollutants lighter than water, rise to the surface and are efficiently skimmed off and transferred to the separation chamber.

In normal conditions all the flow is through the separation chamber, where the quiescent conditions allow the pollutants to separate out efficiently. Water from the cleanest zone in the separation chamber flows through a coalescer unit, to remove smaller globules of oil, up to the junction chamber and thence to the outlet

Storm flows above NSB

During a storm the level in the primary chamber rises and the stormwater passes over the weir into the junction chamber and to the outlet.

The design keeps the turbulence within the separation chamber to a minimum which avoids disturbing the contaminants retained.

Chamber 1

The inlet connects directly into chamber 1 - the primary chamber where silt and other heavy pollutants are deposited and light liquids are skimmed off to be transferred to the main separation chamber, chamber 3.

Maintenance requires the removal of accumulated silt and other heavy pollutants, checking the skim pipe is not blocked and removing floating debris.

Chamber 2

This is the junction chamber where the clean water passing out of the main separation chamber and the storm flow over the weir from the primary chamber meet and pass to the outlet. This chamber is an approved sampling point if samples are required for analysis. As it is mainly clean water passing through the chamber, maintenance is confined to checking the weir plate is free of debris.

Chamber 3

The main separation chamber is where the light liquids are retained and, in the case of ESR Bypass Systems, where the coalescer units are incorporated.

The coalescer units should be removed and cleaned in accordance with the requirements set out on Page 5.

Retained light liquids should be removed from the top and any sediment from the bottom. Smaller Bypass systems generally need to be completely emptied.

SPEL ESR™ Bypass SuDS Treatment System

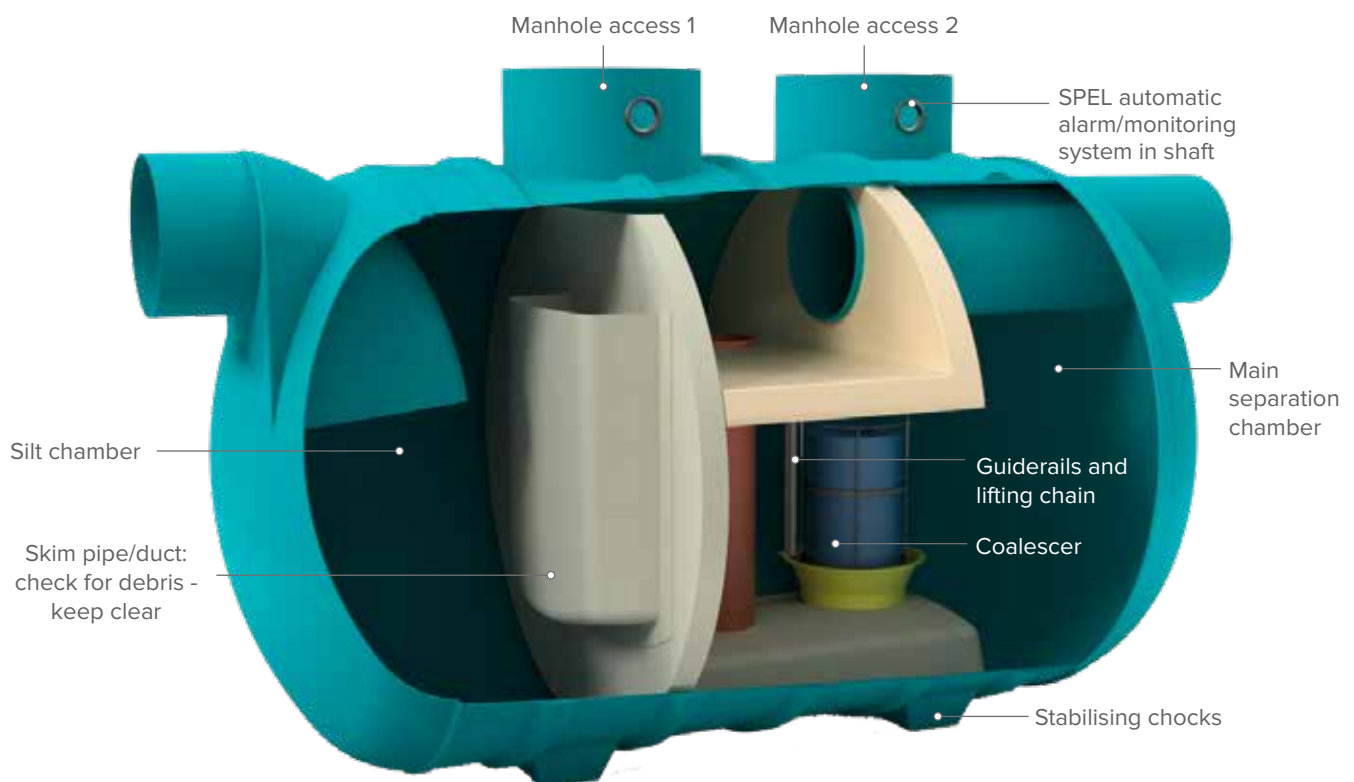
The SPEL ESR™ Bypass System is fully certified to meet the CIRIA SuDS Mitigation Index. It has been tested by WRc to the British Water Code of Practice for Manufactured Treatment Devices. This unit is also certified to the British and European Standard BS EN 858 by HR Wallingford. SPEL ESR Bypass systems are designed for long term performance and with SPEL high volume coalescer units, low maintenance.

SPEL ESR™ Bypass Systems are manufactured in class 1 models and with silt capacity in accordance with BS EN 858-1. The range of models is listed in the SPEL Data Manual or on the SPEL website.

SPEL automatic alarm/monitoring systems will automatically warn you when the SPEL ESR™ Bypass System requires emptying of light liquids and/or silts (depending on the alarm system chosen). However, regular inspections are recommended at intervals to suit the site conditions. We recommend the SPEL ESR™ Bypass System is checked at 3, 6, or 12 monthly intervals to ensure correct operation of the treatment device, alarm and check the pollutant levels.

Where a SPEL automatic alarm/monitoring system is not fitted, the SPEL ESR™ Bypass System should be checked at 3, 6, 12 monthly intervals, depending upon site conditions, to determine the depth of retained pollutants. When the depth of light liquids retained has reached the predetermined design level in accordance with the European Standard BS EN 858-1, or if excessive silt has accumulated, it should be emptied.

Maintenance Access



A wide range of SPEL ESR™ Bypass treatment devices are available incorporating coalescer unit/s for small to large catchment areas.

When emptying ensure both chambers (primary – chamber 1 and separation – chamber 3) are emptied equally to prevent unequal pressure on the internal partition.

Manhole access 1

This is the access to the primary chamber for removal of silt, the inspection of the skim pipe and clearing of any floating debris.

This also provides access to the junction chamber which is suitable as a sampling point for the final discharge.

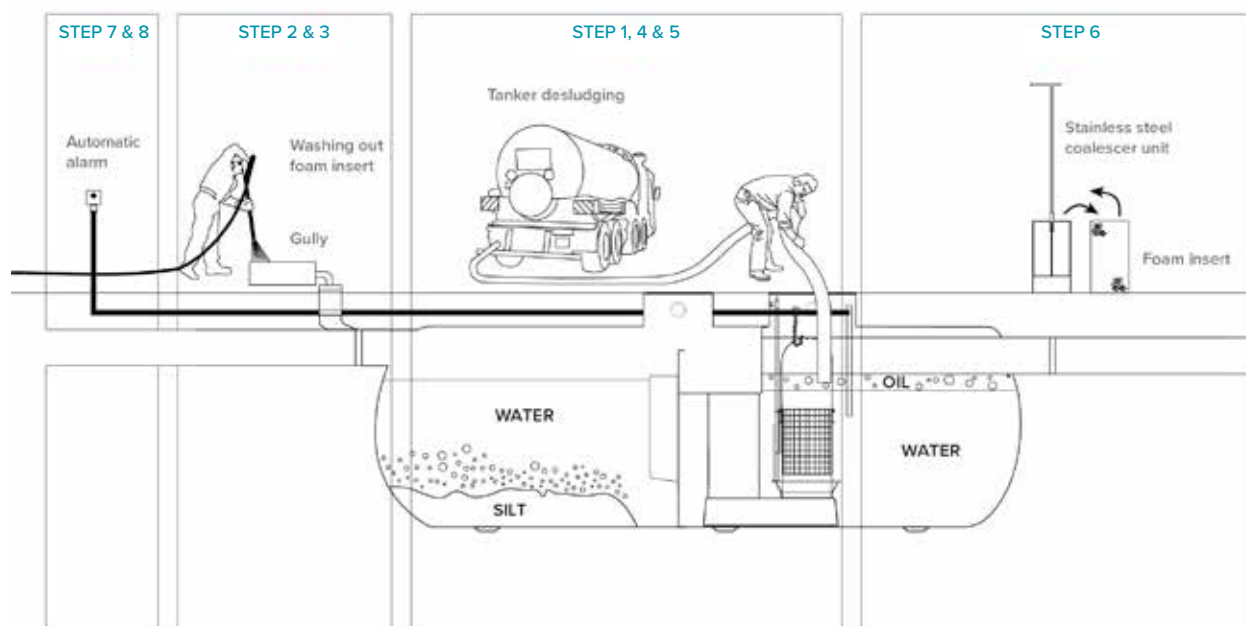
Manhole access 2

This provides access for the inspection, the removal and reinsertion of the coalescer units and the removal of hydrocarbons and silt. The SPEL automatic alarm/monitoring system probe is generally situated at in a probe protection tube in this access shaft (see section on alarms).

This is an example, exact number and location of access shafts will depend on exact model chosen.

SPEL ESR™ Bypass SuDS Treatment System

Maintenance



Important Note: When emptying, ensure both chambers are emptied equally starting with the silt retention chamber and then the coalescer chamber and back again until empty.

STEP 1

Sucking out oil/fuel

Suck off as much retained oil from both chambers of the ESR System as possible. This prevents oil coating the surface of the coalescer if this is removed first.

STEP 2

Coalescer Unit

Using the lifting handle, chain or wire rope, lift the coalescer unit out of the tank and place upstream of the ESR System.

STEP 3

Cleaning
Foam Insert

Remove foam insert and wash with normal water pressure ensuring the dirty water runs into the ESR System.

STEP 4

Sucking out silt

For Intermediate Maintenance, the use of a tanker with a rigid suction pipe can suck out the silt from the base of the system, without the need to empty the complete unit.

Note: For Intermediate Maintenance, go to Step 6.

