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1.0 DRAINAGE STRATEGY

1.1 Proposals for surface water disposal

- Surface water disposal will be via gravity to the Rochdale Canal. This will be via a new headwall outfall with upstream treatment train consisting of permeable paving to a minimum of 70% of private driveways, trapped gullies, attenuation tank with downstream flow control device, a SPEL Purceptor treatment device and reedbed swale.
- A filter drain will be included to drain the footway link adjacent to the canal.
- Surface water discharge will be attenuated to 29.6 l/s as a minimum practicable rate.
- Attenuation storage for rainfall events will be provided for up to the 1 in 100 year plus 30% climate change event in proprietary below ground storage. The total storage volume is 2116 m³.
- The surface water drainage system will be offered for adoption to the appropriate sewerage undertaker. The extent of adoption is to be determined through the technical approval process. Features falling outside of adoption will fall under the responsibility of the management company for the site.

1.2 Proposals for foul water disposal

For the majority of the site, foul water will be pumped to the 225 mm public combined sewer in Hollingworth Road to the east of the site via an adoptable pumping station. Levels along the site frontage next to Hollingworth Road are to be lifted and it is proposed to connect plots in this area by gravity.

1.3 Maintenance proposals

The sewerage system will be expected to be maintained by Vistry Partnership's contractor until the system has been formally adopted by the sewerage undertaker and management company. Any maintenance work must be carried out by a competent contractor and be in accordance with relevant health and safety guidance. Risk assessments and method

statements will be provided by the contractor carrying out the maintenance works prior to maintenance works commencing.

Therefore, a maintenance plan has been put forward to ensure that the sewerage system is maintained and in good condition prior to adoption. This should be read in accordance with a site-specific temporary runoff management plan.

All plot drainage associated with individual dwellings shall be the responsibility of the plot owners and shown on relevant deed plans. Maintenance of permeable driveways will also be the responsibility of the plot owners and information in respect of this should be passed to purchasers on handover.

See tables below for typical maintenance regimes.

TYPICAL MAINTENANCE PLAN FOR ATTENUATION TANKS

Maintenance Responsibility	Maintenance Schedule	Required Action	Frequency
Sewerage Undertaker	Regular Maintenance	Inspect and identify any areas that are not operating correctly. If require take remedial action.	Monthly for three months, then annually.
		Remove debris from catchment surface (Where it may cause risk to performance).	Monthly.
		Remove sediment from pre-treatment structures and/or internal forebays.	Annually, or as required.
	Remedial Work	Repair/rehabilitate inlets, outlets, overflows and vents.	As required.
	Occasional Maintenance	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
		Inspection of flow control device with moving parts to be greased. If flow control is removed for repair or inspection new neoprene seal to be installed.	Annually

		Survey inside of tank for sediment build-up and remove as necessary.	Annually, or as required. After large rainfall events.
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Table 1: Maintenance Regime for Tanks

TYPICAL MAINTENANCE PLAN FOR INLET, OUTLETS AND INSPECTION CHAMBERS

Maintenance Responsibility	Maintenance Schedule	Required Action	Frequency
Sewerage Undertaker (adopted drainage) Plot owners (plot drainage)	Regular Maintenance	Inspect surface structures, removing obstructions and silt as necessary. Check there is no physical damage	Monthly.
		Trim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris	Monthly.
		Remove cover and inspect, ensuring that water is flowing freely and that the exit route for the water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn.	Annually.
	Remedial Work	Repair physical damage if necessary.	As required.
	Occasional Maintenance	Check topsoil levels are 20mm above edges of chambers to avoid mower damage	As necessary.

Table 2: Maintenance Regime for Below Ground Drainage structures.

Regular maintenance should also include visual inspection of the inlet and outlet structures to the reedbed area along with the outfall to the canal. All debris to be removed and surrounding vegetation to be cut back accordingly. Interim jetting and CCTV survey should be undertaken for the final outfall to canal to ensure appropriate operation.

Prior to adoption and during site construction, the flow control manhole should be bunged and water in the tank appropriately discharged or over-pumped to avoid disturbance of silt build up. The flow control manhole and tank should be desilted at appropriate intervals to suit construction and rainfall.

TYPICAL MAINTENANCE PLAN FOR PERMEABLE PAVING

Maintenance Responsibility	Maintenance Schedule	Required Action	Frequency
Plot Owners	Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface) replace lost jointing material where required	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
		Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial Actions	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required.

