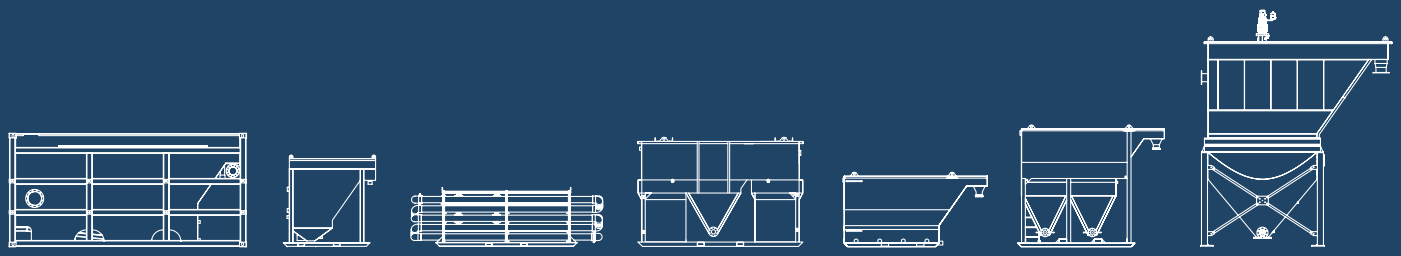
Siltbuster®

Solutions for Contaminated Land & Remediation



Hire, Sales & Technical Support

Who are Siltbuster?

At Siltbuster we pride ourselves as not being just a plant hire company but a solutions provider. Our reputation has grown over the past 15 years based on customer focused product development and ongoing technical support.

Water treatment isn't always as simple as it should be, that's why as part of our services we offer:

- Site visits to scope best solutions
- In-house laboratory testing of samples
- On-site commissioning and installation
- Telephone and on-site technical support
- Regional employees ensuring timely response to enquiries

We have the largest hire fleet of water treatment equipment in the UK operating both nationwide and internationally, enabling us to mobilise the equipment you need for when you need it.

Our equipment is used on projects ranging from small residential developments to some of the largest civil infrastructure schemes recently undertaken including: Heathrow T5, CrossRail, Hinkley Point C, the Forth Road Bridge, Copenhagen Metro and even the odd special project such as mud runs and the raising of the Costa Concordia!

Furthermore, Siltbuster run a series of CPD accredited, industry leading Managing Water Pollution on Construction Sites courses to provide training to the construction industry on environmental legislation and practical solutions to minimise pollution.

Hydrocarbons and the Environment

What is the Problem?

Oils (often referred to as hydrocarbons) can be viscous substances that are typically insoluble within water and often exhibit a tell-tale odour.

With space at a premium, historically contaminated areas of land are being identified and selected as the site of future construction schemes.

These 'brownfield' or 'remediation' sites face the same waterborne challenges encountered upon civils schemes with virgin soils – but also the added complication of residual hydrocarbon presence from the industrial legacy.

Environmental Harm

- Highly toxic to animals and aquatic life.
- Smothers and coats vegetation, preventing photo-synthesis.
- Damages natural habitats, disrupts ecosystems and destroys breeding grounds.
- Hydrocarbons which evaporate affect the respira-tory systems of mammals and birds.
- Extremely mobile in water and difficult to contain.

Sources of Hydrocarbon Pollutants

Hydrocarbon contamination encountered on construction sites is undeniably linked to man-based activities. Whether it be from uncontrolled or deliberate release the sources of oil pollution are broad and wide.