STEP 5

Sucking out
complete contents
(if necessary)

For a Full Maintenance (at least once every 5 years, as recommended by EA, SEPA and NRW) the complete contents will need to be emptied and a structural and component check conducted.

Note: SPEL Recommend the replacement of coalescer unit(s) at all Full Maintenance intervals.

STEP 6

Re-insert coalescer unit

Re-insert the foam insert into the stainless steel coalescer basket and re-insert the coalescer unit into the ESR System. Re-position the lifting handle, chain or wire rope.

STEP 7

SPEL automatic alarm
monitoring system

The SPEL automatic alarm/monitoring system probe should be lifted out of the probe protection tube, wiped clean and re-inserted. The system should now be reset according to instructions. See Section 8 (Alarms) in the SPEL Data Manual.

STEP 8

Test SPEL automatic alarm

To test an alarm is working, ensure the previous step has been carried out.

Following this, an oiler silt alarm should sound when clean and dry and in contact with air, therefore, holding it in the air should set off the alarm on the control panel. For high level liquid alarms, putting them in water should set off the alarm.

SPEL Coalescer System

Important: ensure all coalescers are correctly seated in the coalescer cone following maintenance. The SPEL Coalescer Guide Rail or 3L System helps ensure correct seating.

SPEL Coalescer

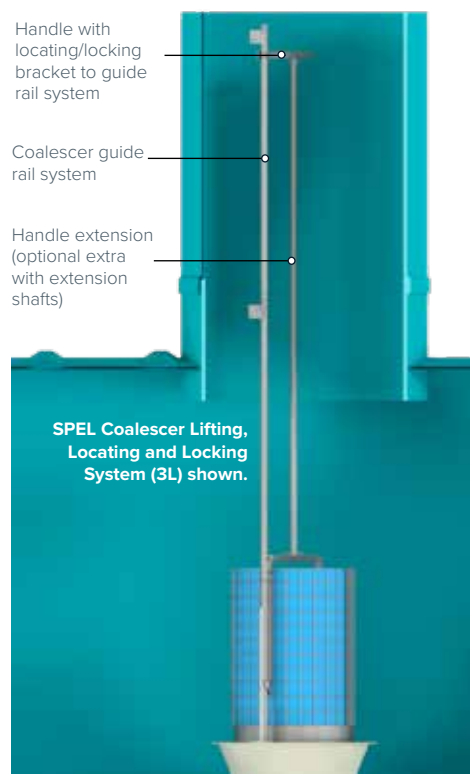
Normal servicing of the smaller SPEL systems frequently requires emptying the unit completely providing access for the coalescer units to be taken out, cleaned and returned and guided accurately to their seating positions. However larger SPEL systems may only require the hydrocarbon pollutants and silt to be removed.

In order to limit the servicing to sucking off the fuel/oil from the top and the silt from the bottom guide rails are required to ensure coalescer units are replaced into their correct positions.



SPEL Coalescer Lifting, Locating and Locking System (3L)

The SPEL 3L System has all the benefits of the below SPEL Guide Rail System and includes a locking mechanism and rigid lifting handle, this locks the coalescer in position and makes for easier lifting and locating.



SPEL Coalescer Guide Rail Systems

SPEL Guide Rail Systems are optional but strongly recommended for all tanks with deeper inverts or larger than 300 Series (1.8m dia.).



SPEL Coalescer System without Guide Rails

Optional lifting chains available for ease of maintenance.

Automatic Alarms/Monitoring Systems

Alarm systems are available for all SPEL Systems. These include probes for oil, silt and high level. There are also a range of control panels including solar power, more detail on our alarm systems can be found in Section 8.

Maintenance procedure

The SPEL automatic alarm/monitoring system will automatically warn you when the treatment system requires emptying. Where a SPEL automatic alarm/monitoring system is not fitted, SPEL systems should be checked at three, six or twelve-monthly intervals depending on site conditions, to determine the depth of retained pollutants and silt in both chambers. When the depth of the oil/fuel retained has reached the predetermined design level, in accordance with BS EN 858-1, it should be emptied.

Control Panels



Mains Powered Separator Alarms

For silt, oil and high level detection, compatible with the below alarm probes.

Solar Alarms

Available with optional flashing beacon, and GMS/ SMS communication, also compatible with the below alarm probes.

Alarm Probes



idOil-OIL oil probe

Detects oil and indicates when the treatment system's oil storage is full.

This probe is required in order for a treatment device to comply with BS EN 858.



idOil-SLU silt probe

Monitors the silt layer in the treatment system and indicates when the silt layer has reached its maximum level.



idOil-LiQ high liquid level probe

Indicates when the liquid level in the treatment system rises excessively e.g. in an outlet blockage situation.

Kiosks for externally mounted alarm/control panels are available. See Section 8 of our Data Manual for further detail.



Warranty

SPEL Underground Tank Shells

We warrant that our SPEL Tankstor® and Separator underground tank shells, as identified by the serial number, if installed strictly in accordance with the company's relevant installation procedure as detailed in the SPEL Data Manual, Section 7, Installation Guidance and verified with an 'as built' installation drawing prepared by a qualified design consultant or an approved person and stage photographs to show the methods adopted from start to completion having in mind particularly:- ground conditions, invert depth, water table depth in winter, external loading, type and quality of backfill material, will

1. providing our published specifications and installation requirements are fully met the shell laminate integrity will last for a period of twenty-five years following date of original delivery/collection.
2. not fail for a period of twenty-five years from the delivery/collection date due to external corrosion; and
3. not fail for a period of twenty-five years from the delivery/collection date due to internal corrosion provided the tank is solely used for:-

Rainwater storage

Potable water at ambient temperatures

Fuel/oil contaminated surface rainwater

Domestic sewage

For other applications the life expectancy will be determined by the contents, the operating conditions and the resin system/reinforcement specification used.

SPEL GRP Extension shafts come with a 12 month warranty as long as they are installed in-line with the SPEL Data Manual Section 7 Installation Guidance and verified with verified with an 'as built' installation drawing prepared by a qualified design consultant or an approved person and stage photographs to show the methods adopted from start to completion having in mind particularly:- ground conditions, invert depth, water table depth in winter, external loading, type and quality of backfill material.

Our liability under this warranty is set out in SPEL General Conditions of Sale available on request. In brief they shall be limited to, at our option,

- (1) repair of the defective tank
- (2) delivery of a replacement tank to the original site or
- (3) refund of the original purchase price.

We shall not be liable for any labour or other installation costs, indirect or consequential loss, damage or other damages in connection with such tanks.

Accessory warranties do not extend beyond the warranty period by our suppliers. This applies to such items as access covers and frames, monitoring equipment, Bauer type connections for emptying, pumping equipment or any accessories as defined in the company's official order acknowledgement/invoice.

The foregoing constitutes our exclusive obligation and we make no express or implied warranties, or any warranty of merchantability or fitness for any particular purpose whatsoever, except as stated.

Maintenance Log

Site Visit and Maintenance Carried Out

Company		Address	
Model Number		Asset Number/Location	
Serial Number		Installation Date	

Date	Visual Check	Oil Probe Clean/Check	Silt Probe Clean/Check	Control Panel Check/Test	Tank Empty	Coalescer Check/Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations Date of Next Service:								

Date	Visual Check	Oil Probe Clean/Check	Silt Probe Clean/Check	Control Panel Check/Test	Tank Empty	Coalescer Check/Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations								

Date of Next Service:

Date	Visual Check	Oil Probe Clean/Check	Silt Probe Clean/Check	Control Panel Check/Test	Tank Empty	Coalescer Check/Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations								
Date of Next Service:								

Maintenance Log

Site Visit and Maintenance Carried Out

Company		Address	
Model Number		Asset Number/Location	
Serial Number		Installation Date	

Date	Visual Check	Oil Probe Clean/ Check	Silt Probe Clean/ Check	Control Panel Check/Test	Tank Empty	Coalescer Check/ Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations Date of Next Service:								

Date	Visual Check	Oil Probe Clean/Check	Silt Probe Clean/Check	Control Panel Check/Test	Tank Empty	Coalescer Check/Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations Date of Next Service:								

Date	Visual Check	Oil Probe Clean/Check	Silt Probe Clean/Check	Control Panel Check/Test	Tank Empty	Coalescer Check/Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations Date of Next Service:								

Maintenance Log

Site Visit and Maintenance Carried Out

Company		Address	
Model Number		Asset Number/Location	
Serial Number		Installation Date	

Date	Visual Check	Oil Probe Clean/ Check	Silt Probe Clean/ Check	Control Panel Check/Test	Tank Empty	Coalescer Check/ Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations Date of Next Service:								

Date	Visual Check	Oil Probe Clean/ Check	Silt Probe Clean/ Check	Control Panel Check/Test	Tank Empty	Coalescer Check/ Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations Date of Next Service:								

Date	Visual Check	Oil Probe Clean/Check	Silt Probe Clean/Check	Control Panel Check/Test	Tank Empty	Coalescer Check/Clean	Coalescer Replacement	Structural Check
Tick all that apply								
Comments/Observations Date of Next Service:								

Operation & Maintenance

With SPEL Products

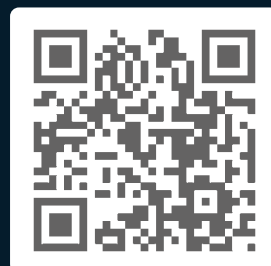
A guide that outlines the best practices, ensuring your SPEL system is achieving the best results for longer.



