

Rathlin Energy (UK) Limited

Crawberry Hill Wellsite

SURFACE WATER MANAGEMENT PLAN

Version 1.0

for

Rathlin Energy (UK) Limited
8 Wimpole Street
London
W1G 9SP

by

Envireau Water
North Office
Aske Stables
Aske, Richmond
North Yorkshire
DL10 5HG

Tel: 01748 889268
Fax: 01332 874850
E mail: info@envireauwater.co.uk
Web: www.envireauwater.co.uk



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Rathlin Energy (UK) Limited, Crawberry Hill Wellsite

CONTENTS

1	INTRODUCTION	4
2	SITE DESCRIPTION	4
2.1	Site Location and Setting	4
2.2	Wellsite Layout	4
3	SURFACE WATER RUNOFF.....	5
3.1	Greenfield Runoff Rate	5
3.2	Attenuation Capacity	5
4	DISCHARGE METHOD	5
5	MONITORING STATION	5
6	GRAVITY DISCHARGE	6
7	WATER SAMPLING & ANALYSIS.....	6
8	DISCHARGE TO SOAKAWAY	7
9	DISCHARGE RECORDS.....	7
10	ADDITIONAL CHECKS	7
11	TRAINING.....	7
12	REFERENCES	7

FIGURES

Figure 1	Site Location Plan
Figure 2	Site Layout Plan
Figure 3	Surface Water Discharge Decision Tree
Figure 4	Surface Water Discharge Arrangement
Figure 5	Monitoring Arrangement
Figure 6	Gravity Discharge Arrangement

APPENDICES

Appendix A	Sensor Data Sheets
Appendix B	SPEL Separator Data Sheet

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SURFACE WATER MANAGEMENT PLAN

Crawberry Hill Wellsite

1 INTRODUCTION

This document sets a management plan for surface water at the Crawberry Hill Wellsite.

2 SITE DESCRIPTION

2.1 Site Location and Setting

The Crawberry Hill wellsite is located approximately 2km southwest of the village of Bishop Burton and 12km northwest of Hull at NGR SE 9760 3780 (approximate centre of site).

The wellsite address is as follows:

Crawberry Hill Wellsite
Rathlin Energy (UK) Limited
Land Southwest of Crawberry Hill
Walkington Heads
Beverley
HU17 8RU

The wellsite covers an area of approximately 0.9ha and is situated at an elevation of approximately 85mAOD, with local ground level falling towards the northeast.

The location and setting of the wellsite is shown on Figure 1.

2.2 Wellsite Layout

The wellsite comprises a flat area of hardstanding surrounded by a perimeter ditch and earth bunds. The base of the wellsite is underlain by a High Density Polyethylene (HDPE) membrane, which covers the footprint of the wellsite and perimeter containment ditches, to ensure any surface water collecting on the wellsite is retained.

A wellsite layout plan is presented on Figure 2.

3 SURFACE WATER RUNOFF

Surface water collecting on the site percolates through the hardstanding, is intercepted by the HDPE membrane and is directed to the perimeter containment ditch, where it is collected.

3.1 Greenfield Runoff Rate

Based on the IH 124 method [Ref 1] the estimated Greenfield Runoff Rate (GRR) for the wellsite area has been calculated as 2.08 l/s/ha for a 1 in 100 year storm event (1% annual probability of occurrence).

3.2 Attenuation Capacity

Based on the estimated GRR and wellsite area, the amount of water that needs to be attenuated at the wellsite during a 1 in 100 year (+20% allowance for climate change) storm event is 896m³. The perimeter ditch and hardstanding area provides 439m³ of attenuation storage capacity. The remaining 457m³ is provided by allowing the wellsite to flood to an estimated depth of 150mm; which is a conservative assumption based on 50% of the wellsite area being occupied by plant or equipment.

4 DISCHARGE METHOD

The method of discharge is represented by the decision tree on Figure 3 and can be summarised as follows:

- i. Surface water will collect in the perimeter ditch.
- ii. The water will be passed through a monitoring station (see Section 5) and the quality checked to make sure it meets the requirements for discharge.
- iii. If the water meets the requirements for discharge, then it will be discharged from the perimeter ditch under gravity via a Class 1 Separator to a soakaway (see Section 6 & 8).
- iv. If the water does not meet the requirements for discharge, arrangements will be made for disposal by alternative methods, e.g. disposal by authorised haulage tanker to a licensed waste disposal facility/water treatment facility.
- v. Samples of discharge water will be collected for laboratory analysis of key indicators to demonstrate compliance (see Section 7).

A general discharge arrangement diagram is shown on Figure 4.

5 MONITORING STATION

The monitoring station is shown schematically on Figure 4 & 5. The operation is summarised as follows:

- i. A transfer pump will be used to abstract water from the perimeter ditch.
- ii. The water will be run through pipework containing a Hach Lange SC Solitax turbidity sensor and Hach Lange SC FP360 oil-in-water sensor to monitor turbidity (suspended solids) and liquid phase

hydrocarbons. The sensors will be wired into a Hach Lange SC controller to provide continuous data recording. Data sheets for the sensors and controller are provided as Appendix A.

- iii. The water will be returned to the perimeter ditch approximately 10m from the abstraction point.
- iv. The abstraction rate of the water will be controlled to ensure that a representative volume of water passes through the monitoring station.
- v. The monitoring station will be operated for at least one hour and readings taken at one minute intervals to demonstrate the quality of the water. Records will be kept of all data collected.
- vi. The data will be reviewed and the average hydrocarbon and suspended solids concentration of the water will be calculated based on one hour of continuous 1 minute data.

6 GRAVITY DISCHARGE

As shown schematically on Figure 6, a gravity discharge pipe will connect the perimeter ditch to the Oil separator and will be operated as follows:

- i. Discharge will only take place when the site is manned. The discharge will be controlled using two isolation valves. The valves will be manually operated and secured when not in operation. The keys for the valves will be held in the site office.
- ii. To facilitate discharge, the keys will be obtained from the site office and the two valves will be manually opened. Discharge will take place until water levels in the perimeter ditch are reduced to the required level. The discharge will then be stopped by closing the two valves. The valves will be secured on completion and the keys returned to the site office.
- iii. The two valves will be secured at all times whilst the wellsite is unmanned and discharge operations are not being undertaken. This will prevent unauthorised discharges of water by unauthorised personnel.

7 WATER SAMPLING & ANALYSIS

To provide calibration data for the sensors, water samples will be collected from the discharge pipe using sterilised, specified sampling containers. The water samples will be transported the same day in a safe and suitable manner to a UKAS accredited laboratory.

The following parameters will be analysed for:

- ü pH, conductivity, major ions, total petroleum hydrocarbons, suspended solids

Water samples will be collected on a monthly basis, when the discharge is in operation.

8 DISCHARGE TO SOAKAWAY

Water will be discharged from the perimeter ditch to a soakaway via a Class 1 SPEL oil-water Separator. The SPEL Separator is designed, manufactured and tested in accordance with the European Standard BS EN 858-1 and meets the requirement of the Environment Agency's Pollution Prevention Guidelines (PPG3) and the Construction Products Regulations.

The discharge arrangement means there is a negligible risk that free phase hydrocarbons would be present in the discharge; however, the Separator does provide an additional level of environmental protection. The specification of the SPEL Separator is provided in Appendix B.

The discharge valves and the inspection plate of the Separator will be secured at all times whilst the wellsite is unmanned and discharge operations are not being undertaken. This will prevent unauthorised discharges of water by unauthorised personnel.

The soakaway will be designed and constructed in accordance with the best practice set out in BRE 365 [Ref 2]. An orifice plate will be placed on the discharge pipe to ensure the maximum rate of discharge does not exceed the estimated GRR of 2.08 l/s/ha.

An MCERTS accredited flow meter will be installed on the discharge pipe to record the flow rates and demonstrate compliance.

The water being discharged to soakaway will be visually inspected during discharge to ensure it is free from solids and visible oil and grease.

9 DISCHARGE RECORDS

Records of all the monitoring, sampling and discharge activities will be recorded within the Rathlin Energy Environmental Management System. Records will be made available to the Environment Agency for inspection. The records will include the date, time and all relevant results of monitoring and analysis.

10 ADDITIONAL CHECKS

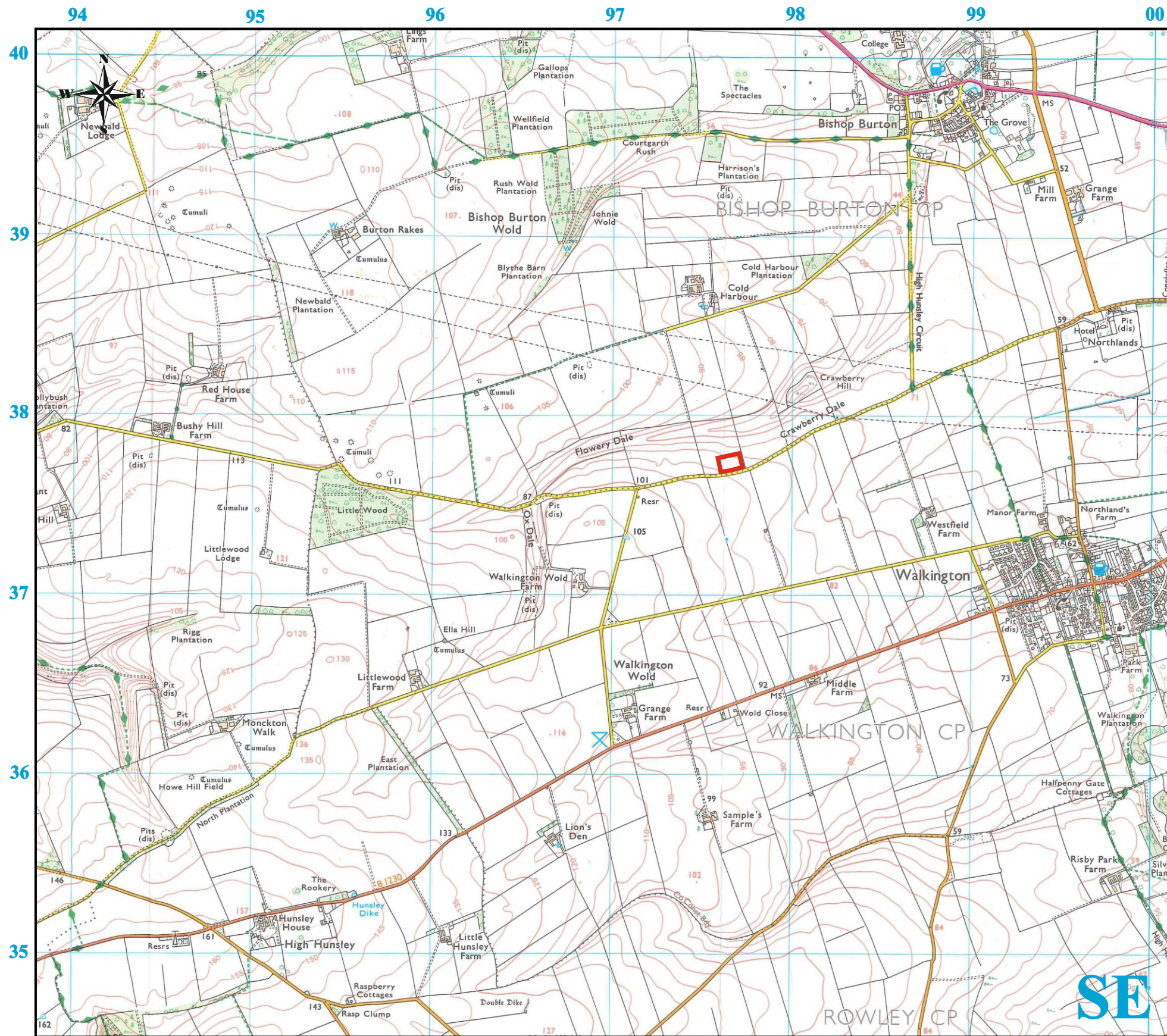
During periods of non-operations, the discharge equipment will be inspected on a regular basis and the condition recorded on the Rathlin Energy Checklist 8 form – (RE-05-CHK-008). Any issues identified will be addressed. Records will be made available to the Environment Agency for inspection.