The most common of which are:

- Remediation sites
- Petrol stations
- Industrial sites
- Fuel spills
- Gas works
- Wood preserving yards
- Metal fabrication
- Steel mills
- Petroleum and chemical factories
- Construction activities

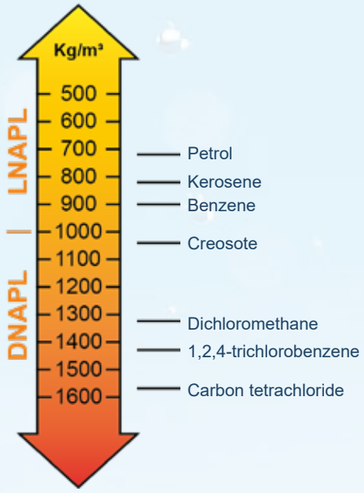
Particular attention should be paid to fuel storage and chemical storage tanks, distribution pipe-lines, onsite machinery and drainage systems (pipes, sumps and oil water interceptors).

Types of Hydrocarbon Pollutant

Hydrocarbon Phases

In the environment, hydrocarbons are found in one of the three following phases:

- Free phase - individual globules or a separate liquid phase
- Emulsified - very small globules of hydrocarbon suspended in water
- Dissolved - hydrocarbon fully mixed with the water to form a solution



Floating or Sinking

Free phase hydrocarbons either float or sink depending on their relative density compared to water (which has a specific gravity of 1).

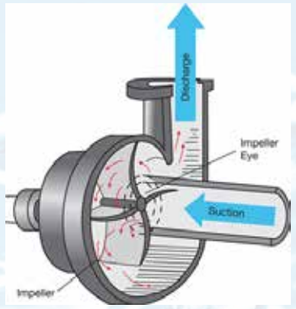
LNAPL

- Light non-aqueous phase liquids have a density less than water (<1,000 kg/m³, specific gravity <1) and therefore float on the water surface.
- They can be separated through flotation or skimming.

DNAPL

- Dense non-aqueous phase liquids have a density greater than water (>1,000 kg/m³, specific gravity >1) and therefore sink.
- They can be separated through settlement.

Factors to Consider



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Pump Choice

Selection of the correct delivery pump is crucial as oil droplets may be affected by pumping. If the oil globules are broken down into smaller globules, an emulsion can form. Emulsified oil is then much harder to separate and requires specialised treatment methods.

Avoid centrifugal pumps, the impeller based design has a high energy whisking motion which has the potential to cause droplet breakup and the formation of emulsions.

Use a positive displacement pump (e.g. diaphragm, peristaltic) which move a fluid by repeatedly enclosing a fixed volume and moving it mechanically through the system. These are less likely to cause damage to the oil droplets.

Position the pump as far away as possible from the treatment system - as the liquid flows along the long pipeline the droplets can coalesce.

Typical Discharge Consents

Controlled Waters
Typical discharge consents for controlled waters (surface water courses and groundwater), requires no significant trace present so far as is reasonably practical, i.e. no visible oil or grease.

Typically, no visible oil or grease is taken to correspond to a limit of 5mg/L of oil (subject to Environmental Permit Limits where relevant). Any dissolved phase components must not exceed individual Environmental Quality Standards (EQS).

Sewer
Discharging to a sewer varies depending on the capacity and size of the receiving works and is subject to agreement with the water authority, typically in the form of a Trade Effluent Consent.

Typical permits require the absence of volatile or flammable components. Saponifiable oil or grease (something that can form a soap) to be below a limit of 300mg/L and Unsaponifiable oil or grease to be below a limit of 50mg/L.

Inclined Plate Oil Water Separators

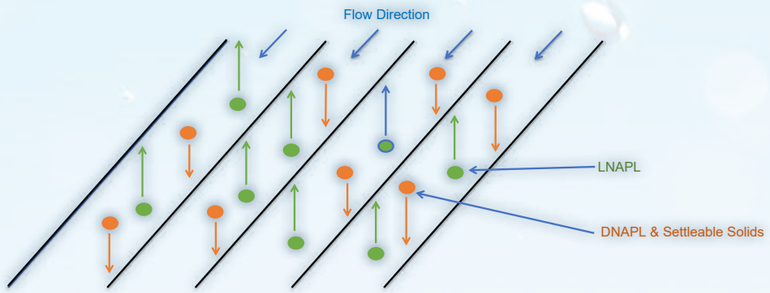
HB50-OWS and FB50-OWS

The Units

Inclined plate oil water separators work in the opposite way to conventional lamella clarifiers in order to remove LNAPL material.