Lancaster Road, Shrewsbury, Shropshire SY1 3NQ

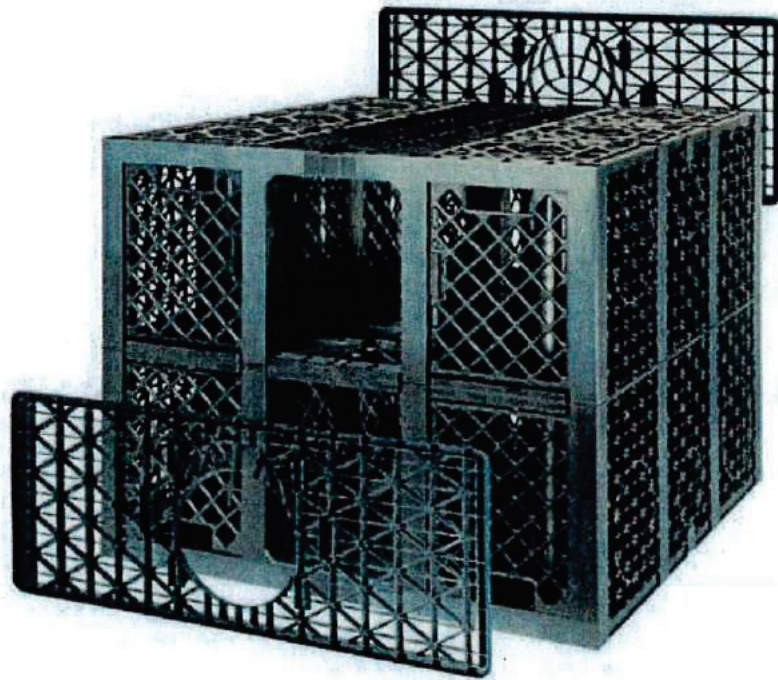
Phone: +44 (0)1743 445200

Email: info@spelproducts.co.uk / sales@spelproducts.co.uk

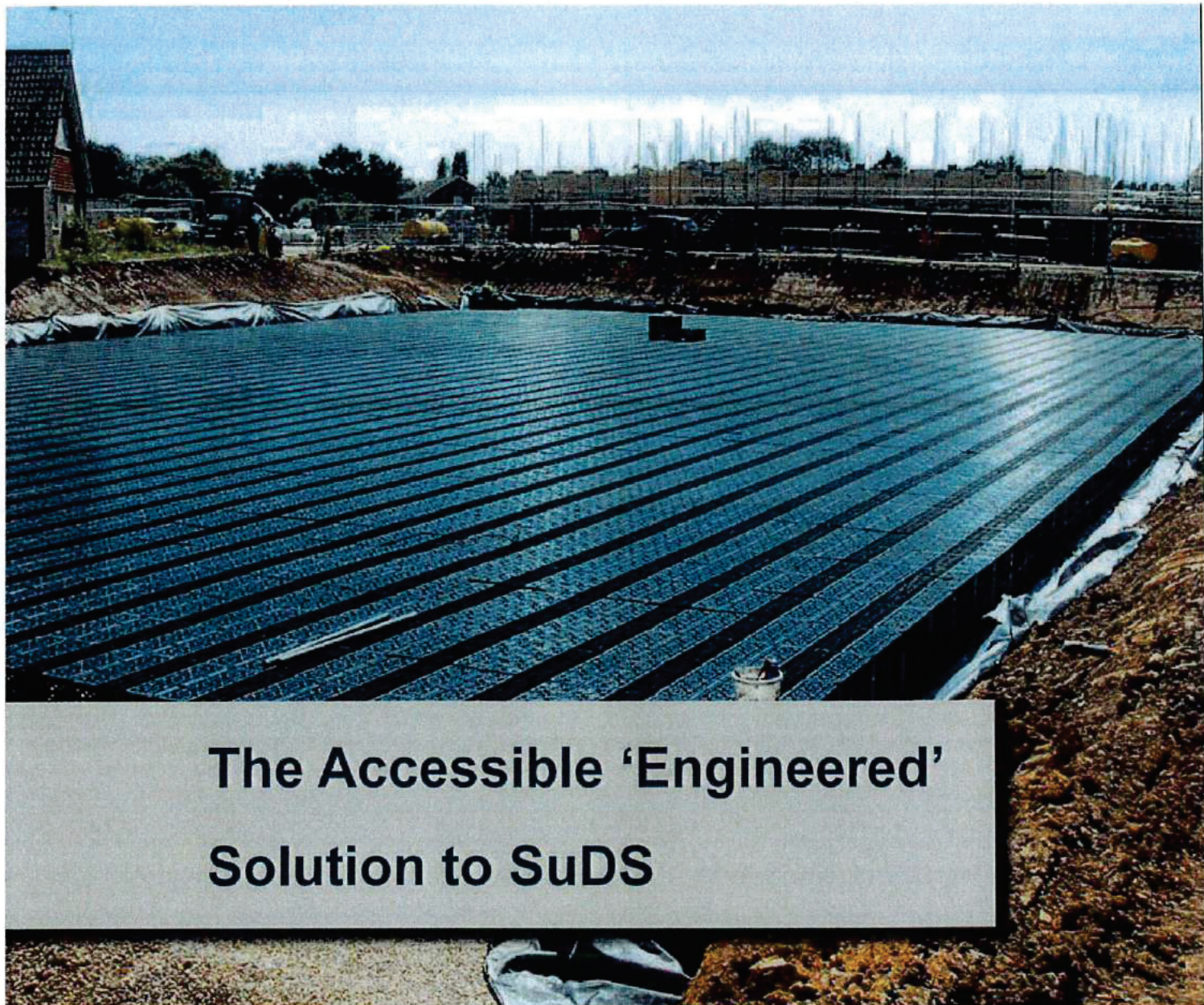


spelproducts.co.uk

15/07



Stormbloc® User Manual



The Accessible 'Engineered' Solution to SuDS

SuDS / Source Control

Regulatory and guidance documents such as PPS 25 and Building Regulations are putting increasing demands on developers and engineers to consider sustainable drainage systems (SuDS) wherever possible and to incorporate source control approaches into surface water drainage systems.

*"Sustainable drainage systems (SuDS) are increasingly being used to mitigate the flows and pollution from runoff. The philosophy of SuDS is to replicate as closely as possible the natural drainage from a site before development and to treat runoff to remove pollutants, so reducing the impact on receiving watercourses. This requires a reduction in the rate and volume of runoff from developments, combined with treatment to remove pollutants as close to the source as possible."*¹

¹ CIRIA C609 (2004) - Sustainable Drainage Systems - Hydraulic, structural and water quality advice.



Maintenance Instructions

The patented inspection / maintenance tunnels within each Stormbloc® module allows almost the entire volume of the construct to be inspected via CCTV camera and flushed through.

A catchpit chamber immediately upstream of the system is recommended as this will reduce the amount of silt entering the installation. For larger installations it may also be advantageous to add further catchpits to the system design or an advanced vortex silt trap such as the Downstream Defender® by Hydro International. The collection sump(s) should not be allowed to overfill as this will lead to silt carry-over into the Stormbloc® modules.

As all schemes are different, the frequency at which the catchpit(s) should be emptied will need to be determined on site. For small soakaways and individual infiltration tanks it will generally only be necessary to ensure that the catchpits / silt traps are free from debris such as leaves or sediment. It is recommended that any 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.

Individual maintenance schedules should be drawn up using the information obtained from the initial inspections. 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.

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 Stormbloc® Inspect / manhole and the integral inspection / maintenance tunnel. The silt should be flushed to the Stormbloc® Inspect or catchpit manhole and removed from there.

References

- 1 Water Research Centre (2001)
Sewers for Adoption 5th Edition.
- 2 Department for Transport, Local Government and the Regions (2001).
Planning Policy Statement (PPS), Note 25: Development and Flood Risk.
- 3 The Building Regulations 2000 (amended 2001).
Approved Document H3.
- 4 British Standards Institute (1973).
CP312: Part 1: 1973 British Standard Code of Practice for Plastics Pipework (Thermoplastics Material). General Principles and Choice of Material.
- 5 Building Research Establishment (1991).
BRE Digest 365, Soakaway Design.
- 6 Construction Industry Research and Information Association (1995).
CIRIA Report 156 Infiltration Drainage - Manual of Good Practice.
- 7 Construction Industry Research and Information Association (1997)
The SUDS Manual (C. 697).
- 8 Micro Drainage.
The Micro Drainage Suite of Programs.
Website: www.microdrainage.co.uk
- 9 Hydro International.
Stormcell® User Manual.
- 10 Hydro International.
Stormwater Package Brochure.
- 11 WTB Geotechnics
SC Membrane: Technical Data Sheet.
- 12 WTB Geotechnics
AZTEX SPR14 Geotextile Technical Data Sheet.

Hydro International PLC

Shearwater House
Clevedon Hall Estate
Victoria Road
Clevedon
Somerset BS21 7RD

Tel: 01275 337977 Fax: 01275 874979
e-mail: enquiries@hydro-international.co.uk
website: www.hydro-international.biz



Agrément Certificate

10/4795

Product Sheet 1

HYDRO INTERNATIONAL STORMWATER MANAGEMENT SYSTEMS

STORMBLOC STORMWATER MANAGEMENT SYSTEM

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This relates to the Stormbloc Stormwater Management System, for use as sub-surface water storage or as a soakaway to manage run-off from impermeable surfaces.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



KEY FACTORS ASSESSED

System design — information is provided in the Certificate to assist in the design of a stormwater management system (see section 5).

Strength — the system has adequate strength and stiffness to resist long- and short-term loads when used in accordance with this Certificate (see section 6).

Resistance to chemicals — the system will have adequate resistance to the types and levels of chemicals likely to be found in rainwater and soils normally encountered in civil engineering practice (see section 9).

Durability — the system will have a service life in excess of 50 years when installed in accordance with this Certificate (see section 11).

The BBA has awarded this Agrément Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 24 December 2010

Brian Chamberlain

Head of Approvals — Engineering

Greg Cooper

Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

©2010

tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba-star.co.uk
website: www.bbacerts.co.uk

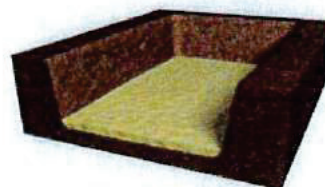
STORMBLOC® STORAGE SYSTEM – INSTALLATION GUIDELINES

Notes: Detailed design advice and installation instructions can be found in the Stormbloc® User Manual. Stormbloc® modules are delivered in stacks of 4 No 0.66m deep modules (20kg per module) or 8 No 0.35m deep modules (12kg per module). The maximum mass of any Stormbloc® Inspect component is 48kg. Modules should not be dropped or thrown and impacts should be avoided. Care should be taken when walking on the modules as these may be slippery especially when wet or frosty.

1) Excavate the area for the installation in accordance with the design. For installations greater than 3m from finished cover level to the base of the Stormbloc® tank, advice should be sought from Hydro International.



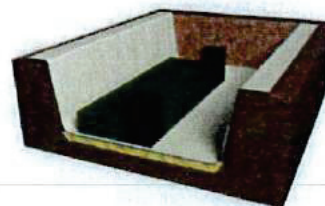
2) Form a level sand or gravel subgrade layer, min 100mm deep.