11 TRAINING

All personnel involved in the discharge operation will be trained and competent and a record of training held within the Rathlin Energy Environmental Management System.

12 REFERENCES

- Ref 1: D C W Marshall & A C Bayliss. Flood estimation for small catchments. Institute of Hydrology Report 124, June 1994.
- Ref 2: Soakaway Design. BRE Digest 36, March 2007.



KEY

Site boundary

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Scale 1: 25,000 (at A3)

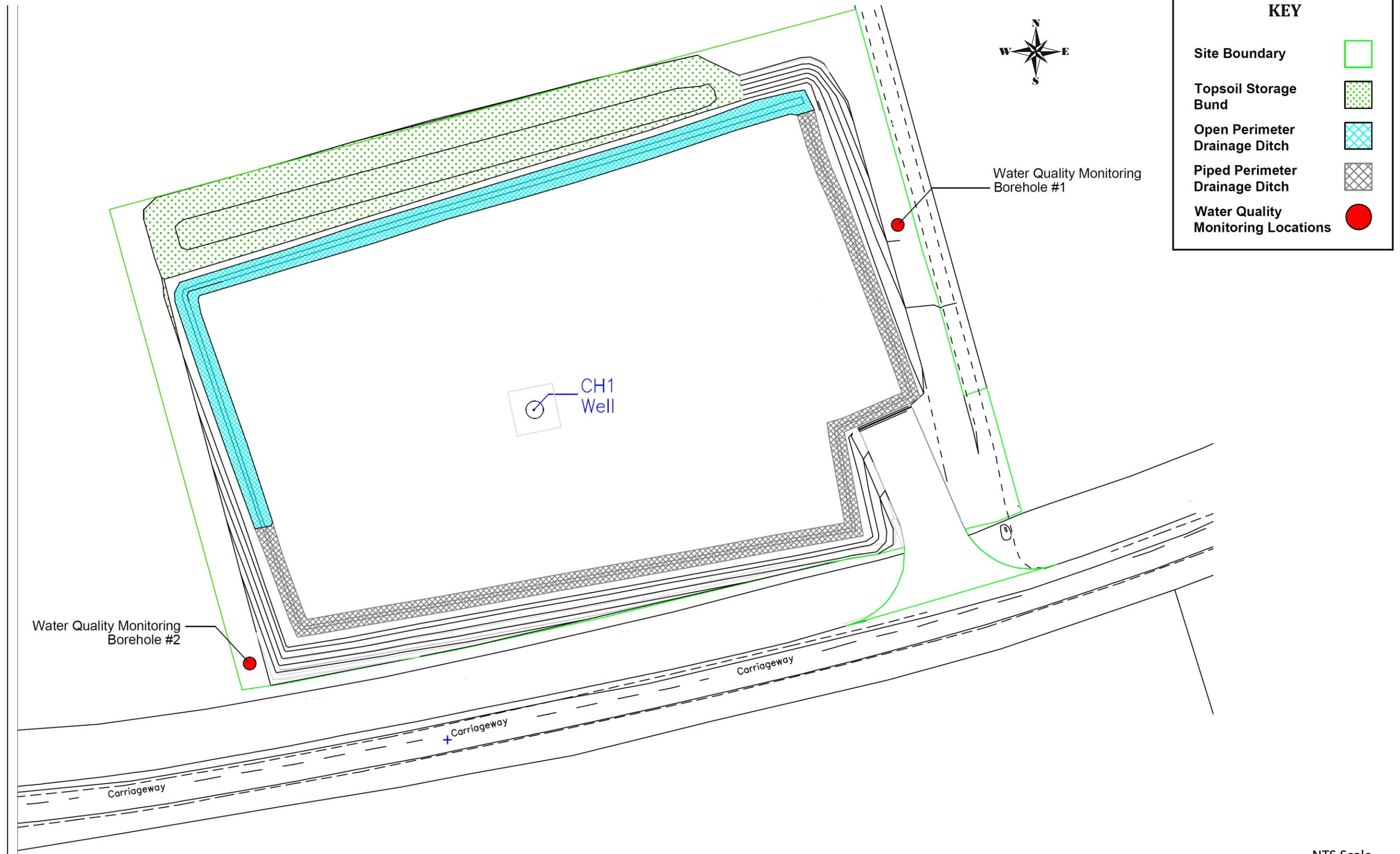


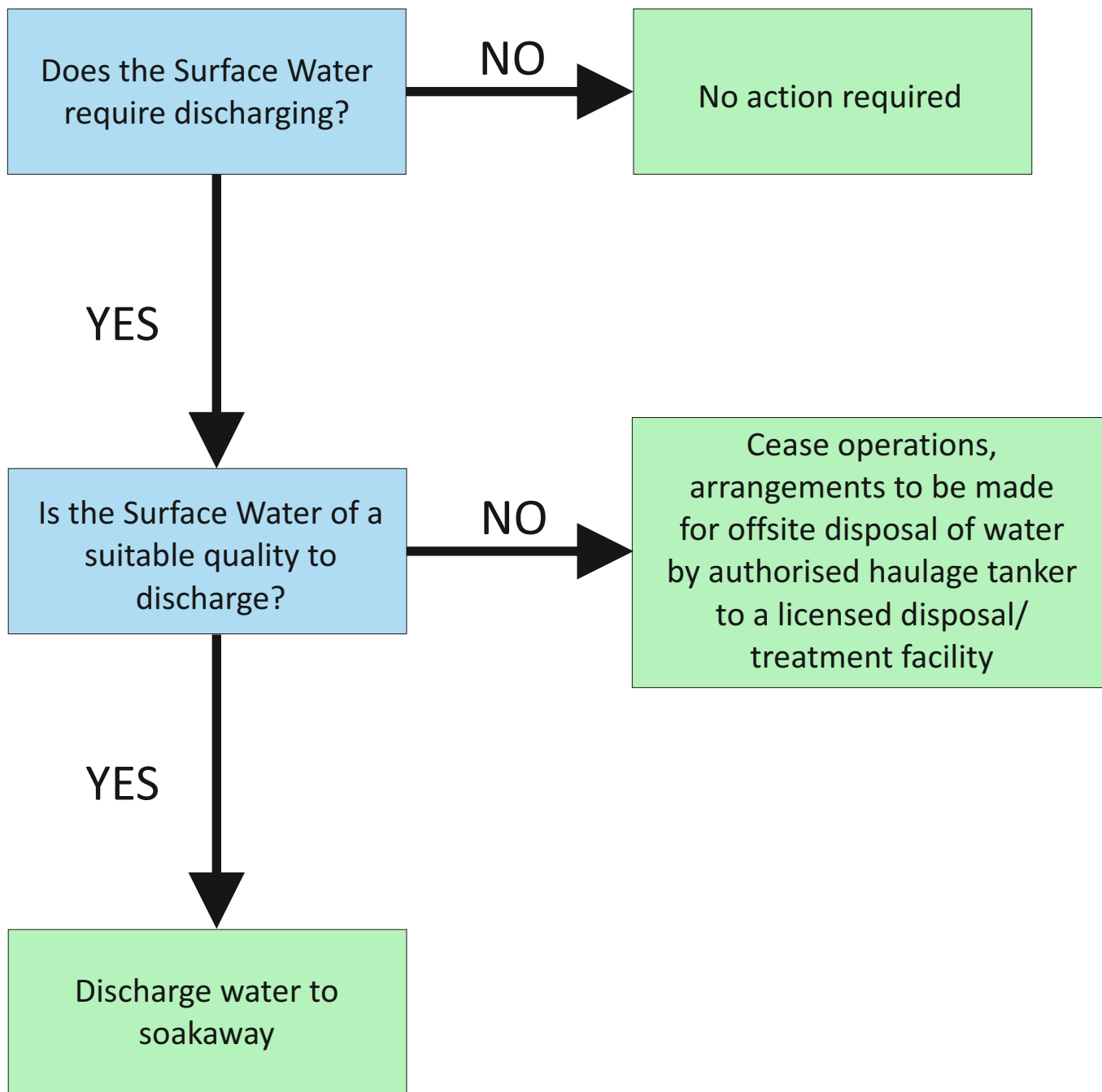
Ref: P:\Rathlin SW Discharge
(1763)\Crawberry Hill\Management
Plan\Fig 1 - Site Loc.cdr
Date: 09/02/2015