As LNAPLs want to rise, droplets with a rise rate greater than the velocity of the flow coming down the plates will come into contact with the inclined plates and rise to the surface where they're then captured by an oil skimmer.

Conversely DNAPLs have a tendency to sink therefore the system is operated in the conventional configuration. DNAPLs and settleable solids will be captured in the sludge storage area.



Did you know...

The same unit can be used to remove suspended solids, LNAPLs and DNAPLs of 60 microns and above at a flow rate up to 20 m³/hr.

1 HEIGHT ADJUSTABLE OIL SKIMMER

2 INCLINED LAMELLA PLATES

3 LNAPL STORAGE AREA

4 DNAPL STORAGE HOPPER

KEY ADVANTAGES

+ Single unit removes free phase hydrocarbons and settleable solids
+ Readily transportable, fast and simple to deploy, easy to operate
+ Integral storage of separated product

TYPICAL APPLICATIONS

+ Remediation of gas and oil works
+ Storm water runoff
+ Petrol station forecourts

Product Detail

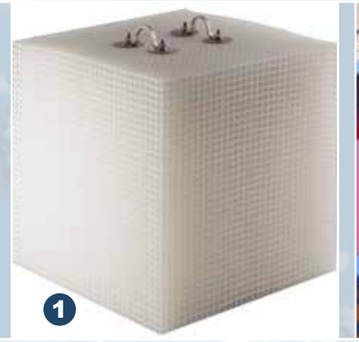
Siltbuster inclined plate OWS units are almost identical to lamella clarifier units but run in reverse direction and at a reduced flow rate in order to ensure effective removal of free phase hydrocarbon contaminants.

These units use inclined plates to give a vastly increased surface area of up to 20 times the unit's footprint.

The LNAPLs are separated by a variable height skimmer bar and are captured in a storage area. DNAPLs and solids collect in the storage hopper.