Maintenance Responsibility	Maintenance Schedule	Required Action	Frequency
		Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
	Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Monitoring	Initial inspection	Monthly for three months after installation
		Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 hours after large storms in first six months
		Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	Annually

Table 3: Maintenance Regime for Permeable Paving

INFORMATION ON SPEL PURACEPTOR

3.24 SPEL Puraceptor® Class 1 Separators

Maintenance

SPEL Puraceptor® class 1 separators

The SPEL Puraceptor® class 1 separator is available in single chamber or two chamber models.

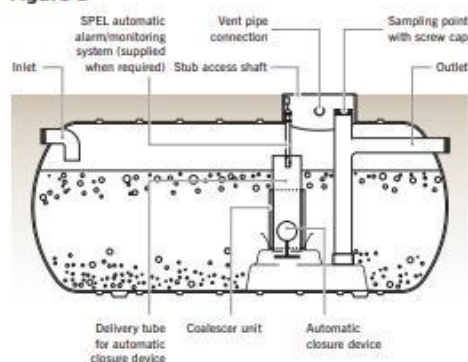
Single chamber models (Figure 1)

These incorporate a coalescer unit and an automatic closure device type 'R'. For maintenance see 3.20.

Two chamber models (Figure 2)

The maintenance procedure for the SPEL Puraceptor® class 1 two chamber models is detailed on sheet 3.20.

Figure 1



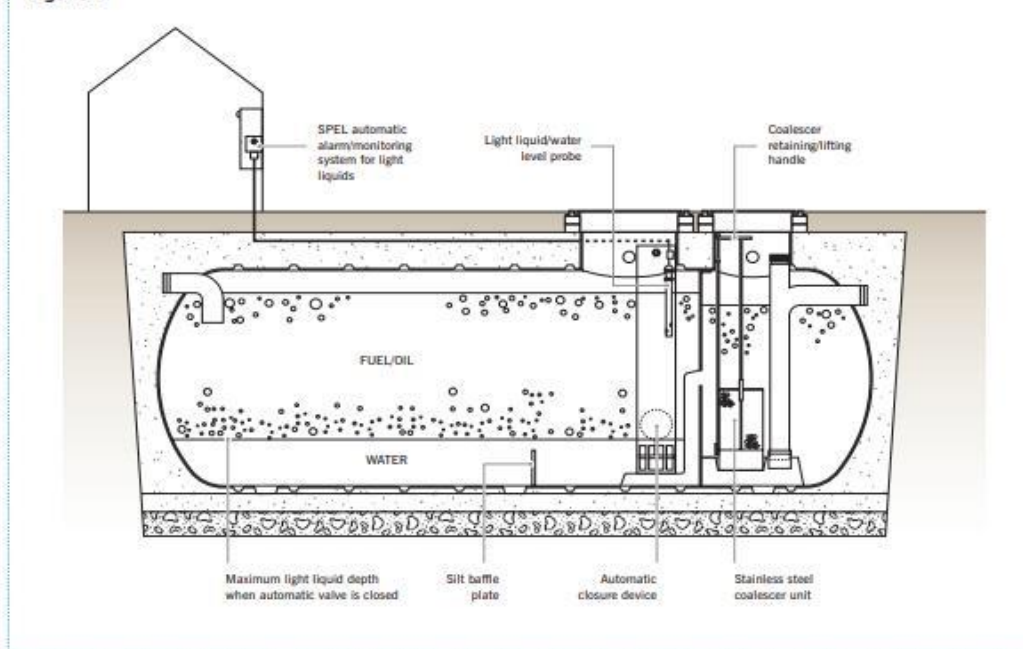
Maintenance requirements

The SPEL automatic alarm/monitoring system will automatically warn you when the SPEL Separator requires emptying of light liquids. See ref. 3.10 – 3.19. However, silt will accumulate and require removing at intervals depending on the site conditions.

We recommend the SPEL Separator is checked at 3, 6 or 12 monthly intervals to determine the depth of silt in the primary chamber.