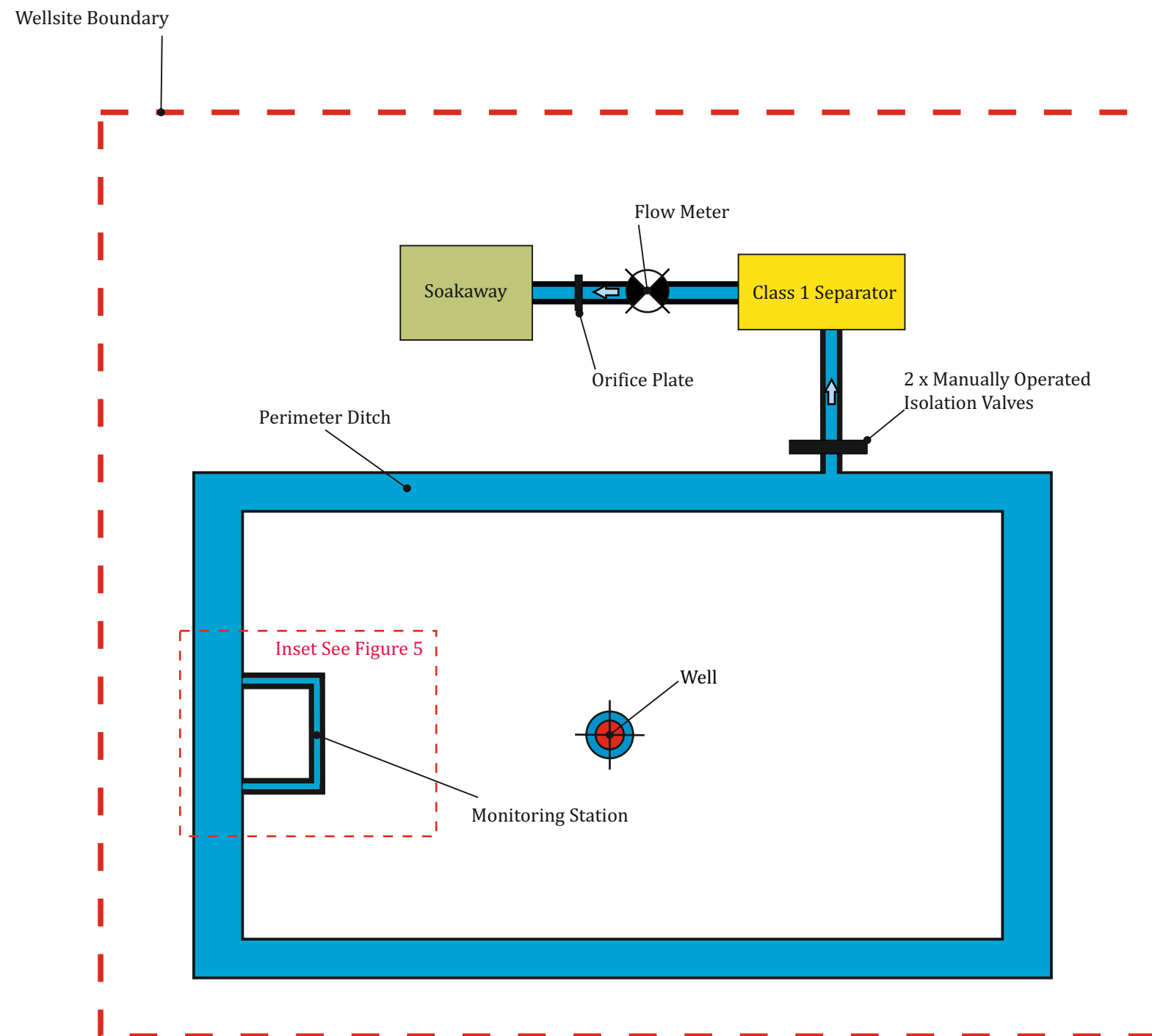
Figure 1

Rathlin Energy (UK) Ltd - Crawberry Hill

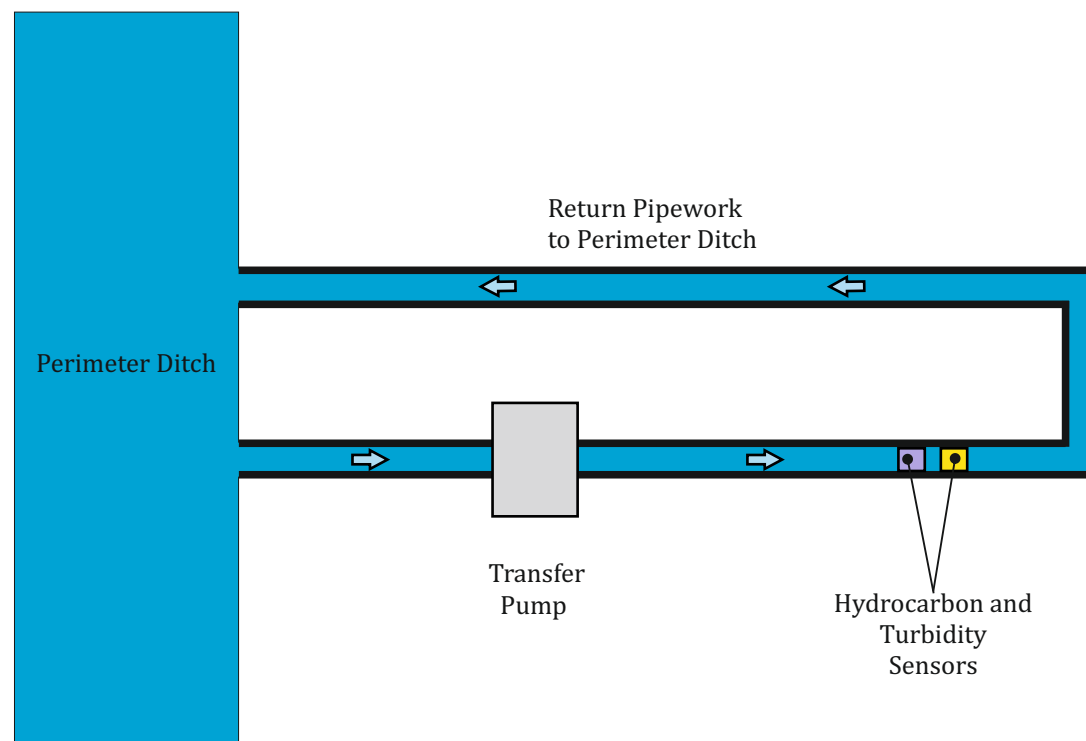
Site Location



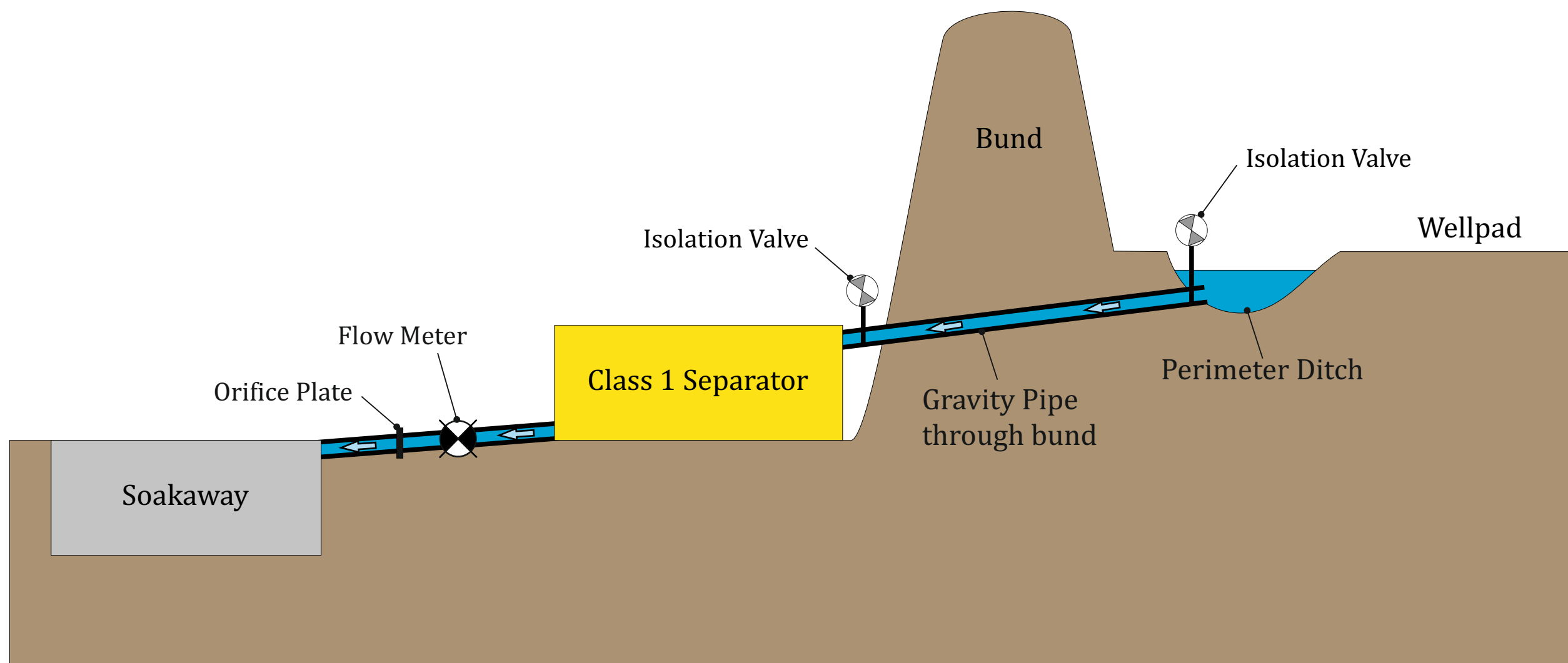




Not to scale
This is a schematic only



Not to scale
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APPENDIX A

Sensor Data Sheets

PRODUCT INFORMATION

PROCESS ANALYSIS
SOLITAX SC



For the lowest turbidity and the highest solids content: SOLITAX sc

- **Colour-independent measurement of solids**
- **No calibration**
- **Proven cleaning system**
- **As in-tank or in-pipe probe**
- **Combinable with probes for O₂, NO₃, pH, etc**

Wide field of application

The high-precision process probes of the SOLITAX sc family determine turbidity in ultraclear to strongly turbid liquids, and solids concentrations in activated, primary and digested sludges. The potential applications for SOLITAX sc therefore range from drinking and wastewater treatment to the monitoring of surface water and the treatment of sludge.

Economically efficient

Time-consuming multipoint calibrations with dilution series are replaced by a single correction factor. The wide range from 0.001 FNU to 150 g/l covers the optimal solution for every application. The measurement data is displayed and processed with the help of the SC100 or SC1000 Controller. In short: Advantages that are long-lasting and economically efficient.



LANGE 

Persuasive advantages: SOLITAX sc

Maximum time saving

All SOLITAX sc probes are factory calibrated in conformity with DIN EN ISO 7027 for long-term calibration stability. A correction factor replaces the time-consuming multipoint on-site calibrations. The automatic wiper eliminates soiling of the measurement window as it occurs. The result: more stable measured values and lower maintenance costs.

Maximum variability

Turbidity and solids measurement, plastic or stainless steel housing, with or without wiper system - SOLITAX sc offers the right probe for every field of application.