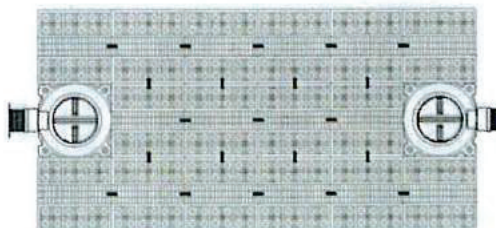
3) Line the excavation with a suitable impermeable geomembrane (min 460 g/m²). On sites where there are concerns relating to contamination, or groundwater level / protection, a fully encapsulated system, with a heat sealed membrane installed by a specialist lining contractor will often be required. Where multiple sheets are required, these should be lapped and sealed in accordance with the manufacturer's recommendations.



4) Inspect the modules for damage prior to installation. Lay the Stormbloc® modules and Stormbloc® Inspect Chambers on the geomembrane in accordance with the design. The integral inspection tunnels within the modules should generally create a continuous line along the length of the tank.

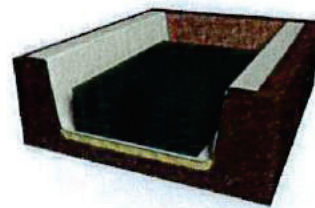


5) The modules should be connected using the supplied connecting pieces in the centre of each edge that neighbours another module. Where a single layer of 0.35m deep modules is used, the supplied connecting pieces should link the top of the structural support pillars of neighbouring modules.



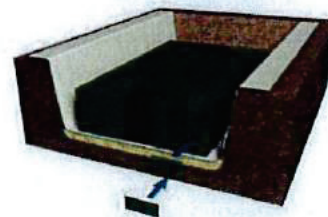
6) For multi-layer designs, the supplied multi-layer connectors should be used between layers. Modules on the second and subsequent layers can then be located using the multi-layer connectors.

Where 0.35m deep modules are used, these should form the top layer and oriented such that the text imprinted on the 0.35m deep module is at the bottom edge.



7) All tunnel ends should be fitted with the appropriate end plate as supplied. End plates can be provided blank, with holes pre-cut to ease pipe connections, or with an adapter spigot in accordance with the design.

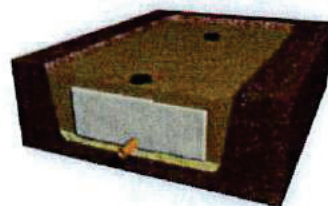
Pipe connections into the Stormbloc® Inspect modules may require a band-seal to attach onto the spigot. Please contact Hydro International for site specific details.



8) The sides and top of the Stormbloc® system should be completely wrapped within the geomembrane. Holes should be cut into the geomembrane to accommodate pipe connections and the extension shaft on the Stormbloc® Inspect chambers. Where multiple sheets are required, these should overlap by min 300mm. All joins, laps and pipe connections must be appropriately sealed.



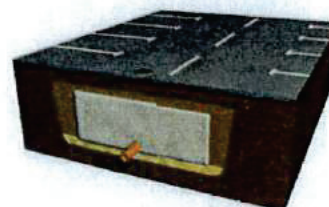
9) The sides of the excavation should be filled with a suitable granular material such as Type 1 or Type 2 sub-base or Class 6P selected granular material as defined in the Department for Transport Specification for Highway Works (SHW). This material should be compacted in 150mm layers using a laminar working device. Care should be taken to ensure that the geomembrane is not punctured or torn during installation or backfilling.



10) Backfill over the top of the modules should also be carried out using Type 1 or Type 2 sub-base in accordance with the Department for Transport Specification for Highway Works (SHW). The initial 300mm of cover should be compacted using a laminar working device. Thereafter other types of compaction plant may be used provided the mass per metre width $\leq 2300\text{kg}$.



11) Once 500mm of well compacted cover has been achieved, heavier plant may run across the system up to a maximum mass per metre width of 5000kg. The wheel load from tipper trucks and excavators should not exceed 50 kN fully loaded. Vehicles should only traverse above the Stormbloc® in straight passes. If a change in direction is required, vehicles should drive off the system, turn and drive back on in the direction required.



Hydro International Ltd

Unit 2 Rivermead Court
Kenn Business Park
Windmill Road
Clevedon BS21 6FT

Tel: 01275 878371 (general enquiries)
Tel: 01275 337937 (Hydro-Brake sales/support)
e-mail: stormwater@hydro-int.com
website: www.hydro-int.com



Agrément Certificate

08/4596

Product Sheet 1 Issue 6

HYDRO INTERNATIONAL HYDRO-BRAKE FLOW CONTROLS

S-RANGE HYDRO-BRAKE OPTIMUM FLOW CONTROLS

This Agrément Certificate Product Sheet⁽¹⁾ relates to S-Range Hydro-Brake Optimum Flow Controls⁽²⁾, a range of units to control the discharge outlet flow in stormwater management systems.

(1) Hereinafter referred to as 'Certificate'.

(2) Hydro-Brake, and Kick-Flo are registered trademarks of Hydro International Ltd.

The assessment includes

Product factors:

- compliance with Building Regulations
- compliance with additional regulatory or non-regulatory information where applicable
- evaluation against technical specifications
- assessment criteria and technical investigations
- uses and design considerations

Process factors:

- compliance with Scheme requirements
- installation, delivery, handling and storage
- production and quality controls
- maintenance and repair

Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review



KEY FACTORS ASSESSED

- Section 1. Mechanical resistance and stability
- Section 2. Safety in case of fire
- Section 3. Hygiene, health and the environment
- Section 4. Safety and accessibility in use
- Section 5. Protection against noise
- Section 6. Energy economy and heat retention
- Section 7. Sustainable use of natural resources
- Section 8. Durability

The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Sixth issue: 12 October 2023

Originally certificated on 18 October 2008

Hardy Giesler
Chief Executive Officer

This BBA Agrément Certificate is issued under the BBA's Inspection Body accreditation to ISO/IEC 17020. Sections marked with † are not issued under accreditation.

The BBA is a UKAS accredited Inspection Body (No. 4345), Certification Body (No. 0113) and Testing Laboratory (No. 0357).

Readers MUST check that this is the latest issue of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

The Certificate should be read in full as it may be misleading to read clauses in isolation.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

British Board of Agrément

Building 3, Hatters Lane
Croxley Park, Watford
Herts WD18 8YG

©2023

tel: 01923 665300
clientservices@bbacerts.co.uk
www.bbacerts.co.uk

SUMMARY OF ASSESSMENT AND COMPLIANCE

This section provides a summary of the assessment conclusions; readers should refer to the later sections of this Certificate for information about the assessments carried out.

Compliance with Regulations

Having assessed the key factors, the opinion of the BBA is that S-Range Hydro-Brake Optimum Flow Controls, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations:



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	H3(3)	Rainwater drainage
Comment:		The products can contribute to satisfying this Requirement. See section 1 of this Certificate.
Requirement:	7(1)	Materials and workmanship
Comment:		The products are acceptable. See sections 8 and 9 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of workmanship and materials
Comment:		The products can contribute to satisfying this Regulation. See sections 8 and 9 and the Annex of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.6	Surface water drainage
Comment:		The products can contribute to satisfying this Standard, with reference to clauses 3.6.1 ⁽¹⁾⁽²⁾ to 3.6.5 ⁽¹⁾⁽²⁾ . See section 1 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The products can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	12	Building standards applicable to conversions
Comment:		Comments made in relation to the products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ .
		(1) Technical Handbook (Domestic).
		(2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23(1)(a)	Fitness of materials and workmanship
Comment:	(i)(iii)(b)	The products are acceptable. See sections 8 and 9 of this Certificate.
Regulation:	82	Rainwater drainage
Comment:		The products can be used in a construction to satisfy this Regulation. See section 1 of this Certificate.

Fulfilment of Requirements

The BBA has judged S-Range Hydro-Brake Optimum Flow Controls to be satisfactory for use as described in this Certificate. The products have been assessed as units to control the discharge outlet flow in stormwater management systems.

ASSESSMENT

Product description and intended use

The Certificate holder provided the following description for the products under assessment. S-Range Hydro-Brake Optimum Flow Controls are vortex flow controls manufactured from 3, 5 or 8 mm thick grade 1.4301 (A1 304)/ 1.4307 (A2 304L) and 1.4401 (A4 316)/ 1.4404 (A4 316L) stainless steel to BS EN 10088-4 : 2009. The units are self-activating without any moving parts and do not, therefore, require external power.

S-Range Hydro-Brake Optimum Flow Controls consist of:

- integral bypass door — on the front face of the unit, outlet pipe location spigot and mounting face gasket or push-fit sealing rings
- wire rope — to allow remote operation of the pivoting bypass door (3 mm diameter rope consisting of 7 x 7 strand elements of 0.018 mm diameter) and stainless-steel wire rope attachment brackets.

The products have the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	Typical range of values
Design flow rate ($\text{l}\cdot\text{s}^{-1}$)	0.7 to 250
Design head (m)	0.4 to 4
Maximum lateral dimension (mm)	
Lug mounted units	180 to 2000
Backplate mounted units	Dependent on discharge pipe size
Push-fit units	180 to 2000
Mass (kg) excluding packaging	
Lug mounted units	6 to 680
Backplate mounted units	Dependent on discharge pipe size
Push-fit units	6 to 680

The products are available with the following types of mounting arrangement:

- lug mounting — lugs are provided at points around the perimeter of the flow control mounting face. This is appropriate for the majority of applications where the outlet diameter of the installation structure is approximately 0.5 times the flow control body diameter or less
- push-fit spigot — a push-fit spigot with rubber sealing rings is provided. A single lug may also be provided on the outside perimeter of the mounting face to prevent rotation of the flow control in service. Precise specification of the outlet pipe is essential for push-fit mounting, in order to ensure a watertight seal
- backplate mounting — a rectangular mounting plate is provided to allow fixing to the outlet of the installation structure where lug mounting is not appropriate. If a flat surface is not available, the mounting plate may also be provided curved to the same radius as the chamber in which it is to be fitted.

Ancillary Items

The Certificate holder recommends the following ancillary items for use with the products, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- mounting anchor bolts (A2 304L or A4 316 stainless steel)
- storage facilities.

The products are intended for use in stormwater management systems to restrict the outlet flow from the system by increasing back pressure, achieved by inducing a vortex flow pattern in the water passing through the device. In this application, the units are often used in conjunction with geocellular storage systems, concrete tanks and oversized pipes and ponds.

Product assessment – key factors

The product was assessed for the following key factors, and the outcome of the assessments is shown below. Conclusions relating to the Building Regulations apply to the whole of the UK unless otherwise stated.