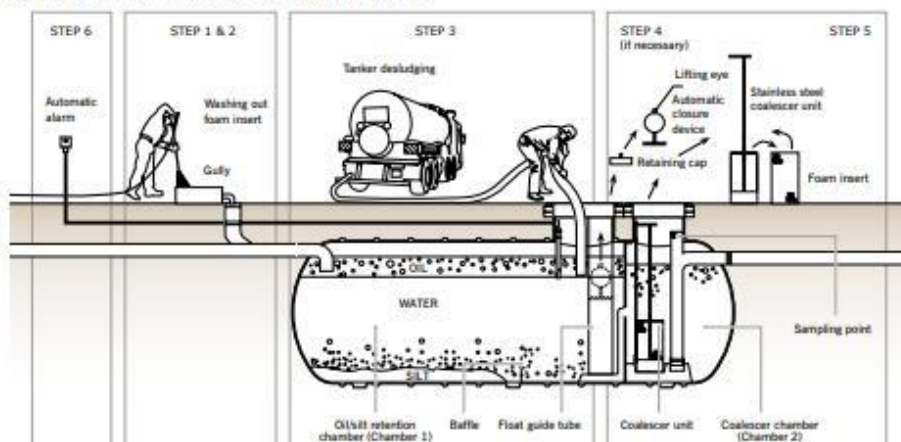
Separators must be provided with a remote device to provide visual and audible warning when the level of oil reaches 90 per cent of the oil storage volume (V) under static liquid level conditions. This automatic warning device indicates that the separator is in need of immediate emptying for it to continue to work effectively.

Figure 2



Maintenance

SPEL Puraceptor® separator - two chamber model



Step 1: Coalescer unit

Use the lifting handle or unclip the retaining clip for the wire rope and lift the coalescer unit out of the tank and place ahead of the Puraceptor®.

Step 2: Cleaning foam insert

Remove foam insert and wash with normal water pressure ensuring the dirty water runs into the Puraceptor®.

Step 3: Sucking out oil/fuel and silt

Suck off the retained oil from both chambers of the Puraceptor® and then the silt deposited on the bottom, leaving sufficient water to ensure the ACD remains floating.

Step 4: Sucking out complete contents (if necessary)

If the quantity of pollutants exceeds recommended levels, the complete contents of the Puraceptor® may need to be removed.

After sucking out completely, remove the ACD in the ACD retaining tube by first removing the retaining cap (this is to safeguard against the removal of the float by unauthorised persons).

Then, by means of a pole with a hook, lift out the ACD using the lifting eye on the float. Check the seating at the base of the retaining tube is free of debris/silt that could prevent the ACD closing off in an emergency.

Step 5: Re-insert coalescer unit and ACD

Re-insert the foam insert into the stainless steel coalescer unit and re-insert the coalescer unit into the Puraceptor®. Re-clip the wire rope or location pin as provided with the SPEL lifting/locating/locking system (see 3.7).

Partially fill the Puraceptor® with clean water to ensure the ACD when re-inserted remains floating. Check the ACD is not damaged and the closure plate is clean. Re-insert the ACD.

Finally check the ACD is floating and the retaining cap has been replaced to safeguard against its removal by unauthorised persons, unless depth of tank precludes doing so from ground level.

ACD closes off in emergency due to oil spill

If the ACD closes off, the oil/fuel spill needs to be removed by a suction tanker. With a single chamber model, the complete contents will need to be removed in order to release the ACD. With the two chamber models, insert the suction hose into the first chamber (oil/silt retention chamber) and then the head in the second chamber will normally provide a back pressure and automatically release the ACD.

Precaution: never try to pull the ACD off its seating by force.

Step 6: 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 3.10 – 3.19.

Maintenance procedure

The SPEL automatic alarm/monitoring system will automatically warn you when the Puraceptor® requires emptying. See 3.10 – 3.19. Where a SPEL automatic alarm/monitoring system is not fitted, SPEL Puraceptors® 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 and the correct operating of the ACD (automatic closure device). 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.

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

The purpose of the automatic closure device (ACD) is to close the separator off automatically when the maximum oil storage capacity is attained.

The ACD ensures that in the event of a major spillage, pollutants do not enter the drainage system, however the ACD should not be regarded as a substitute for an automatic alarm/monitoring system.

Commissioning

SPEL Puraceptor® Class 1 Separators
single chamber models
Models P004/1C/ESR to P050/1C/ESR

After the tank has been installed, leave the water in.

1. Remove the ACD from the packing box, taking care not to cause damage.
2. Remove the retaining cap from the top of the retaining tube in the separator.
3. Insert the ACD into the retaining tube using the lifting eye provided. Allow it to sink to the bottom. The stainless steel retaining plate should seat on the base flange and the ACD attain its operating position as shown in the open position.
4. Replace the retaining cap. This is to safeguard against the removal of the float by unauthorised persons or rising above the tube under abnormal conditions.