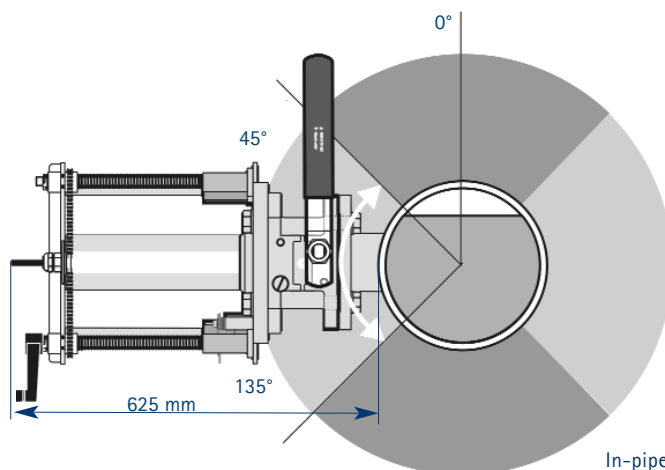
This variability is also reflected in the fixing systems for the immersion and in-pipe probes.

SOLITAX sc variants

	t-line sc	ts-line sc	inline sc	hs-line sc	highline sc
TURBIDITY MEASUREMENT					
Drinking water	●	●	●	●	●
Wastewater	●	●	●	●	●
SOLIDS MEASUREMENT					
Primary sludge				●	●
Thickened sludge				●	●
Active sludge		●	●	●	●
Return sludge		●	●	●	●
Dewatered return sludge		●	●	●	●
Digested sludge				●	●
Centrate		●	●	●	●
Lime sludge		●	●	●	●

● suitable

Installing SOLITAX sc as insertion probe



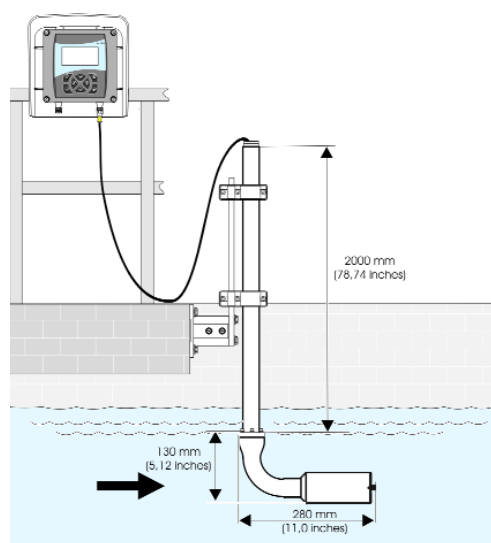
In-pipe installation with the help of safety fitting; recommended mounting angle 45° to 135°.

Technical data

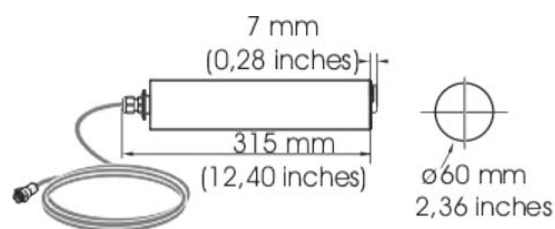
	t-line sc	ts-line	inline sc	hs-line sc	highline sc
Parameters	Turbidity -	Turbidity Solids			
Measurement procedure	90° IR scatter light	IR dual scatter light			
- Turbidity	DIN EN ISO 7027	DIN EN ISO 7027			
- Solids	-	Equivalent to DIN 37414			
Measuring range					
- Turbidity*	0.001 - 4,000 FNU	0.001 - 4,000 FNU			
- Solids	-	0.001 - 50 g/l		0.001 - 150 g/l	
Accuracy					
- Turbidity*	<1% or 0.001 FNU	<1% or 0.001 FNU			
- Solids	-	<5%			
Response time	1 - 300 sec	1 - 300 sec			
Sample temperature	0 - 40 °C	0 - 40 °C			
Flow rate	3 m/s	3 m/s			
Immersion depth	0.1 - 10 m	0.1 - 10 m/60 m**	-	0.1 - 10 m/60 m**	-
Pressure range	1 bar	1 bar/6 bar**	6 bar	1 bar/6 bar**	6 bar
Weight	520 g/ - **	520g/1400 g**	- /2400 g**	520g /1400 g**	- /2400 g**
Dimensions (D x L)	60 x 200 mm	60 x 200 mm	60 x 315 mm	60 x 200 mm	60 x 315 mm
Housing	PVC	PVC/stainless steel	Stainless steel	PVC/stainless steel	Stainless steel
Cleaning	With automatic wiper/without				
Cable length	10 m fixed, max. 100 m extension cable				
Type of fitting	Immersion probe	Immersion probe	Insertion probe	Immersion probe	Insertion probe
Display unit	SC 100 Controller (model LXV401) or SC 1000 Controller (model LXV400 and model LXV402)				

* For user-specific offset and gradient correction; ** PVC/ stainless steel

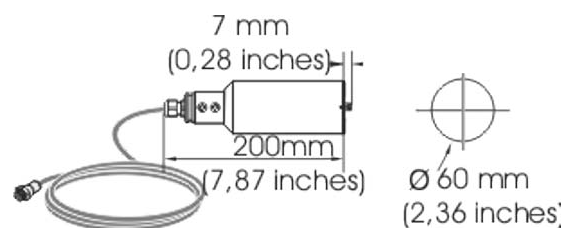
Installing SOLITAX sc as immersion probe



SOLITAX sc insertion probe



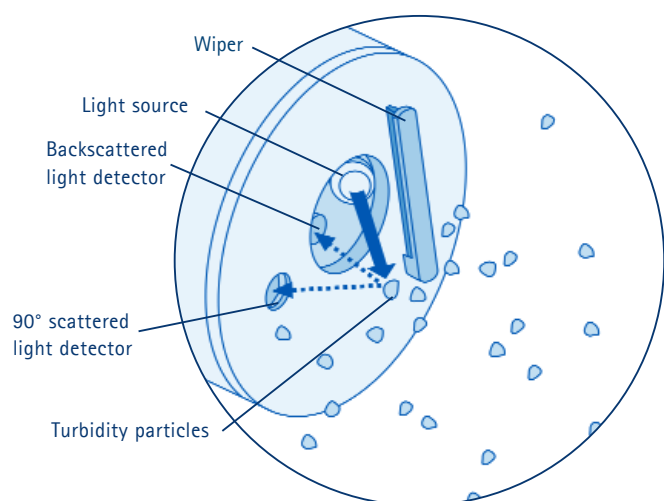
SOLITAX sc immersion probe



The SOLITAX sc principle

Unique colour-independent measurement of solids

Primary and active sludges with different structures and colours, dark digested sludges and light lime sludges make the highest demands on the precise measurement of solids. Only SOLITAX sc solids probes with the patented dual scattered light method can satisfy these demands. The key principle: Parallel evaluation of different scattered light signals.



Function of SOLITAX sc



SC 100 Controller

Up to two SC probes can be connected, e.g. SOLITAX sc with O₂, pH, NO₃, etc.



SC 1000 Controller

Up to eight SC probes can be connected; optional expansion through networking.

Ordering information

DESCRIPTION	ART. NO.
SOLITAX sc, stainless steel, with wiper*	
- ts-line	LXV423.99.00100
- hs-line	LXV423.99.00200
- inline	LXV424.99.00100
- highline	LXV424.99.00200
SOLITAX sc, plastic (PVC), with wiper*	
- t-line	LXV423.99.10000
- ts-line	LXV423.99.10100
- hs-line	LXV423.99.10200
ACCESSORIES	
Tank rim mounting	LZX414.00.10000
In-flow safety fitting, stainless steel	LZX337
In-flow fitting, stainless steel	LZX461
Weld-on flange, stainless steel	LZX660
Extension cable	
- 5 m	LZX848
- 10 m	LZX849
- 15 m	LZX850
- 20 m	LZX851
- 30 m	LZX852
- 50 m	LZX853
SC 100 Controller	LXV401
SC 1000 Controller	LXV400 and LXV402
SPARE PARTS AND CONSUMABLES	
Wiper profiles, silicone (5 mm)	LZX050
Wiper profiles, Viton (5 mm)	LZX578

* All SOLITAX sc probes are also available without a wiper.

HACH LANGE Services



Ordering, information and advice:
UK: +44 (0)161 872 14 87
IRL: +353(0)1 4602522
EU: +49 (0)211 52 88-0



On site technical support.

HACH LANGE GMBH
Willstätterstraße 11
D-40549 Düsseldorf
Tel. +49 (0)2 11 52 88-0
Fax +49 (0)2 11 52 88-143
info@hach-lange.de
www.hach-lange.com

HACH LANGE LTD
Pacific Way
Salford
GB-Manchester, M50 1DL
Tel. +44 (0)161 872 14 87
Fax +44 (0)161 848 73 24
info@hach-lange.co.uk
www.hach-lange.co.uk

HACH LANGE LTD
Unit 1, Chestnut Road
Western Industrial Estate
IRL-Dublin 12
Tel. +353(0)1 4602522
Fax +353(0)1 4509337
info@hach-lange.ie
www.hach-lange.ie



FP 360 sc OIL-IN-WATER CONTINUOUS ONLINE MONITORING SENSOR

Applications

- Industrial water
- Power
- Wastewater
- Drinking water



Continuous oil-in-water monitoring for the right price.

The FP 360 sc is the only online oil-in-water instrument that delivers the highest sensitivity and selectivity with the lowest total cost of ownership.

The right technology for the right price

Due to its unique combination of submersible probe design and UV fluorescence sensing technology, the FP 360 sc delivers the best technology to detect oil in water and is priced below competitive UV fluorescent instruments.

Minimal maintenance

The FP 360 sc has no tubes, pumps, or valves that can foul or require constant maintenance interventions. Maintenance is limited to occasional wiping of the sensor's measurement window, calibration once every two years, and Xenon lamp replacement every four years.

Reduced laboratory testing

While laboratory testing is the ultimate method of measuring oil in water, it is a long and complex process that requires special equipment and trained lab personnel. The FP 360 sc provides a cost-effective, continuous online monitoring solution to maintain process control and avoid oil contamination with minimal laboratory testing.

High sensitivity and selectivity

The FP 360 sc can detect and measure polycyclic aromatic hydrocarbons (PAHs) from 1.2 ppb to up to 5000 ppb ($\mu\text{g/L}$). This is approximately equivalent to a concentration of mineral oil between 0.1 to 150 ppm (mg/L). Furthermore, the FP 360 sc method of detection makes it impervious to interferences by turbid water or natural organic and biological matter that impact online light scattering, UV absorbance, and VIS fluorescence instruments.

One to eight sensors

The HACH LANGE Digital Controller Family can receive data from up to eight HACH LANGE digital sensors, including oil-in-water, suspended solids, turbidity, pH/ORP, dissolved oxygen, conductivity, ammonium, phosphate, SAC, and nitrate in any combination.