1 Mechanical resistance and stability

Data were assessed for the following characteristics.

1.1 Strength and stability

1.1.1 An assessment was made of the structural adequacy of the products under loads that they are expected to resist.

1.1.2 The products are manufactured from stainless steel of a sufficient strength and thickness to ensure that the products remain fit for purpose throughout their design life.

1.1.3 Under normal operation, the products will deflect by no more than the thickness of the material used for manufacture. This ensures that the volume of the unit available for water flow is not compromised during operation and therefore the hydraulic operation of the unit is not adversely affected by deformation of the unit.

1.2 Flow characteristics

1.2.1 An assessment of computational fluid dynamic (CFD) modelling was used to predict the hydraulic performance of the products.

1.2.2 An assessment of the Certificate holder's predicted characteristics was made against the results of hydraulic performance tests. Results of tests are given in Table 2.

Table 2 Characteristics of flow

Product assessed	Assessment method ⁽¹⁾	Requirement	Result
S-Range Hydro-Brake Optimum Flow Controls	Volume flow rate	±5% accuracy	Pass
	Dimensional accuracy	±2 mm accuracy	Pass

(1) In accordance with *Final Test Specification: Verification of Head Versus Flow Characteristic for Hydro International Hydro-Brake Flow Controls* document.

1.2.3 On the basis of data assessed, the products are deemed fit for the purpose of controlling the discharge outlet flow rates.

2 Safety in case of fire

Not applicable.

3 Hygiene, health and the environment

Not applicable.

4 Safety and accessibility in use

Not applicable.

5 Protection against noise

Not applicable.

6 Energy economy and heat retention

Not applicable.

7 Sustainable use of natural resources

The products are manufactured from stainless steel, which can be recycled.

8 Durability

8.1 The potential mechanisms for degradation and the known performance characteristics of the materials in the products were assessed.

8.2 Under normal service conditions, the products will have a life of at least 60 years, provided they are designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

PROCESS ASSESSMENT

Information provided by the Certificate holder was assessed for the following factors:

9 Design, installation, workmanship and maintenance

9.1 Design

9.1.1 The design process was assessed by the BBA, and the following requirements apply in order to satisfy the performance assessed in this Certificate:

9.1.1.1 The products are used to control flows across, or to limit the rate of discharge from, a site. Where used to limit the rate of discharge from a site, the allowable discharge rate to an appropriate outfall must be set by the Environmental Regulator, local Planning Authorities or the Sewer Undertaker.

9.1.1.2 The configuration of the inlet, volute and outlet is varied to achieve the required discharge control characteristics. The units must be fitted with a fixed inlet or an adjustable inlet gate to allow for post-installation adjustment of the discharge flow rate by up to 40%.

9.1.1.3 A minimum clear opening of 50 mm for protected and 100 mm for unprotected drainage system is needed. Except for some situations, where it is required to use a flow control with a smaller minimum opening. In which case, the installation of screens or debris removal systems upstream of the device is necessary.

9.1.2 Guidance on design of sustainable drainage systems is given in *Flood risk and coastal change guidance* and CIRIA C753 : 2015.

9.1.3 Additional information on flow characteristics of the units are given in Annex A of this Certificate.

9.2 Installation

9.2.1 Installation instructions provided by the Certificate holder were assessed and judged to be appropriate and adequate.

9.2.2 Installation must be carried out in accordance with this Certificate and the Certificate holder's instructions. A summary of instructions and guidance are provided in Annex A of this Certificate.

9.2.3 The units may be supplied for installation in purpose-built or existing structural housings on site. These must have adequate strength to resist the loads imposed by the units. The design of these structures is outside the scope of this Certificate.

9.2.4 The units may also be supplied ready-fitted to purpose-built reinforced concrete or plastic manhole chambers ready for installation into the ground. The performance of these chambers is outside the scope of this Certificate.

9.2.5 Other than where a curved backplate is supplied, this must incorporate a flat mounting surface on the inside face of the chamber wall at the outlet pipe.

9.2.6 The benching must be formed as indicated on the installation drawing.

9.2.7 Where an adjustable inlet gate is provided, the factory set position must not be adjusted without prior consultation with the Certificate holder.

9.3 Workmanship

Practicability of installation was assessed by the BBA on the basis of the Certificate holder's information and a site visit to witness installation in progress. To achieve the performance described in this Certificate, installation of the products must be carried out by a competent general builder, or a contractor, experienced with these types of products.

9.4 Maintenance and repair

9.4.1 Ongoing satisfactory performance of the products in use requires that they are suitably maintained. The guidance provided by the Certificate holder was assessed by the BBA and found to be appropriate and adequate.

The following requirements apply in order to satisfy the performance assessed in this Certificate:

9.4.2 Access must be allowed for clearing debris from the chamber housing the unit's flow control. In the event that the inlet to the unit becomes blocked, the pivoting bypass door may be operated by pulling the wire rope attached upwards to drain down the chamber and provide access for maintenance. The pivoting bypass door must be returned to the closed position following drain down of the chamber and clearance of the blockage.

9.4.2.1 Regular inspections must be carried out to ensure that debris that may obstruct the inlet to the flow control is not present in the chamber. The frequency of inspection will depend on the location of the units but must be at least once per year.

10 **Manufacture**

10.1 The production processes for the product have been assessed, and provide assurance that the quality controls are satisfactory according to the following factors:

10.1.1 The manufacturer has provided documented information on the materials, processes, testing and control factors.

10.1.2 The quality control operated over batches of incoming materials has been assessed and deemed appropriate and adequate.

10.1.3 The quality control procedures and product testing to be undertaken have been assessed and deemed appropriate and adequate.

10.1.4 The process for management of non-conformities has been assessed and deemed appropriate and adequate. An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

† 10.2 The BBA has undertaken to review the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

11 Delivery and site handling

11.1 The Certificate holder stated that the products are supplied wrapped in polythene and plywood packaging for small units and on a pallet for large units. Each unit is stamped with the Certificate holder's unique project reference number and carries a label bearing the Certificate holder's contact information and advice on orientation. The packaging also bears details of the package weight and client details.

11.2 Delivery and site handling must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

11.2.1 The products should be transported in their original packaging if possible. During unloading they must be handled with care.

11.2.2 The products should be stored appropriately to avoid being dropped or receiving impacts, eg from construction plant.

ANNEX A – SUPPLEMENTARY INFORMATION †

Supporting information in this Annex is relevant to the product but has not formed part of the material assessed for the Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

Management Systems Certification for production

The management system of the manufacturer has been assessed and registered as meeting the requirements of ISO/IEC 9001 : 2015 by Lloyd's Register Quality Assurance Limited (Certificate LRQ 10509695).

Additional information on design

A.1 The allowable discharge rate is often calculated in respect of the greenfield equivalent run-off rate for the undeveloped site. Where a site is being redeveloped, the allowable discharge rate may be determined based on the discharge rate prior to the redevelopment.

A.2 The design head acting on the upstream side of products is generally determined by the maximum design top water level within the storage volume.

Additional information on flow characteristics

A.3 Owing to the 'S'-shaped head-flow characteristic, the units are able to pass greater volume flow rates at lower heads, whilst still limiting the flow at the duty/design point to an acceptable level.

A.4 The products have a hydraulic characteristic, comprising three distinct stages corresponding to different phases of operation:

- pre-initiation phase — at low heads, the flow control provides similar performance to an orifice plate with equivalent size to its outlet⁽¹⁾. Flow rate accuracy of $\pm 5\%$ of the ultimate duty/design flow is typically achievable in this region
- vortex initiation phase — as the head increases, vortex motion will start to develop inside the unit, starting to restrict the flow⁽¹⁾. Flow rate accuracy of -5% of flow to +5% of phase peak is typically achievable in this region
- post-initiation/design phase — following vortex initiation, the flow control characteristic stabilises, providing hydraulic performance equivalent to a substantially smaller orifice plate than the unit's outlet. The units can be specified to give a duty/design point in any part of this region, though in most practical cases specification will be at flow rates above the initiation phase peak (corresponding to the Flush-Flo point). Flow rate accuracy of $\pm 5\%$ of flow is typically achievable in this region.

As the water level subsides and water in the system drains, the energy within the flow reduces and the vortex collapses. Air is drawn into the volute and the unit returns to operating in a similar manner to an orifice of the same cross sectional area. This drains the system quickly so that the upstream network is ready for the next event.

(1) Although a flow control would not usually be selected with the duty/design point in this region, this part of the characteristic will have implications to overall drainage system operation.

A.5 The products allow the inlet, volute and outlet to be individually configured to suit the application, enabling the system to be designed to provide the appropriate hydraulic performance or to suit constant discharge, multi-stage discharge or risk-based network designs. Individual configuration of the inlet, volute and outlet also allows the system designer to adjust the physical dimensions of the unit in order to:

- maximise the internal clearances
- comply with minimum outlet guidelines
- retrofit to existing infrastructure.

A.6 The products are specified and supplied to meet individual application requirements. Though the characteristics are incorporated into a number of commercially available hydraulic modelling packages, the Certificate holder should be contacted directly for advice on correct selection. The following information should be provided:

- operating head — depth from the unit's outlet invert to the design water level(s)
- flow — required discharge at the given head(s)
- manhole details or control chamber proposals, including outlet size
- information on any 'special' conditions, for example if the unit is expected to be subjected to downstream surcharging or possible siphoning effects.

A.7 In most cases the downstream drainage system will be designed to allow the unit a free discharge. However, this is not always possible and in certain cases it will be necessary to design the flow control to surcharge conditions. Surcharge of the flow control will affect the hydraulic performance, and advice should be sought from the Certificate holder. Installations where the outlet is surcharged are outside the scope of this Certificate.

A.8 Where a drainage system has been designed and hydraulically modelled based on the use of the products, it is essential to ensure that the same flow control, or a flow control that has been confirmed to provide an equivalent hydraulic performance across the whole design head range, is used in the final installation.

Additional information on installation

A.9 Care should be taken handling the units and when lowering into position for installation. Where appropriate, larger units should be lifted via the fitted lugs using mechanical lifting/lowering equipment.

A.10 The unit is offered up to the chamber outlet wall until the spigot projects into the outlet pipe with its invert seated to the outlet pipe invert and with the unit in the correct orientation.

Additional information on maintenance

A.11 Measures should be taken to remove silt sediment and debris from the surface water at an early stage to prevent problems further downstream.