Note: If the tank's invert depth exceeds 1m it is advisable to remove the retaining cap prior to installation and only replace after inserting the ACD, if it is possible to do so from ground level.

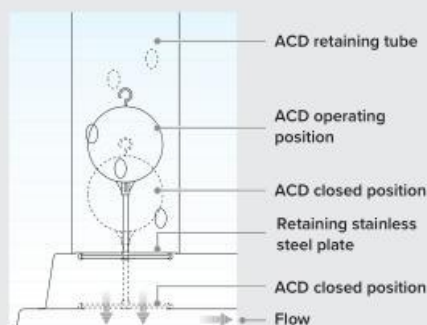
Larger Models

Where the ACD is already positioned in the unit, proceed as follows:

1. Before putting any water in the tank, lift rope attached to ACD up to the next knot and hang it from the rope hook. This is now in the 'operating position'.
2. As soon as the water level in the tank is above the ACD, the rope must be removed altogether and the rope hook must be unbolted. Do not leave the rope hook attached to the shaft. Ensure the ACD automatically remains in the 'operating position'.
3. Tape up or fill the hole(s) in the shaft where the rope hook was attached to prevent any backfill seeping into the shaft.

Maintenance - SPELGuard

Dependent upon site conditions it is advisable to remove the ACD periodically taking care not to raise it too quickly and damage the plastic/copper float. Clean from debris/silt to prevent premature closing. Check the seating in the base unit is free of debris/silt that could prevent proper closing in an emergency.



Installation

SPEL Separators can be installed with a concrete or pea gravel surround, dependent upon ground conditions and water table level. Detailed installation instructions are provided with each unit 'SPEL Tankstor and separator installation instructions'.

Site access and conditions

It is the responsibility of the contractor to ensure suitable access to good hard ground that is safe and suitable for off-loading.

Off-loading/handling

The contractor is responsible for off-loading. The tank must be handled with care to prevent accidental damage from impact or contact with sharp objects.

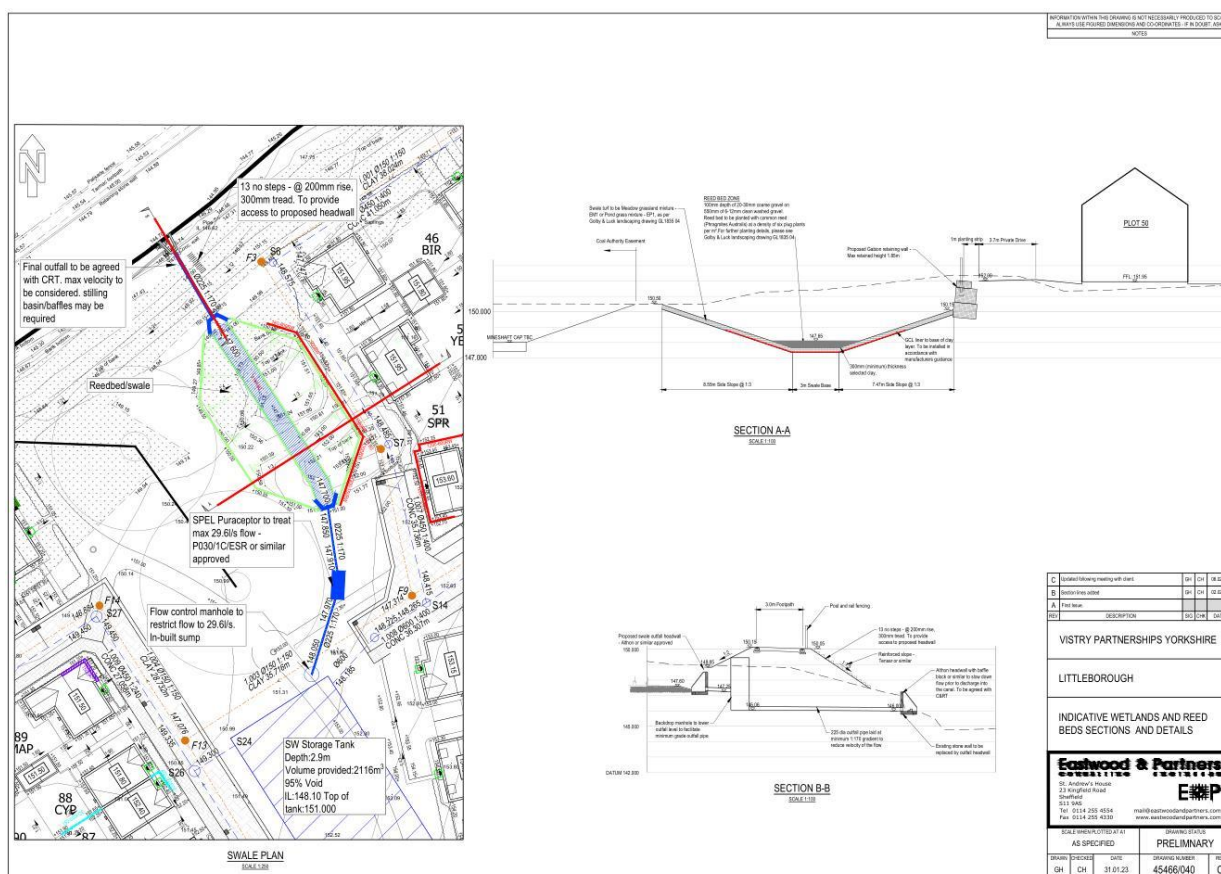
Tanks should be lifted using slings, not chains or wire ropes. Do not drag tanks along the ground for any distance and avoid jarring or bumps. Do not lift with water in the tank.