There's no complicated wiring or set up procedures with the family of controllers. Just plug the sensor to any HACH LANGE digital controller and it's ready to use because it's "plug and play."

Technical Data*

Measurement method	UV fluorescence method for polycyclic aromatic hydrocarbons (PAH)	Resolution	0.1 ppb (µg/L) (PAH) in the lowest measuring range
Light Source	Miniature xenon flashlamp with interference filter	Reproducibility	2.5 % of measured value at constant temperature (PAH)
Detector	UV photodiode with interference filter; Compensation of daylight and flashlamp intensity fluctuations	Response time	10 s (T90)
Excitation	Wavelength 254 nm	Calibration	Factory calibrated with UV fluorescence standard or process calibration with results of a grab sample analysis.
Wavelength	Measurement: 360 nm	Sample temperature	1 - 40 °C
Measuring range	Low Range: 0 - 50 ppb (µg/L) and 0 - 500 ppb (µg/L) (PAH)** 0.1 - 1.5 ppm (mg/L) and 0.1 - 15 ppm (mg/L) (oil)** High Range: 0 - 500 ppb (µg/L) and 0 - 5,000 ppb (µg/L) (PAH)** 0.1 - 15 ppm (mg/L) and 0.1 - 150 ppm (mg/L) (oil)**	Pressure range	Max. 30 bar
		Material	Housing: stainless steel 316Ti (1.4571) or titanium
		Dimensions (W x H x D)	68 x 306 mm (D x L; without connector and suspension pin)
		Weight	Stainless steel: 2.8 kg Titanium: 1.8 kg
		Warranty	2 years

*Subject to change without notice.

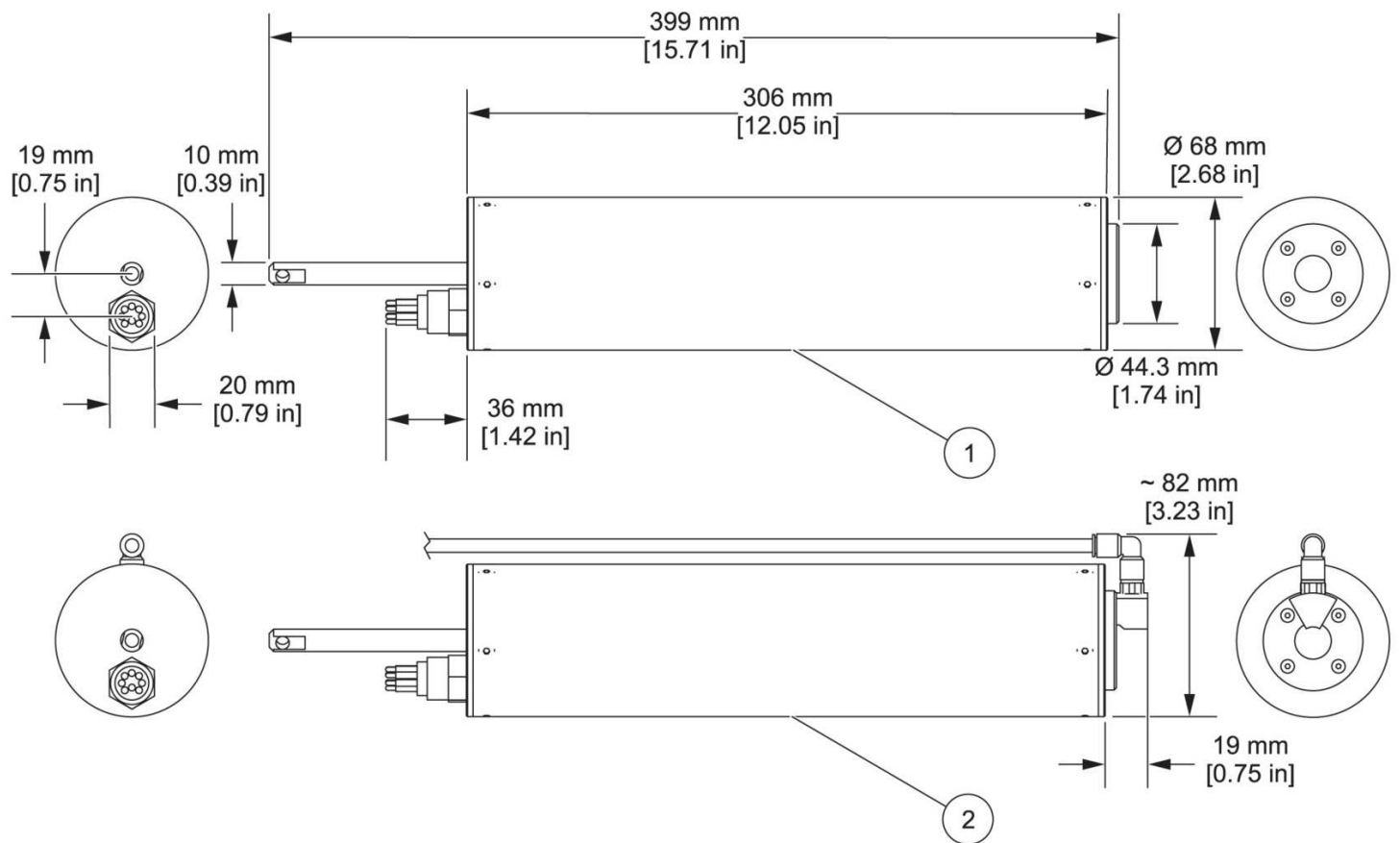
**With calibration standard.

Principle of Operation

The FP 360 sc measures intensity of fluorescence light at a wavelength of 360 nm emitted by polycyclic aromatic hydrocarbons (PAH) after UV irradiation of the sample at 254 nm. Since PAHs are components of most mineral oils, the FP 360 sc can detect the presence of oil contamination in surface, process, or industrial waters. In addition, since the intensity of the emitted light is proportional to the PAHs concentration, the FP 360 sc can be calibrated to measure oil concentration in stable matrices.

Dimensions

Figure 1 shows the sensor without the cleaning unit. Figure 2 shows the sensor with the cleaning unit.



Order Information

Sensors

LXV441.99.11101	FP 360 sc PAH/Oil Fluorescence probe, 0-500 ppb, stainless steel body, 10 m cable, w/o cleaning
LXV441.99.11201	FP 360 sc PAH/Oil Fluorescence probe, 0-500 ppb, stainless steel body, 10 m cable, with cleaning
LXV441.99.11301	FP 360 sc PAH/Oil Fluorescence probe, 0-500 ppb, stainless steel body, 1.5 m cable, w/o cleaning
LXV441.99.12101	FP 360 sc PAH/Oil Fluorescence probe, 0-500 ppb, titanium body, 10 m cable, w/o cleaning
LXV441.99.12201	FP 360 sc PAH/Oil Fluorescence probe, 0-500 ppb, titanium body, 10 m cable, with cleaning
LXV441.99.12301	FP 360 sc PAH/Oil Fluorescence probe, 0-500 ppb, titanium body, 1.5 m cable, w/o cleaning
LXV441.99.21101	FP 360 sc PAH/Oil Fluorescence probe, 0-5000 ppb, stainless steel body, 10 m cable, w/o cleaning
LXV441.99.21201	FP 360 sc PAH/Oil Fluorescence probe, 0-5000 ppb, stainless steel body, 10 m cable, with cleaning
LXV441.99.21301	FP 360 sc PAH/Oil Fluorescence probe, 0-5000 ppb, stainless steel body, 1.5 m cable, w/o cleaning
LXV441.99.22101	FP 360 sc PAH/Oil Fluorescence probe, 0-5000 ppb, titanium body, 10 m cable, w/o cleaning
LXV441.99.22201	FP 360 sc PAH/Oil Fluorescence probe, 0-5000 ppb, titanium body, 10 m cable, with cleaning
LXV441.99.22301	FP 360 sc PAH/Oil Fluorescence probe, 0-5000 ppb, titanium body, 1.5 m cable, w/o cleaning

Accessories

LZX914.99.11110	Stainless steel chain mounting set
LZY669	Flow cell with mounting panel for FP 360 sc

Controllers

SC 200	The SC 200 Universal Controller is the most versatile controller on the market. It allows the use of digital and analogue sensors, either alone or in combination, to provide compatibility with the broadest range of sensors.
SC 1000	Get the same great features as the SC 200 Controller above - "plug and play", all digital operation and communication - but with the SC 1000 Controller, up to eight HACH LANGE sensors can be used with one controller in any combination. The SC 1000 Controller is also expandable and upgradeable to easily adapt to your needs.

Service Packages

TSE-COM-FP360SC	Commissioning for FP 360 sc. Includes first level training.
TSE-BC-FP360SC	Basic maintenance contract for FP 360 sc. Includes one onsite visit and final reporting.
TSE-CC-FP360SC	Comfort maintenance contract for Oil-in-water sensor FP 360 sc. Includes one onsite visit and final reporting. Extended warranty up to 60 months.
TSE-MC-FP360SC	Onsite one-off inspection for Oil-in-water sensor FP 360 sc. Includes one onsite visit on demand and final reporting.