A.12 The units may be jetted, in accordance with standard sewer jetting procedures, without affecting the hydraulic performance of the stormwater management systems.

Bibliography

BS EN 10088-4 : 2009 *Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes*

CIRIA C753 : 2015 *The SuDS manual*

ISO/IEC 9001 : 2015 *Quality management systems — Requirements*

Flood risk and coastal change guidance — National Planning Policy Framework — August 2022

Conditions of Certificate

Conditions

1 This Certificate:

- relates only to the product that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

3 This Certificate will be displayed on the BBA website, and the Certificate Holder is entitled to use the Certificate and Certificate logo, provided that the product and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product
- actual installations of the product, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to UKCA marking and CE marking.

6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product which is contained or referred to in this Certificate is the minimum required to be met when the product is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

British Board of Agrément

Building 3, Hatters Lane
Croxley Park, Watford
Herts WD18 8YG

©2023

tel: 01923 665300
clientservices@bbacerts.co.uk
www.bbacerts.co.uk

MC



INSTRUCTIONS AND MAINTENANCE MANUAL



INSTRUCTIONS AND MAINTENANCE MANUAL

ASSEMBLY

APPLICATION OF EUROPEAN DIRECTIVES

See document of European Directives applicable to **CMO Valves**.



The **MC** penstock complies with the Directive on Equipment and Protective Systems for Potentially Explosive Atmospheres. In these cases the logo will appear on the identification label. This label shows the exact classification of the zone in which the penstock can be used. The user is responsible for its use in any other zone.

HANDLING

When handling the equipment please pay special attention to the following points:

- **SAFETY WARNING:** Before handling the penstock, check that the crane to be used is capable of bearing its weight.
- Do not lift the penstock or hold it by the actuator. Lifting the penstock by the actuator can lead to operating problems as it is not designed to withstand the penstock's weight.
- When lifting the penstock, take care not to damage the sealing joints, as this may lead to leakage during the operation of the penstock.
- To prevent damage, especially to the anticorrosive protection, it is recommended to use soft straps to lift the **CMO Valves** wall penstocks. These straps must be secured around the side profiles in the upper part of the body.
- If the equipment is packed in wooden boxes, these must be provided with clearly marked holding areas where the slings will be placed when securing them. In the event that two or more penstocks are packed together, separation and securing elements must be provided between them to prevent possible movements, knocks and friction during transport. When storing two or more penstocks in the same box you must ensure they are correctly supported to prevent deformations. In the case of dispatches by sea we recommend the use of vacuum bags inside the boxes to protect the equipment from contact with sea water.
- Pay special attention to maintaining the correct levelling of the penstocks during loading and unloading as well as during transport to prevent deformations in the equipment. For this purpose we recommend the use of mounts or trestles.



INSTALLATION

In order to avoid personal harm and other type of damage (to property, the plant, etc.) please follow these recommendations:

- The staff responsible for the handling and maintenance of the equipment must be qualified and trained in operations with this type of equipment.
- Use suitable Personal Protective Equipment (PPE) (gloves, safety boots, goggles, helmet, reflective vest...).
- Shut off all operating lines to the valve and put up a warning sign.
- Completely isolate the valve from the whole process.
- Depressurise the process.
- Drain all the line's fluid through the valve.
- Use hand tools not electric tools during the installation and maintenance, in according to current regulations.

Before installation, inspect the penstock to ensure no damage has occurred during transport or storage.

Make sure that the inside of the penstock body and, in particular, the seal area are clean. Inspect the wall intended for installation of the penstock, making sure it is clean and flat.

The **MC** penstock can be unidirectional or bidirectional:

- When **bidirectional**, the fluid may come in one direction or another.

- When **unidirectional**, the fluid always comes in the same direction. It is necessary to define whether it is favourable or unfavourable:

- If it is **favourable**, the flow direction presses the penstock against the wall.
- If it is **unfavourable**, the fluid direction tends to separate the penstock from the wall, in this case the design of the penstock is identical to bidirectional.



ADVANTAGE

ASPECTS TO BE CONSIDERED DURING ASSEMBLY

The most common system to mount these penstocks is supported on the wall and secured with chemical or expansion anchors (fig. 1), although, as can be seen in fig. 2 and fig. 3, there are other assembly options.

Whatever the fastening option, the upper and side profiles are always secured with chemical or expansion anchors; for this reason it is very important that the wall is completely flat, otherwise the body could become deformed and suffer irreparable damage when starting to tighten the anchors. It is therefore recommended to use a flat rule when screwing down the body. Support the rule on the body and begin to tighten the chemical or expansion anchors, and stop tightening as soon as the body begins to deform.

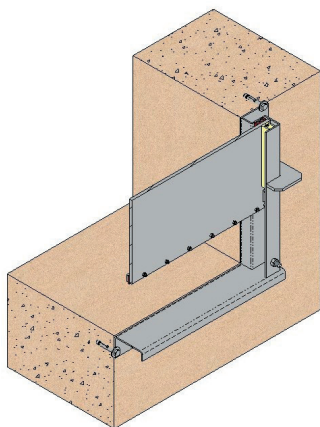


Fig. 1

SECURED TO THE WALL USING
CHEMICAL OR EXPANSION AN-
CHORS (STANDARD)

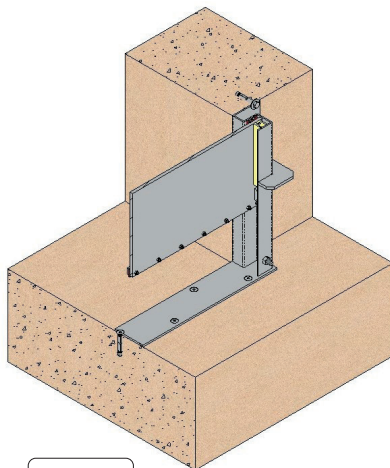


Fig. 2

FLAT BASE

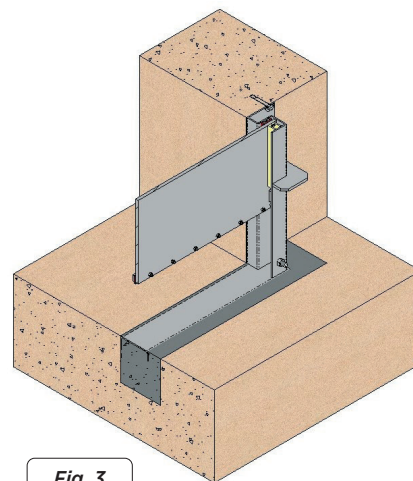


Fig. 3

BASE WITH HOUSING

Proceed as follows to mount the penstock **using chemical or expansion anchors** (the most common way, fig. 1):

- Start by placing the penstock completely open on the wall, ensuring the passage of the penstock coincides with the wall orifice.
- Using the holes of the body of the penstock as a guide, make the boreholes necessary in the wall for the chemical or expansion anchors.
- Remove the penstock and apply sealing paste such as SIKAFLEX-11FC or similar where the penstock is to be located, in order to prevent leakages between the body and the wall.
- Return the penstock to its location above the sealing paste and introduce the chemical or expansion anchors. These anchorings must also be suitable for the operating conditions and their measurements must in accordance with the approved plans.
- Once all the chemical or expansion anchors are in place, carry out the initial tightening with low torque and then, once all the anchors have been slightly tightened, carry out the final crosswise tightening. Tighten using a flat ruler, avoiding overtightening which may cause deformation of the penstock. The final torque must be correct in accordance with the applicable standard.

This procedure can be used both for flat base (fig. 2) and standard penstocks (fig. 1).

Proceed as follows to mount the penstock with the **base embedded in the concrete** (fig. 3):

- The civil work must include housing in the ground, which must be checked to be of sufficient size and clean.
- Position the penstock in the housing and align it with regards to the wall orifice, ensuring that the base of the penstock is level with the civil work, thus ensuring there is no protrusion in the base, guaranteeing entirely continuous passage.
- Keeping the penstock in this position, make the boreholes necessary for the upper and side profiles, using the holes of the body of the penstock as a guide.
- Remove the penstock and apply sealing paste such as SIKAFLEX-11FC or similar where the penstock is to be located on the wall, in order to prevent leakages between the body and the wall.
- Return the penstock to its location above the sealing paste and screw down with chemical or expansion anchors using the usual procedure, namely with the help of a flat rule, screwing crosswise and without excessive force.
- After correctly securing the upper and side profiles, proceed with the second layer of cementing. This involves filling the base housing with concrete, ensuring there is no protrusion in the passage of the fluid.

The penstock can be installed completely with chemical or expansion anchors or with the base embedded in the concrete. In either case, the following points must be taken into account:

- The equipment must be firmly secured to the wall.
- As regards scaffolding, ladders and other auxiliary elements to be used during the assembly, follow the safety recommendations indicated in this dossier.
- Once the equipment has been assembled, make sure that there are no elements which can interfere with the through conduit movement.
- Make the relevant connections (electrical, pneumatic, hydraulic) in the equipment's actuator system following the instructions and wiring diagrams supplied with it.
- The assembly of the equipment must be coordinated with the site's control and safety staff and no modifications are permitted in the equipment's external indication elements (limit switches, positioners, etc.).
- When operating the equipment follow the safety recommendations indicated in this dossier.

ASSEMBLY POSITIONS

This type of penstock is mounted on vertical walls, in which there is a square, round or rectangular orifice; this orifice may be at a certain height (fig. 4) or at ground level (fig. 5). The position of the penstock is always vertical.



Fig. 4

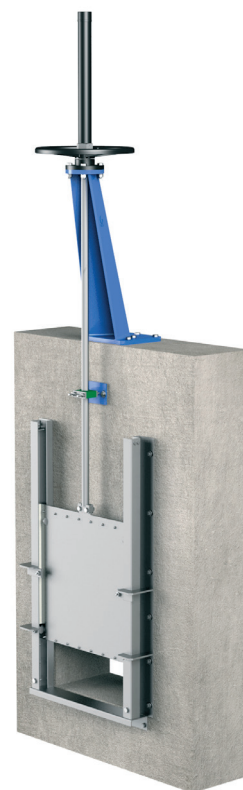


Fig. 5

Once the penstock has been installed, check that all the screws and nuts have been correctly tightened and that the whole penstock operation system has been correctly adjusted (electrical connections, pneumatic connections, instruments,...).

All **CMO Valves** penstocks are tested at its facilities, although the penstock may have become damaged during handling or transport. Once the penstock is installed, it is therefore very important to check that there is no leakage when fluid load is applied to the penstock.