Health and safety

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

A warning notice should be visible at the top of each access shaft – 'danger, harmful fumes' and 'respirators must be worn in this tank'. Before entering persons must be qualified in accordance with 'confined space' requirements.

EXAMPLE SWALE/REEDBED MAINTENANCE



Years 1– System construction			
Item	Description	Visits/year	Year
1.0	Retrofit post-construction		0
1.1	Work conducted to PPG (pollution prevention guidelines) guidance – include contingency for storms during construction and incorporation of measures to prevent pollution to the receiving watercourse		

Item	Description	Visits/year	Year
2.0	Year 1-2 System establishment		1
2.1	General – inspect planting.	2	
2.2	Additional plug plant in-filling to be undertaken during the planting season where bare patches occur due to poor plug establishment.	1	1
2.3	Control of noxious weeds and coarse grasses (i.e. nettles, docks, thistles, ragwort and rosebay willow herb) - hand weed where possible, or spot herbicide treatment and hand wipe.	1	1
2.4	Check operation of reedbed filter during storms.	1	1
2.5	If significant patches fail to establish by end Year 2, undertake soil testing to determine if further amelioration is required.	1	1

Item	Description	Visits/ year	Year
3.0	Land Trust management and maintenance		
3.05	Quarterly inspection of system for debris and sediment accumulation.	4	2-6
3.1	Annual cut of vegetation – vegetation trimmed and arisings removed to local composting heaps on system margins to promote invertebrate biodiversity.	1	2-6
3.2	Annual cut of margins of system to ensure encroachment of scrub is minimised.	1	2-6
3.3	Annual monitoring to identify noxious weeds, trees and invasive species to be controlled - hand weed where possible, or spot herbicide treatment and hand wipe. Inspect bank integrity and check requirement for tree or scrub removal on bank margins.	1	2-6
3.5	<i>Annual structure and sediment inspection</i> – Inspect inlet and outlet for obstruction, erosion etc., inspect pipework, for build-up of material and examine flow through the reedbed.	1	2-6
3.6	Remove sediment material from open water zones. Typically the inlet and outlet zone of the treatment areas could be impacted by preferential deposition in these zones and this build up can compromise attenuation volume and sedimentation process. Sedimentation rates will depend on the catchment characteristics but once the development site is fully established it is anticipated that accretion rates will slow.	As required	2-6
3.7	Remove all litter from the site including inlet and outlet areas	2	2-6

TYPICAL MAINTENANCE PLAN FOR FILTER DRAINS

Maintenance Responsibility	Maintenance Schedule	Required Action	Frequency
Management Company	Regular Maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
		Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly.
		Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation and	Six monthly.

Maintenance Responsibility	Maintenance Schedule	Required Action	Frequency
		establish appropriate silt removal frequencies	
		Remove sediment from pre-treatment devices	Six monthly, or as required
	Occasional Maintenance	Remove or control tree roots where they are encroaching the side of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required.
		At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly or as required.
		Clear perforated pipework of blockages	As required.

Table 4: Maintenance Regime for Filter Drains.