APPENDIX B

SPEL Separator Data Sheet

Section 6
SPEL Stormceptor®
by-pass separators



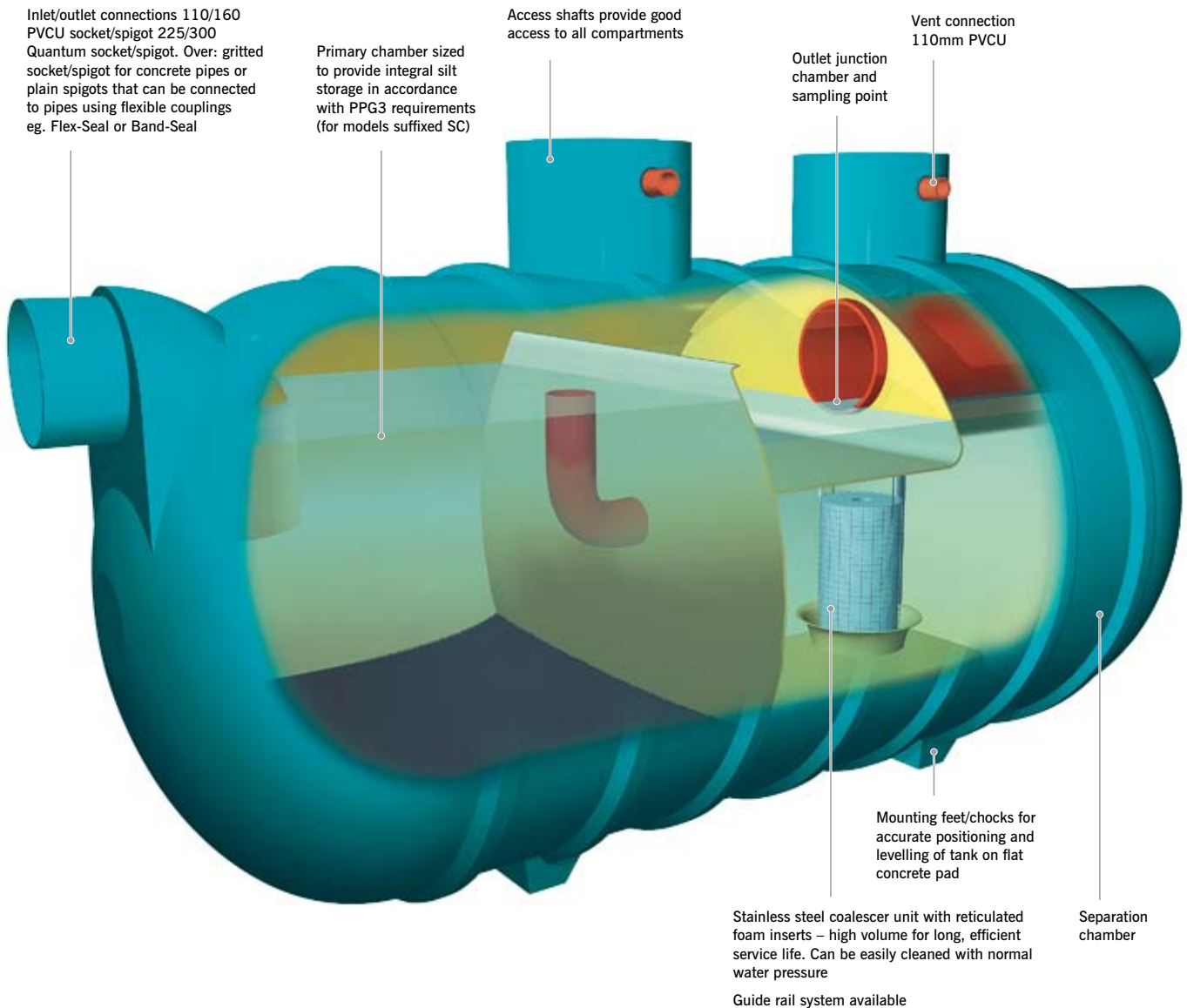
The SPEL Stormceptor is the first Environment Agency listed class 1 by-pass separator to BS EN 858-1:2002.

The Stormceptor provides a very effective means of separating oil and other light liquids from stormwater drainage systems.

Compliant to the European Standard BS EN 858-1, the Environment Agency's Pollution Prevention Guidelines PPG3 and the Construction Products Regulations.

SPEL

Compliant to the European Standard BS EN 858-1, the Environment Agency's Pollution Prevention Guidelines PPG3 and the Construction Products Regulations.



The 'heart' of SPEL Separators is the unique long life, low maintenance coalescer unit which 'polishes' the final effluent AFTER 90% hydrocarbons of silt have been separated out.

The SPEL Stormceptor is a well proven high quality factory-made unit specially designed and fabricated to provide a very effective means of separating oil and other light liquids from stormwater drainage systems.

The SPEL Stormceptor was the first Environment Agency listed class 1 by-pass separator to BS EN 858-1:2002.

The SPEL Stormceptor has been used effectively throughout the UK and abroad since 1985. All sizes and types of development have been catered for, including industrial development sites, hypermarkets and airports. Areas of up to 30 hectares can be covered with a single unit.

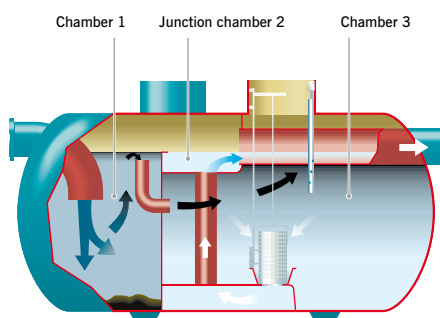
6.2 SPEL Stormceptor® by-pass separators

Operation



Protecting coastal waters

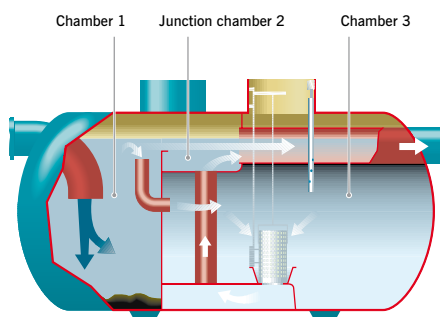
Surface water draining from runways at a busy RAF station in Anglesey is being treated by two SPEL Stormceptor class 1 by-pass separators.



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.



The reclaimed former opencast coal site at Bermuda Park, Warwickshire. The main contractor – Tarmac Construction Midlands – has installed three SPEL 500 series Stormceptor by-pass separators with Econoskim fuel/oil skimming and separate fuel/oil containment facilities. These cater for an impermeable area of 68 acres.



Above and left: SPEL Stormceptor series 600 class 1 by-pass separator for a catchment area of 30 hectares.

How to select and specify

1. In accordance with the EA Pollution Prevention Guidelines PPG3:
 - Determine the type of separator – full retention or by-pass.
 - Determine the class of separator – class 1 or 2.
 - Specify whether silt capacity is required integrally or separately upstream of the separator.
2. Against the catchment area within which your requirements fall, the SPEL Separator nominal size can be ascertained.
3. Inlet/outlet pipe connection orientation A-I (see options below).
4. Inlet/outlet diameter in mm.

Selecting size of SPEL Stormceptor

The nominal size (NSB) is obtained by this formula: $NSB = 0.0018A(m^2)$ where A is the catchment area.

	NSB	Model	Class 1 or 2 C1 or C2	Silt Cap. SC	Orientation inlet/outlet	Inlet/outlet diameter
Example 1	20	320	C1	SC	D	600/600
Example 2	50	4100	C2	–	A	900/900

Example 1

SPEL Stormceptor class 1 by-pass separator NSB 20 model 320C1/SC/D 600/600 (with silt capacity).

Example 2

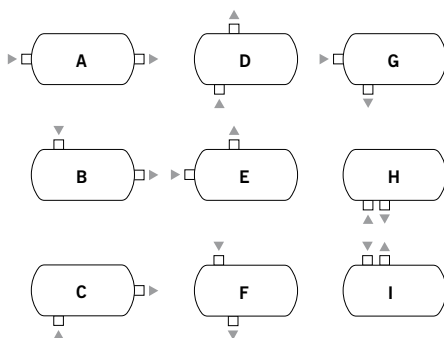
SPEL Stormceptor class 2 by-pass separator NSB 100 model 4100C2/A 900/900 (without silt capacity).

5. SPEL Separators are available in four specifications to suit invert depths and ground water conditions. Standard, Heavy, Extra Heavy and Special, see tables alongside.
6. Optional extras available see 5.6 and 5.7.
 - SPEL coalescer unit guide rail system.
 - SPEL coalescer unit lifting/locating/locking system.
 - SPEL Econoskim® light liquid skimming and separate containment system.
 - SPEL mechanical anchoring system. See 4.11/4.12.
7. SPEL automatic alarm/monitoring system. See 5.7.

Choice of pipe connections

The orientation of inlet/outlet connections indicated depends on the pipe diameter (see under A–I and D–I overleaf) except for Class 2 Stormceptors which accommodate the larger diameter. Any special requirements contact Technical Sales.

Both inlet and outlet connections are spigots (GRP or PVCU) and can be connected to the site pipework using Flex-Seal, Band-Seal or similar flexible couplings.

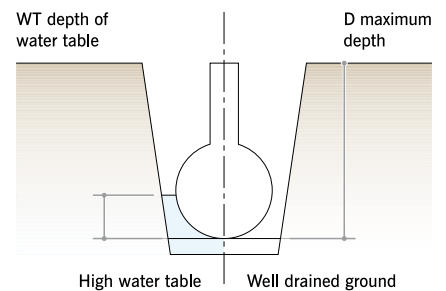


Specification

Standard, heavy, extra heavy or special specification available dependent upon tank burial depth and water table level in winter. The tables below refer to tanks with a concrete surround. For extra heavy and special specification range and pea gravel surround refer to section 4 or contact technical sales.

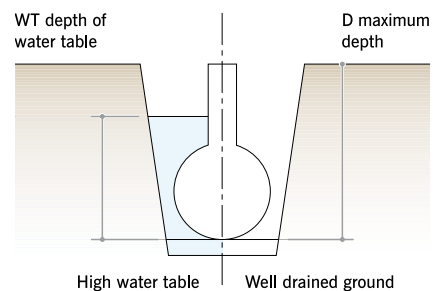
Standard tanks

Series	WT(m)	D(m)
100/200	1.0	4.0
300	0.9	4.0
400	1.3	5.0
500	1.9	5.7
600	2.4	6.2



Heavy tanks

Series	WT(m)	D(m)
100/200	2.0	6.0
300	2.8	5.6
400	3.5	6.0
500	4.5	7.25
600	4.7	7.3



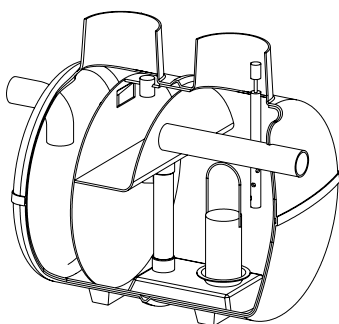
6.4 SPEL Stormceptor® by-pass separators 100 and 200 series, class 1 and 2 models

Compliant to the European Standard BS EN 858-1, the Environment Agency's Pollution Prevention Guidelines PPG3 and the Construction Products Regulations

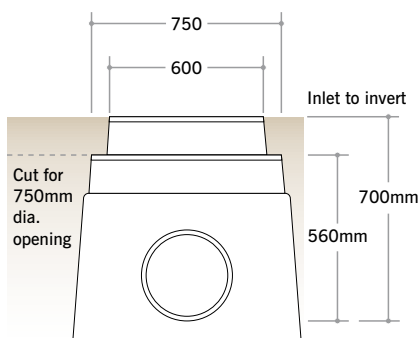
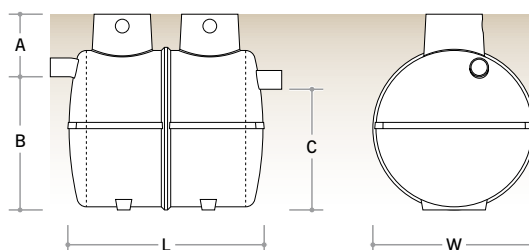
Class 2 models available for 100 and 200 series – change C1 for C2 when quoting model reference.