Coalescing Media Separator

CM400 Oil Water Separator

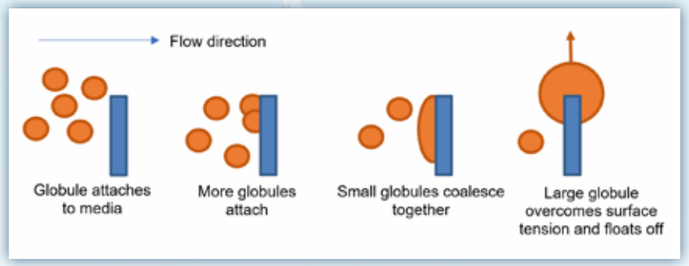


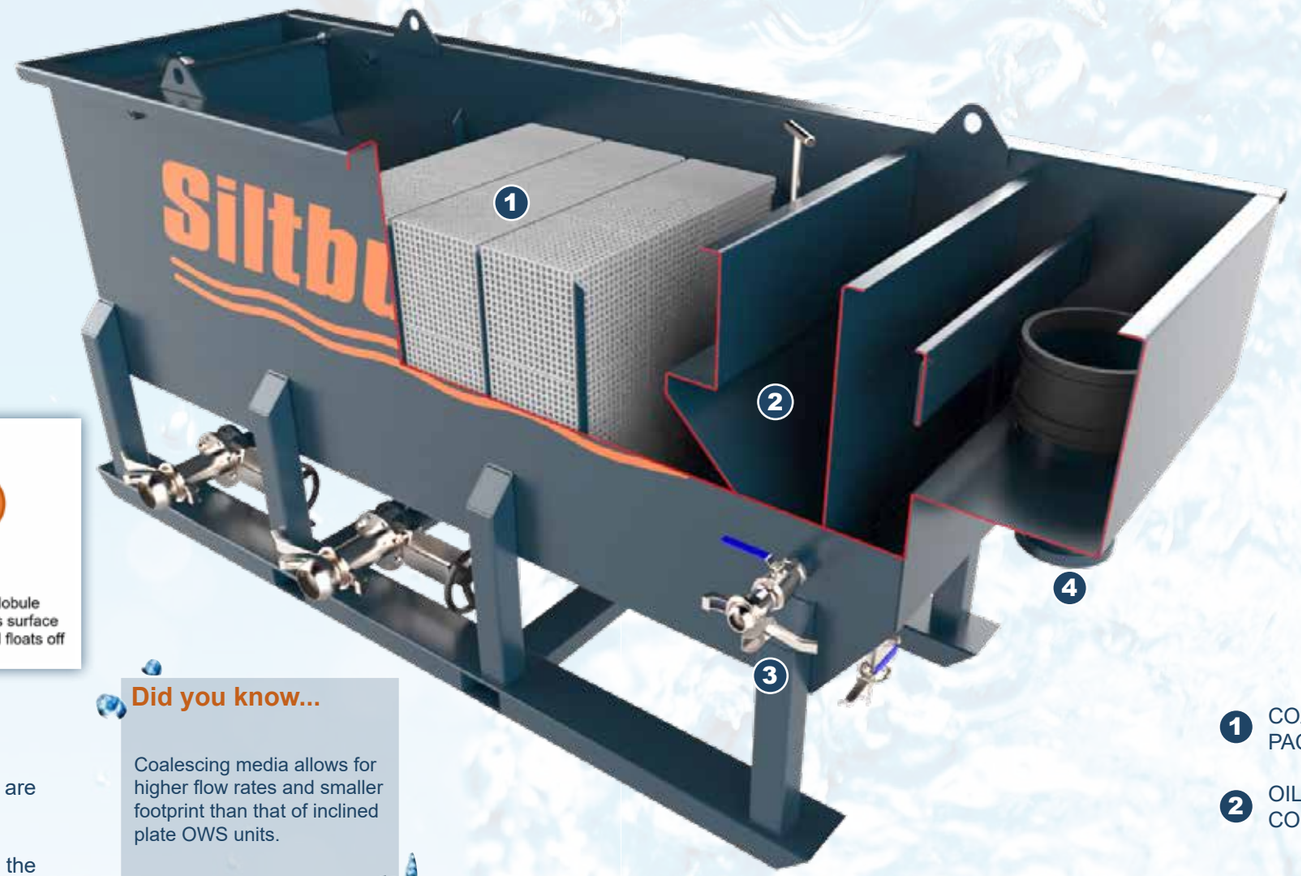
The Unit

Coalescing Media Separators specialise in the removal of LNAPLs at high flow rates without the presence of solids or DNAPLs.

Hydrocarbons are removed by passing water through coalescing media packs.

When globules of hydrocarbons come into contact with the media, they attach to it and then with one another, forming larger globules until the bouyancy of the globule is enough for it to float up to the surface of the water and be captured within the unit.





Did you know...

Coalescing media allows for higher flow rates and smaller footprint than that of inclined plate OWS units.

Product Detail

- Waters contaminated with free phase LNAPL hydrocarbon are pumped into the unit's inlet.
- Hydrocarbon droplets in the pumped waters stick onto the media surface and coalesce (merge) into larger droplets.
- The free phase hydrocarbons are caught at the surface and stored in the unit's waste storage compartment.
- The treated waters rising to the discharge outlet beyond.