Once the penstock is installed in its place, check the electrical or pneumatic connections. If the penstock has electrical accessories or you are in an ATEX zone, earth connections must be made before operating it. If you are in an ATEX zone, check the continuity between the different elements of the penstock (**EN 12266-2, annex B, points B.2.2.2. and B.2.3.1.**). Check the earth connection of the penstock.

ACTUATOR

For the drive and sliding of the gate, **CMO Valves** has different drive systems, to be incorporated according to the needs of the project, installation, use.

In manual actuators (handwheel, gears, lever, etc), it is not necessary to exercise excessive force (max. 25 Kg/mt) for the lower seal to close correctly. If excessive force is used, the lower seal is not improved and there is a risk of causing irreparable damage in the equipment.

HANDWHEEL

To operate the penstock: Turn the handwheel clockwise to close or anticlockwise to open. We can stop turning the handwheel at any degree of opening of the penstock; the through conduit will maintain its position since the actuator is self-locking.

CHAINWHEEL

To operate the penstock pull one of the chain's vertical drops, taking into account that sealing is carried out when the chainwheel turns clockwise. We can stop pulling the chain at any degree of opening of the penstock; the through conduit will maintain its position since the actuator is self-locking.

LEVER

First loosen the position locking clamp located on the yoke. Once it is unlocked, raise the lever to open it or lower to close it. To complete the operation lock the lever again. This actuator also allows the possibility of locking the through conduit at any degree of opening.

PNEUMATIC

CMO Valves pneumatic actuators are designed to be connected to a pneumatic grid of between 6 bar and 10 bar. The pressurised air used for the pneumatic actuator must be correctly dried, filtered and lubricated. This type of actuator does not require any adjustment, due to the fact that the pneumatic cylinder is designed for the exact stroke required by the penstock.

HYDRAULIC

CMO Valves hydraulic actuators are designed to work at a standard pressure of 135 bar (other pressures can be used in accordance with needs).

This type of actuator does not require any adjustment, due to the fact that the hydraulic cylinder is designed for the exact stroke required by the penstock.

MOTORISED

If the penstock incorporates a motorised actuator it will be accompanied with the electric actuator supplier's instructions. Motorised actuators must have torque limiters and limit switches in order to prevent damage to the equipment.

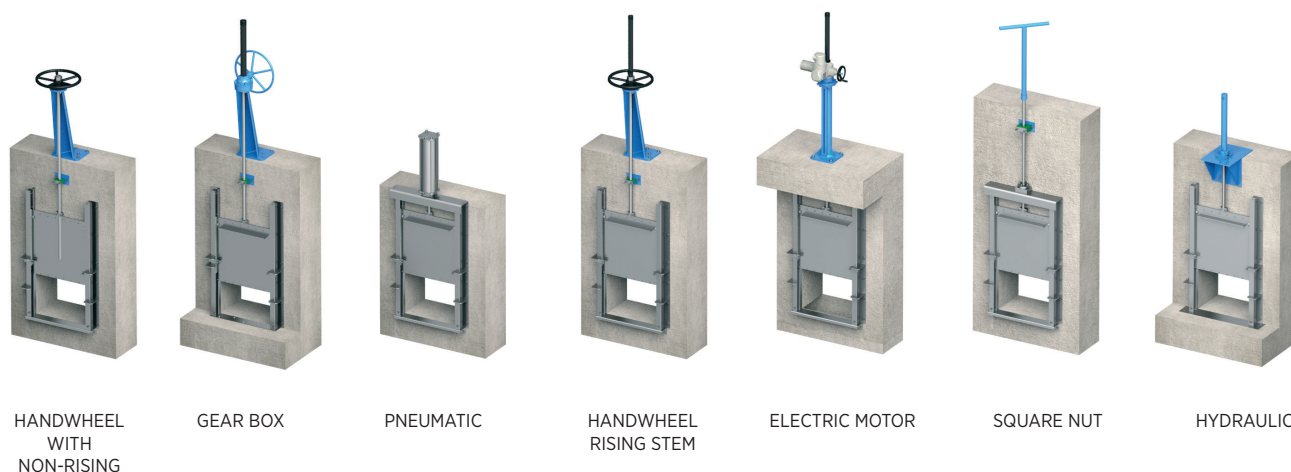


Fig. 6

MAINTENANCE

CMO Valves will not be liable if the penstocks suffer any damage due to improper handling or without proper authorisation. The penstocks must not be modified except under express authorisation from **CMO Valves**. In order to avoid personal or material damage when performing the maintenance tasks, it is recommended to follow these instructions:

- The staff responsible for the maintenance or operation of the equipment must be qualified and trained.
- Use suitable Personal Protective Equipment (PPE) (gloves, safety boots, goggles...).
- Shut off all lines that affect the penstock and put up a warning sign to inform about the work being performed.
- Completely isolate the penstock from the whole process. Empty the duct.
- Drain all the fluid from the duct through the penstock.
- Use hand tools not electric tools during the installation and maintenance, in according to current regulations.



In an ATEX zone, electrostatic charges may be present inside the penstock, which can cause a risk of explosion. The user will be responsible for carrying out the appropriate actions in order to minimise the risks. The maintenance staff must be informed about the risks of explosion and ATEX training is recommended.

Regular cleaning of the penstock to prevent accumulation of dust. Avoid re-painting the products supplied.

LUBRICATION

It is recommended to lubricate the stem twice a year by removing the protection cap and filling it with grease up to half its volume.



After the maintenance and in an ATEX zone, you must check the electrical continuity between the different components of the penstock, such as the body, through conduit, stem... EN 12266-2 Standard, annex B, points B.2.2.2. and B.2.3.1.).

IMPORTANT SAFETY ASPECTS

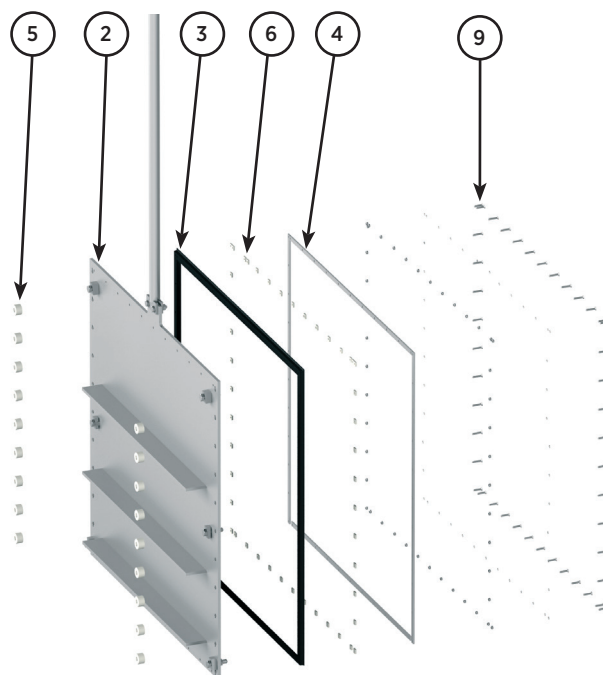
- In order to work under ideal safety conditions, the magnetic and electrical elements must be in idle mode and the air tanks depressurised. The electrical control cabinets must also be out of service. The maintenance staff must be up to date with the safety regulations and work can only start under orders the site's safety staff.
- The safety areas must be clearly marked and you must avoid placing auxiliary equipment (ladders, scaffolding, etc.) on levers or moving parts which will lead to the movement of the through conduit.
- In equipment with spring return actuators, the through conduit must be mechanically locked and only unlocked when the actuator is pressurised.
- In equipment with electrical actuator, it is recommended to disconnect it from the mains in order to access the moving parts without any risk.
- Due to its great importance, you must check that the penstock shaft has no load before disassembling the actuator system.



Taking into account the recommendations indicated, below we indicate the maintenance operations carried out in this type of equipment:

REPLACING THE SEALING JOINT (Fig. 7)

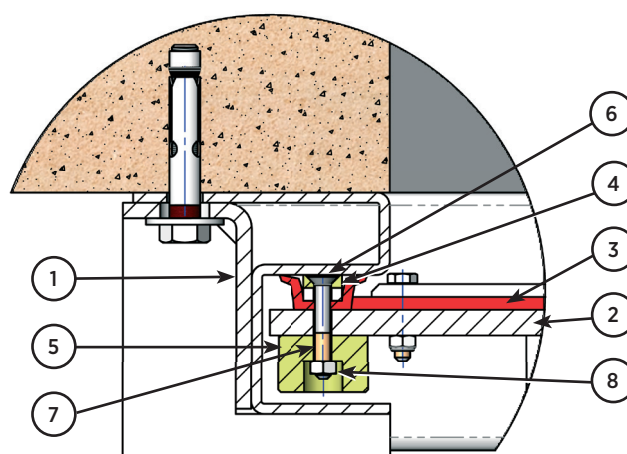
1. Make sure there is absolutely no pressure and fluid in the duct.
2. Release the yoke (2) and remove the complete through conduit from the body in order to facilitate the change of sealing joint.
3. Loosen and extract the screws (9) which secure the flanges (6) and the sealing joint (3).
4. Remove the flanges (4) and finally the deteriorated joint (3), clean the housing.
5. Fit a new sealing joint (3) with the same dimensions as the old one.
6. Replace the flanges (6), securing the seal (3). It is important that the side seals and the lower seal protrude around five millimetres from the lower part of the through conduit (2) in order to make the lower seal. Having checked that they are correctly assembled, screw them down.
7. Introduce the through conduit in the body
8. Screw down the yoke and the stoppers.
9. Before starting up the installation, perform various operations to open and close the penstock while empty.

**Fig. 7**

POS.	DESCRIPTION
1	BODY
2	GATE
3	SEAL
4	SLIDES
5	SLIDES
6	FLANGE GASKET
7	SCREW
8	AUTO LOCK NUT

Table. 1

***Note:** During the assembly of the new sealing joint it is recommended to apply “Vaseline” to the seal to facilitate the assembly process and the correct operation of the valve (do not use oil or grease); table 2 below shows details of the Vaseline used.

**Fig. 8**

PETROLEUM JELLY		
Saybolt colour	ASTM D-156	15
Melting point (°C)	ASTM D-127	60
Viscosity at 100°C	ASTM D-1445	5
Penetration 25°C mm./ 10	ASTM D-1937	165
Silicone content	None	
Pharmacopeia BP	OK	

Table. 2

MAINTENANCE OF THE PNEUMATIC ACTUATOR

The pneumatic cylinders in our valves are manufactured and assembled at our premises. The maintenance of these cylinders is simple, if your need to replace any elements and you have any questions please consult **CMO Valves**. Below is an exploded diagram of the pneumatic actuator (fig 9) and a list of the cylinder's components (table 3). The top cover and the support cover are usually made of aluminium, but from pneumatic cylinders greater than Ø200 mm, they are made of cast ductile iron.