Model	Nominal size (NSB)	Catchment area a (m ²)	Oil storage (litres)	Silt storage (litres)	Overall length (mm)	Overall diameter (mm)	Inlet Invert (mm)	Base to Inlet (mm)	Base to outlet (mm)	Max in/out pipe diameter (mm) for orientation		Number of access shafts diameter (mm)			
					L	W	A	B	C	type A-C	type D-I	450	600	750	900
103 C1/SC	3	1667	45	300	1550	1300	500	1015	965	160	160	2	-	-	-
206 C1/SC	6	3333	90	600	2110	1225	560*	1350	1300	300	300	-	*	1	-
208 C1/SC	8	4444	120	800	2260	1225	560*	1350	1300	300	300	-	*	1	-
210 C1/SC	10	5556	150	1000	2920	1225	560*	1350	1300	300	300	-	*	1	-
215 C1/SC	15	8333	225	1500	4227	1225	560*	1350	1300	400	400	-	*	1	-

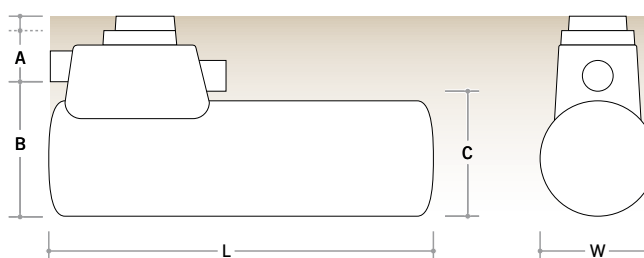
* 200 Series Stormceptors have a dual size access shaft. For units that will collect silt we recommend using the 750mm diameter access which provides enough room for the silt removal hose to be lowered into the tank during maintenance. The value of 'A' here is for the 750mm access – the 600mm access has an 'A' value of 700mm.



100 series



200 series



Dual access shaft openings

For access to desludge primary chamber, cut 750mm dia. access shaft opening. Where a silt trap is incorporated upstream or silt build up will not occur 600mm diameter access shaft may be adequate.

Refer to 6.7 and 6.8 for more comprehensive data including installation.

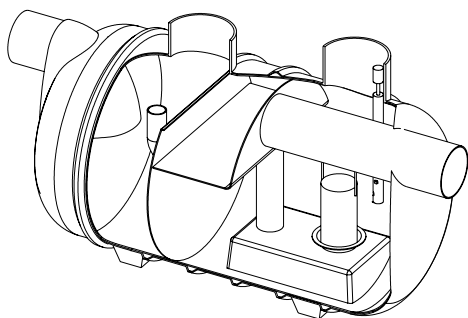
SPEL Stormceptor® by-pass separators 300 and 400 series, class 1 and 2 models

6.5

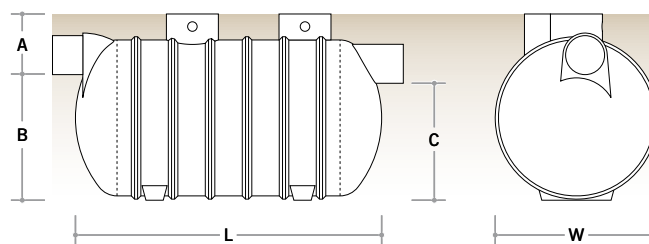
Compliant to the European Standard BS EN 858-1, the Environment Agency's Pollution Prevention Guidelines PPG3 and the Construction Products Regulations

Class 2 models available for 300 and 400 series – change C1 for C2 when quoting model reference.

Model	Nominal size (NSB)	Catchment area a (m²)	Oil storage (litres)	Silt storage (litres)	Overall length (mm) L	Overall diameter (mm) W	Inlet Invert (mm) A	Base to Inlet (mm) B	Base to outlet (mm) C	Max in/out pipe diameter (mm) for orientation		Number of access shafts diameter (mm)			
										type A-C	type D-I	450	600	750	900
318 C1/SC	18	10000	270	1800	3200	1875	700	1450	1350	450	600	-	2	-	-
320 C1/SC	20	11111	300	2000	3535	1875	700	1450	1350	450	600	-	2	-	-
325 C1/SC	25	13889	375	2500	4420	1875	700	1450	1350	450	600	-	2	-	-
330 C1/SC	30	16667	450	3000	5070	1875	700	1450	1350	450	600	-	1	-	1
340 C1/SC	40	22222	600	4000	7060	1875	740	1410	1310	450	600	-	1	-	1
345 C1/SC	45	25000	675	4500	7615	1875	740	1410	1310	450	600	-	1	-	1
350 C1/SC	50	27778	750	5000	8255	1875	740	1410	1310	450	600	-	1	-	1

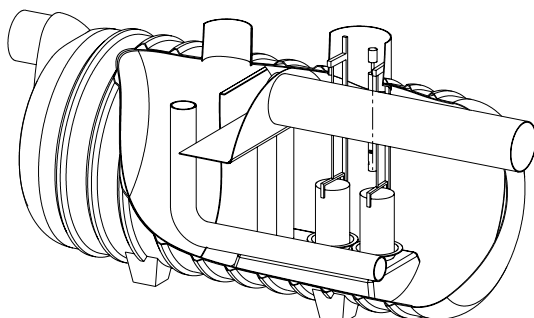


300 series

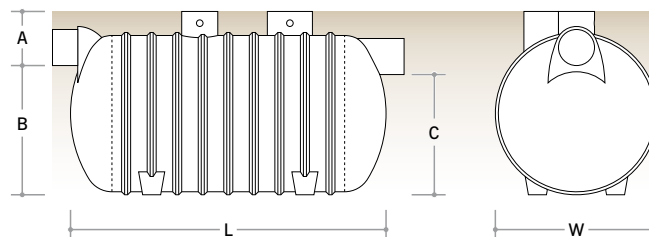


Model	Nominal size (NSB)	Catchment area a (m²)	Oil storage (litres)	Silt storage (litres)	Overall length (mm) L	Overall diameter (mm) W	Inlet Invert (mm) A	Base to Inlet (mm) B	Base to outlet (mm) C	Max in/out pipe diameter (mm) for orientation		Number of access shafts diameter (mm)			
										type A-C	type D-I	450	600	750	900
460 C1/SC	60	33333	900	6000	4400	2700	950	2100	2000	600	750	-	1	-	1
470 C1/SC	70	38889	1050	7000	5250	2700	950	2100	2000	600	750	-	1	-	1
480 C1/SC	80	44444	1200	8000	6170	2700	950	2100	2000	600	750	-	1	-	1
4100 C1/SC	100	55556	1500	10000	7400	2700	1100	1950	1850	750	900	-	1	-	1
4125 C1/SC	125	69444	1875	12500	9050	2700	1100	1950	1850	750	900	-	1	-	1
4150 C1/SC	150	83333	2250	15000	9950	2700	1100	1950	1850	750	900	-	-	-	2
4160 C1/SC	160	88889	2400	16000	11830	2700	1250	1800	1700	750	900	-	1	1	1

400 series – models without silt capacity are available if required – details on application.



400 series



6.6 SPEL Stormceptor® by-pass separators

500 and 600 series, class 1 and 2 models

Compliant to the European Standard BS EN 858-1, the Environment Agency's Pollution Prevention Guidelines PPG3 and the Construction Products Regulations

These Stormceptors are individually designed in accordance with specific site requirements according to catchment area, class, silt capacity, inlet/outlet connection size and orientation. The following is an approximate guide to the range of models available. Please contact our technical department for your specific requirements. Class 2 models available – change C1 for C2 when quoting model reference.

Model	Nominal size (NSB)	Catchment drainage area hectares	Oil storage litres NSBx15	Silt** storage litres NSBx100	*Overall length (mm)	*Overall diameter (mm)	Inlet Invert (mm)	Base to Inlet (mm)	Base to outlet (mm)	Max in/out pipe diameter (mm) for orientation	
					L	W				A	B
5180C1SC	180	10	2700	18000	10040	3650	1260	2615	2390	900	1200
5200C1SC	200	11.1	3000	20000	11140	3650	1260	2615	2400	900	1200
5250C1SC	250	13.9	3750	25000	13840	3650	1260	2615	2400	900	1200
6300C1SC	300	16.7	4500	30000	14250	4150	1425	2850	2600	1200	1500
6350C1SC	350	19.4	5250	35000	16635	4150					
6400C1SC	400	22.2	6000	40000	18259	4150					
6500C1SC	500	27.8	7500	50000	22250	4150					
6500C1	500	27.8	7500	Nil	16635	4150					
6600C1	600	33.3	9000	Nil	19899	4150					
6700C1	700	38.9	10500	Nil	23050	4150					
6750C1	750	41.7	11250	Nil	24650	4150					
6800C1	800	44.4	12000	Nil	–	4150					
61000C1	1000	55.5	15000	Nil	–	4150					

*Tank shell – fittings extra. **Where silt capacity required it is available on the models indicated.

Pipe size and orientation designed to suit site pipework and class 1 or 2.

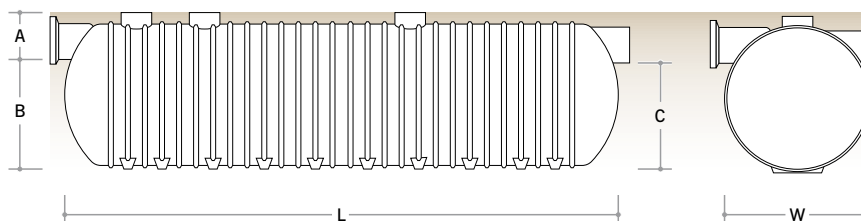
Silt capacity normally provided for integrally in accordance with PPG3.

Series 500

Inside diameter 3500mm, outside diameter 3650mm.

Series 600

Inside diameter 4000mm, outside diameter 4150mm.



Features

Filament wound shells are lightweight but have great strength and durability.

Life expectancy in excess of fifty years.

Smooth, high gloss, corrosion resistant, resin-rich internal surface.

External 'flow coat' water penetration barrier.

25 year warranty.

Stainless steel coalescer units (class 1 separators) with durable high volume reticulated foam inserts for long life and long term efficiency.

SPEL automatic alarm/monitoring system

This is to indicate when separator requires emptying or SPEL Tankstor® with Econoskim®. See 5.7.

Optional extras

SPEL coalescer unit guide rail system. See 9.7.

SPEL coalescer unit lifting/locating/locking system with lifting chains. See 9.6/9.7.

SPEL Econoskim light liquid skimming and separator containment system. Manual or automatic systems which save conventional emptying costs by 90%. Section 11.

SPEL pollution monitoring and containment systems. Section 11.

SPEL mechanical anchoring systems. See 4.11/4.12.

GRP non slip ladder/s with stainless steel fixings.

Regulation/specification compliance as appropriate

Environment Agency's Pollution Prevention Guidelines PPG3.