KEY ADVANTAGES

+ Q-PAC media used has reduced risk of clogging compared to traditional types
+ Typically achieves 99.9% removal of oil droplets larger than 20 microns in diameter
+ Can operate at high flow rates whilst occupying a relatively small footprint

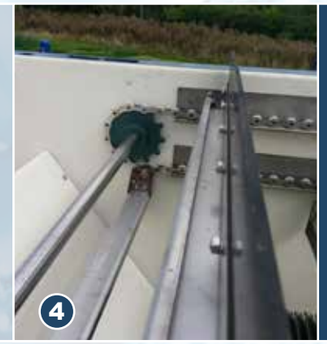
TYPICAL APPLICATIONS

+ Emptying of hydrocarbon contaminated tanks
+ Temporary treatment capacity during Oil Water Separator refurbishment
+ Oil-water only dewatering activities

1. COALESCING MEDIA PACK
2. OIL STORAGE COMPARTMENT
3. CAPTURED HYDROCARBON DRAW-OFF VALVE
4. TREATED WATER OUTLET

Dissolved Air Flotation

Siltbuster DAF Units



The Unit

Primarily used on gas works applications, DAF units generate 'white-water' by dissolving air under pressure and then releasing the pressure to form micro fine air bubbles.

Oil droplets of down to 10 micron in size attach to the air bubbles causing them to rise to the surface, where they coalesce and are scraped off.

Hydrocarbon removal rates can be enhanced by upfront chemical conditioning, to meet tight consents or for difficult to treat applications.

Did you know...

Our DAF units have an integrated white-water system that does not require compressed air, reducing the power consumption/running costs, saving space and reducing noise.

KEY ADVANTAGES

+ High treatment capacity within a compact footprint
+ Built-in white water pump removes the need for an external compressed air supply
+ Automatic sludge scrapers remove build up of floating product to integrated sluge store

TYPICAL APPLICATIONS

+ Cleanup of hydrocarbon spills
+ Remediation projects
  + Gas works
  + Chemical factories
  + Timber preserving yards
  + Petrol stations
+ Primary removal pre-GAC filters

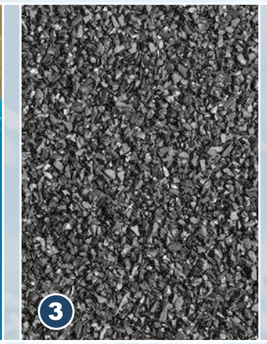
Product Detail

- Waters contaminated with hydrocarbons and suspended solids are pumped into the unit's inlet. If necessary, a coagulant and/or flocculant can be dosed to increase the particle size and buoyancy of difficult to treat material.
- Siltbuster DAF units employ lamella clarifier technology which increases the effective separation area and therefore the removal efficiency of the DAF.
- Air-saturated water is pumped into the front of the system. The air in this water is then released in the form of micro-fine bubbles.
- The micro-fine bubbles adhere to particles in the infeed waters lifting them to the surface.
- The air bubbles and separated material form a layer on the surface of the unit which is continually removed by an integrated scraper.
- Waste material is moved to the waste storage area of the unit and the treated waters then pass below this to the discharge outlet of the system.

1 WHITE WATER MIXED WITH EFFLUENT
2 LARGE EFFECTIVE SEPARATION AREA
3 DEWATERING BEACH AND OIL STORE
4 AUTOMATIC SCRAPERS
5 ADJUSTABLE OUTLET WEIR
6 WHITE WATER RECIRCULATION PUMP

GAC Vessels

Granular Activated Carbon Adsorption



The Unit

Oil-Water separators are excellent at separating free phase hydrocarbons from water, however should any of the hydrocarbons in the water become emulsified or dissolved those fractions become difficult to remove using conventional treatment methods. It is therefore sometimes necessary to utilise a further treatment step in order to 'polish' waters that have passed through oil-water separators before it can be discharged.

GAC (Granular Activated Carbon) pods can be deployed to remove the smallest concentrations of hydrocarbon in order to meet discharge criteria for difficult to treat waters.

Did you know...

As the carbon media is expensive, GAC should only be used for final polishing and not primary treatment. Typically used in conjunction with lamellas or DAF as primary treatment.