The maintenance kit normally includes: The socket and its joints and the scraper, and if the customer wishes the piston is also supplied. Below we show the steps to follow to replace these parts.

1. Position the valve in closed position and shut off the pneumatic circuit pressure.
2. Loosen the cylinder air input connections.
3. Release and remove the cylinder cap (5), the cylinder tube (4) and the tie rods (16).
4. Loosen the nut (14) which connects the piston (3) and the rod (1), remove the parts. Disassemble the cir-clip (10) and remove socket (7) with its joints (8 & 9).
5. Release and remove the cylinder head (2), in order to remove the scraper (6).
6. Replace the damaged parts with new ones and assemble the actuator in the opposite order to that described for the disassembly.

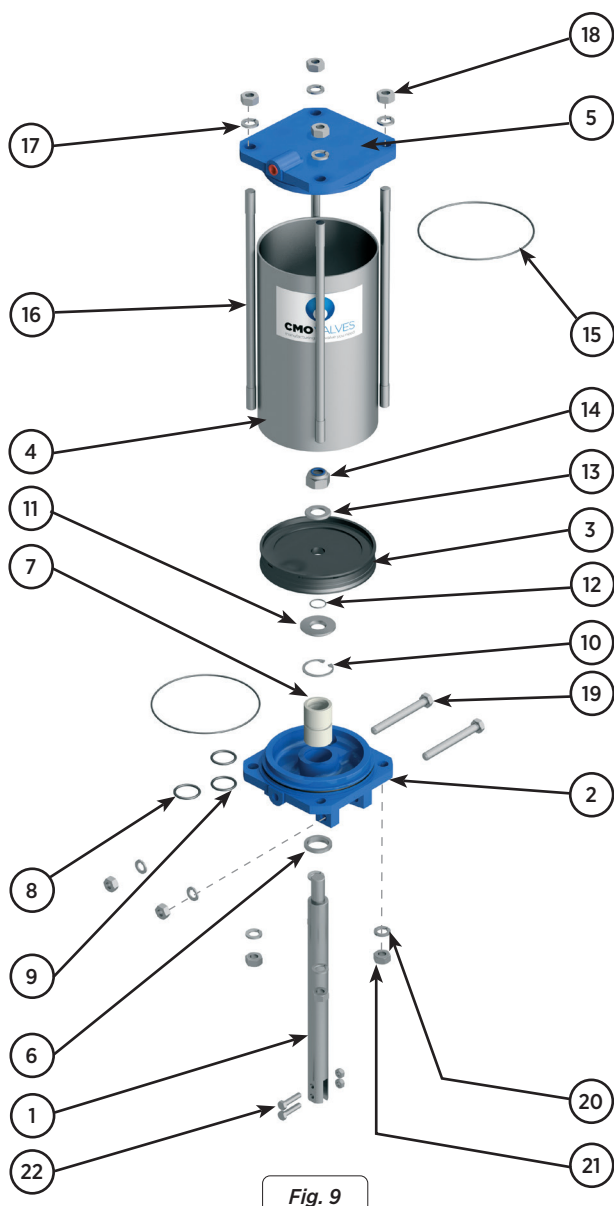


Fig. 9

PNEUMATIC ACTUATOR		
POS.	DESCRIPTION	MATERIAL
1	STEM	AISI-304
2	COVER SUPPORT	ALUMINIUM
3	PISTON	S275JR + EPDM
4	CASING	ALUMINIUM
5	UPPER COVER	ALUMINIUM
6	SCRAPER	NITRILE
7	SOCKET	PA6
8	EXTERIOR O-RING	NITRILE
9	INTERIOR O-RING	NITRILE
10	CIR-CLIP	STEEL
11	WASHER	ST ZINC
12	O-RING	NITRILE
13	WASHER	ST ZINC
14	SELF-LOCKING NUT	5.6 ZINC
15	O-RING	NITRILE
16	TIES	F-114 ZINC
17	WASHER	ST ZINC
18	NUT	5.6 ZINC
19	SCREW	5.6 ZINC
20	WASHER	ST ZINC
21	NUT	5.6 ZINC
22	SCREW	A-2

Table. 3

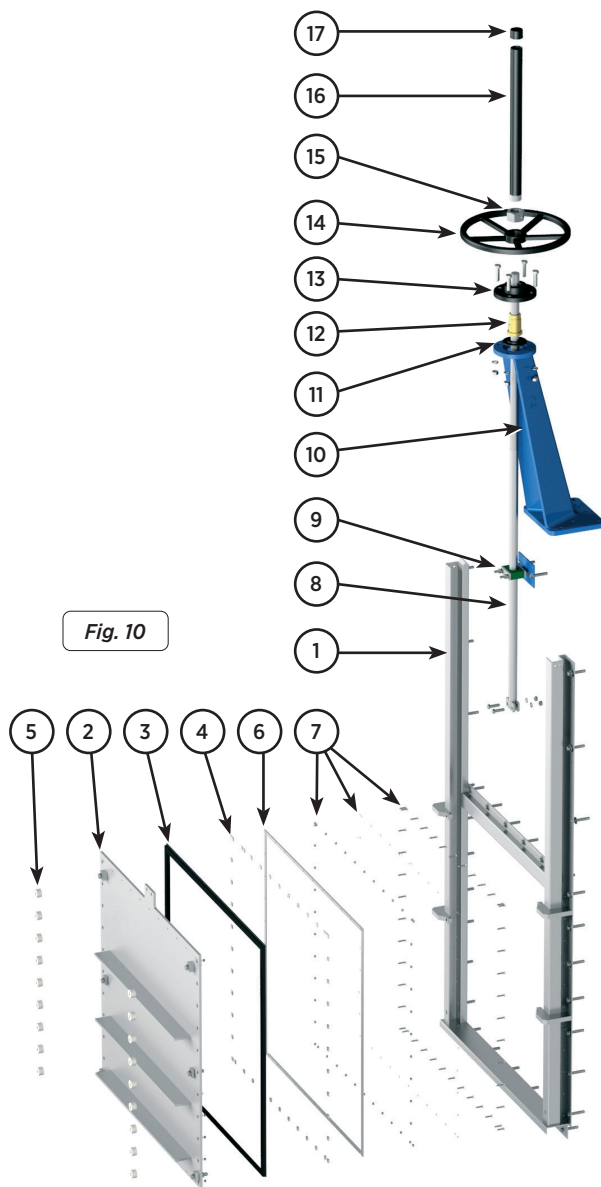
STORAGE

To ensure the valve is in optimum conditions of use after long periods of storage, it should be stored in a well-ventilated place at temperatures below 30°C.

It is not advisable, but if it is stored outside, the valve must be covered to protect it from heat and direct sunlight, with good ventilation to prevent humidity. The following aspects must be considered for storage purposes:

- The storage place must be dry and under cover.
- It is not recommended to store the equipment outdoors with direct exposure to adverse weather conditions, such as rain, wind, etc. Even less so if the equipment is not protected with packaging.
- This recommendation is even more important in areas with high humidity and saline environments. Wind can carry dust and particles which can come into contact with the valve's mobile parts and this can lead to operating difficulties. The actuator system can also be damaged due to the introduction of particles in the different elements.
- The equipment must be stored on a flat surface to avoid deformations.
- If the equipment is stored without suitable packaging it is important to keep the valve's mobile parts lubricated, for this reason it is recommended to carry out regular checks and lubrication.
- Likewise, if there are any machined surfaces without surface protection it is important for some form of protection to be applied to prevent the appearance of corrosion.

COMPONENTS LIST



HANDWHEEL DRIVE	
POS.	DESCRIPTION
1	BODY
2	GATE
3	SEALING JOINT
4	SLIDE
5	SLIDE
6	FLANGE SEAL
7	SCREW - WASHER - NUT
8	STEM
9	GUIDE SUPPORT
10	FLOOR STAND
11	FRICTION WASHER
12	STEM NUT
13	YOKE FLANGE
14	HANDWHEEL
15	HOOD NUT
16	HOOD
17	PROTECTION CAP

Table. 4

As part of its ongoing product and service improvement process, **CMO Valves** reserves the right to alter the data and content of this document at its discretion at any time without notice. The publication of the latest revision renders all previous documents invalid.

Installation and Maintenance Manual available at www.cmovalves.es.



www.cmovalves.com



CMOVALVES

QMS CERTIFIED BY LRQA
Approval number ISO9001 0035593

CMO VALVES
HEADQUARTERS MAIN
OFFICES & FACTORY

Amategi Aldea, 142
20400 Tolosa
Gipuzkoa (Spain)

Tel.: (+34) 943 67 33 99

cmo@cmovalves.com
www.cmovalves.com

CMO VALVES
MADRID

C/ Rumania, 5 - D5 (P.E. Inbisa)
28802 Alcalá de Henares
Madrid (Spain)

Tel.: (+34) 91 877 11 80

cmomadrid@cmovalves.com
www.cmovalves.com

CMO VALVES
FRANCE

5 chemin de la Brocardière
F-69570 DARDILLY
France

Tel.: (+33) 4 72 18 94 44

cmofrance@cmovalves.com
www.cmovalves.com

APPENDIX I – DRAINAGE RECORD LOG SHEETS

Inspection Log – Year..... sheet 1 of 2

Inspection Date	A - Surface Water Catchpit Manholes	B - Foul Water Manholes	E – Surface Water Treatment	G – Hydro Attenuation	Comments
January					
February					
March					
April					
May					
June					

How to complete this Log:

- 1.0 Write date in LH column.
- 2.0 Tick which items have been inspected for that date.
- 3.0 Add to notes and maintenance completed e.g. Catch pits or Channels emptied.

Inspection Log – Year..... sheet 2 of 2

Inspection Date	A - Surface Water Catchpit Manholes	B - Foul Water Manholes	E – Surface Water Treatment	G – Hydro Attenuation	Comments
July					
August					
September					
October					
November					
December					

How to complete this Log:

- 1.0 Write date in LH column.
- 2.0 Tick which items have been inspected for that date.
- 3.0 Add to notes and maintenance completed e.g. Catch pits or Channels emptied.