European Standard; Separator systems for light liquids BS EN 858-1:2002.

British Standard; Specification for design and construction of vessels and tanks in reinforced plastics BS 4994 : 1987.

European Standard; Underground tanks of glass reinforced plastics (GRP) BS EN 976-1 : 1997.

Materials to BS 3532, BS 3691 and or BS 2782 or equivalent standards.

Compliant to the European Standard BS EN 858-1, the Environment Agency's Pollution Prevention Guidelines PPG3 and the Construction Products Regulations.

The 200 Series Stormceptor class 1 by-pass separators are single access shaft units with integral silt capacity. There is complete access to both the primary chamber and the fuel/oil separation chamber for desludging by suction tanker provided the 750mm dia. access shaft is utilised.

If a silt trap is situated upstream of the Stormceptor and/or no build up of silt will occur in the primary chamber the smaller 600mm dia. access shaft can be utilised.

Performance

SPEL Stormceptor class 1 by-pass separators incorporate a coalescer unit and are designed to meet the requirements of the European Standard BS EN 858-1 and the Environment Agency's Pollution Prevention Guidelines PPG3, where the maximum permissible content of residual oil in the outlet is 5mg/l.

The coalescer unit has a robust high volume reticulated foam insert. The insert efficiently coalesces the finer globules of hydrocarbons for gravity separation and due to its large volume, lasts for long periods before requiring cleaning. Cleaning is then a simple operation using normal pressure water. The insert can be reused again and again, rarely requiring replacement.

The inlet/outlet diameters and fall across the separator as indicated ensure optimum performance.

The light liquid storage capacity (fuel, oil etc.) is 15 times the nominal size (NS) in litres, eg. SPEL Stormceptor NSB6 has a light liquid storage capacity of 90 litres.

The first primary chamber can be desludged by a suction tanker providing the 750mm dia. access together with the cover and frame to suit is incorporated.

Specification

SPEL 200 series Stormceptor class 1 by-pass separators incorporate a strong filament wound shell and are manufactured in standard and heavy specification depending on burial depths and water table height as in the table above. See also 6.3.

Inlet/outlet connections

Both inlet and outlet connections are either 225/300/400 dia. Quantum spigots. Flex-Seal/Band-Seal or similar couplings are available for connecting to site pipework if required.

Burial depths for standard and heavy specification tanks

Standard	Maximum burial depth to bottom of tank	4 metres
	Maximum height of water table above bottom of tank	1 metre
Heavy	Maximum burial depth to bottom of tank	6 metres
	Maximum height of water table above bottom of tank	2 metres

Handling

Tanks should be lifted using slings not chains or wire ropes. DO NOT drag tanks along the ground for any distance and avoid jarring or bumps. DO NOT lift with water in the tank. See 4.2.

Preliminary

Remove the plastic tie used to hold the coalescer unit inside the tank.

Insert the coalescer unit securely into the base socket.

Ensure the foam insert is fitted inside the stainless steel coalescer unit.

During installation, it is important the foam inserts are not clogged with dust, debris or drops of wet concrete. To safeguard against this, we recommend covering the access shaft with a sheet of polythene.

Installation guidance notes

Installation should be carried out by a competent contractor in accordance with the following procedures, Health & Safety at Work legislation and good building practice.

For detailed instructions see section 4 or installation instructions supplied with every tank.

1. Determine the size of the excavation allowing for the drain invert depth and a concrete surround. Allowance should be made for consolidating concrete under the unit when backfilling.
2. Pour concrete base to correct depth and level off.
3. When the concrete has set sufficiently, place the tank in position, check for levels (including inlet/outlet inverts) and fill with water to a maximum depth of: 200 series – 200mm, 300 series – 300mm, 400 series – 400mm. Ensure concrete slab is clean ready for placing concrete surround. Surround should preferably be placed within 48 hours of casting the base slab.
4. Place backfill concrete (ST4 mix) up to the depth of the water in the tank ensuring the concrete is properly consolidated under the tank to prevent voids. Consolidate by hand – do not use vibrating pokers. Connect up pipework.

5. Continue backfilling with concrete and at the same time filling the tank with water to equalise pressure and resist floatation. Where the tank is divided into chambers ensure all chambers are filled equally.
6. Top up the tank with water to inlet/outlet invert level and place remainder of concrete to a depth of approximately 150-200mm above the top of the tank. Where extension access shaft is fitted, this can be surrounded in concrete once the main tank concrete surround has set. (See Extension access shafts).
7. Where the concrete slab over the tank is to take vehicle loading it should be reinforced in accordance with good practice to take the maximum load and should be extended onto unexcavated ground. It is important that vehicle loading is not transferred to the tank shell or its concrete surround.
8. Incorporate inspection cover and frame.
NOTE: For access to desludge the primary chamber fit only 750mm dia. manhole cover and frame.

Venting

SPEL Separators are governed by the requirements of petroleum regulations: Petrol filling stations: Construction and Operation HS(G)41, ISBN 0-11885449-6. These state in paragraph 45, that each chamber of a petrol interceptor should be vented and vent pipes should extend to not less than 2.4m above ground level, should not be less than 75mm diameter and of a robust construction, and should be manifolded above ground.

Extension access shafts

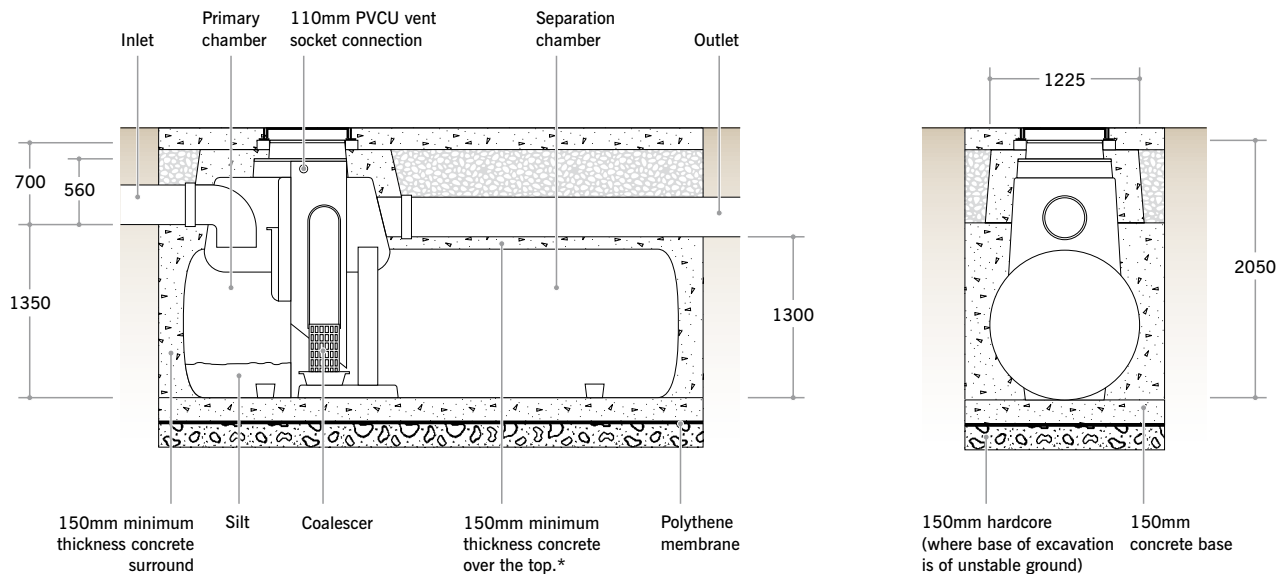
SPEL extension shafts are available in standard lengths of 500mm upwards and 500mm increments. When these should be surrounded with concrete, pour in lifts of approximately 500mm, allowing the concrete to set between each lift.

Commissioning

On completion of installation, check the foam insert is fitted inside the stainless steel coalescer unit, the coalescer unit is inserted securely into the base socket and the tank is free of debris etc.

6.8 SPEL Stormceptor® by-pass separators

200 series, class 1 with silt capacity



* Fabric reinforcement may be necessary where vehicle loading has to be taken into account or where high extension access shafts are to be fitted

SPEL automatic alarm/monitoring system

Requirement of the Environment Agency's Pollution Prevention Guidelines PPG3

The SPEL automatic alarm/monitoring system provides continuous monitoring of the separator contents by sensing when the light liquid within the separator has filled to a predetermined level (with design safety margins), and provides a simple audio-visual warning to alert the operator that the separator needs to be emptied.

Maintenance

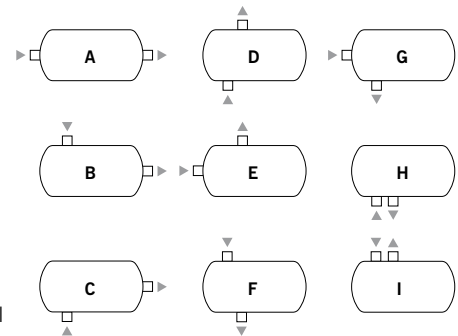
The SPEL 200 series Stormceptor class 1 by-pass separators have good access to both the primary chamber and the light liquid separation chamber for periodic emptying of retained light liquids and silt which is essential to maintain the units optimum performance.

Periods between emptying will have to be determined depending on site conditions but normally at least twice a year.

For detailed instructions see section 9.

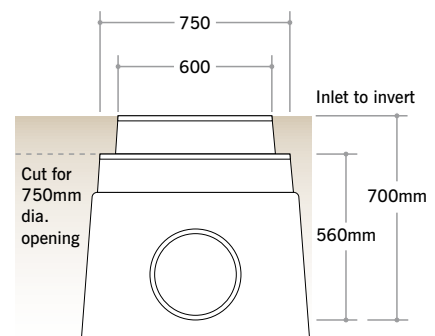
Procedure in brief

1. Lift handle and coalescer unit out of the tank and place ahead of the separator.
2. Remove foam insert and wash with normal water pressure, ensuring the dirty water runs into the separator.
3. Empty light liquids and silt alternating between both chambers to avoid excessive pressure one side of the partition.
4. Re-insert the foam insert into the stainless steel coalescer unit and re-insert the coalescer unit into the separator.



Choice of pipe connections

Orientation of inlet/outlet pipe connections.



Dual access shaft openings

For access to desludge primary chamber, cut 750mm dia. access shaft opening. Where a silt trap is incorporated upstream or silt build up will not occur 600mm diameter access shaft may be adequate.

Catchment area m ²	SPEL ref	Nominal size NSB	Oil storage litres NSBx15	Silt storage litres NSBx100	Overall length (mm)	Max pipe (mm)
3333	206C1SC	6	90	600	2110	300
4444	208C1SC	8	120	800	2260	300
5556	210C1SC	10	150	1000	2920	300
8333	215C1SC	15	225	1500	4227	300