Product Detail

- Waters requiring treatment by a GAC are forwarded under pressure into the inlet.
- Dissolved and emulsified hydrocarbon molecules in the water are 'adsorbed' or trapped into the pores of the granular activated carbon.
- Treated waters then leave the vessel via the system outlet.

KEY ADVANTAGES

+ Can achieve very low concentrations of hydrocarbons upon discharge
+ Simple plug and play operation
+ Easy to move on site

TYPICAL APPLICATIONS

+ 'Polishing' following treatment using an OWS unit
+ Removes dissolved and emulsified hydrocarbons
+ Suitable for sensitive discharge locations

1. INLET CONNECTION POINT
2. PRESSURE RELIEF VALVE
3. GRANULAR ACTIVATED CARBON
4. BACK-PRESSURE MONITORING GAUGE

Typical GAC Specs

	2m³ GAC pod	5m³ GAC pod
Removal of	Hydrocarbons and other dissolved chemical contaminants	Hydrocarbons and other dissolved chemical contaminants
Height	2.85m	2.85m
Diameter	1.29m	1.7m
Dry weight	900kg	900kg
Full weight	1900kg	3100kg
Operating range	0-12m³/hr	0-20m³/hr

Contaminated Land Case Studies

Port Talbot Steel Works

Andrew Scott

Historical contamination had to be tackled before construction work could take place on a brownfield site surrounding the steel works.

The treatment system comprised of modular units, each to remove a specific contaminant. Running from right to left, LNAPL and settleable solids were removed with a lamella clarifier. Next coagulant, flocculant and caustic is dosed and an HB40R removes the metal precipitant and flocculated solids.

A transfer skid inclusive of IFM pressure switch automatically forwards the treated water across onto the pressurised GAC vessel to remove dissolved phase oils.

Nine Elms Gasworks

Costain

Costain had been subcontracted to install drainage throughout the Nine Elms redevelopment site in London. Historical contamination meant the ground was polluted by petroleum hydrocarbons and the water from excavation work needed to be treated before release to sewer.

A D20 DAF unit was used with a 2-stage chemical dosing process upstream to add coagulant followed by flocculant.

This removed the bulk pollutants and relieved pressure on the final stage which was filtering with a granular activated carbon pod. By reducing the frequency the GAC needed replacing Costain saved £17,000 per week.

Sirius Group

Bolton

Remediation work was needed to a site with historic contamination due to excavation work and a series of storms.

Free phase and dissolved hydrocarbons were polluting the surface water runoff along with suspended solids.

Siltbuster rapidly deployed a multi stage treatment system with an HB50-OWS to remove the solids and capture the floating oils. Dissolved hydrocarbons were then removed with a GAC vessel. The use of the HB50-OWS reduced the frequency of backwashing and replenishing the carbon, resulting in a huge cost saving.

Contaminated Land Case Studies

Encirc

Elton

Refurbishment of onsite drainage and water runoff treatment system at a major manufacturing plant required mobilisation of temporary treatment units.

Siltbuster mobilised two HB50 units linked in series with two CM400 units with a combined treatment capacity of 80 m^3/hr.

Treated water was released to controlled waters under permit regulated by the Environment Agency.

Garston Gasworks

Erith Contractors

This gasworks were known for producing carburetted water gas, with coal gas being produced from 1921. The works later had an oil pipeline to the docks.

As part of the remediation work, Erith Contractors were tasked with dewatering 2 gasholder basins which were to be back filled and used for redevelopment.

An FB50 plus a CM400 were used to treat the water, removing LNAPLs and settling solids before discharge to the surrounding environment.

Warsash Maritime Academy

Carlton Civil Engineering

An HB50-OWS with forwarding tank to two 2 cubic metre GAC vessels was used to dewater excavations on a construction site which had historical contamination from marine use.

The setup removed a mixture of free phase and dissolved hydrocarbons, as well as reduced the suspended solids.

The Siltbuster treatment system allowed the contractor to comply with local authority foul sewer discharge consents and avoid the expense of removing waters via waste tankers.

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