WASH BAY

FUEL/OIL & SEDIMENT SEPARATION FOR WASH BAYS

SEPARATING LIGHT OILS FROM WASH BAY WASTEWATER WITH STORMWATER DIVERSION

The exterior vehicle Wash Bay is a quintessential conflict of interest. On the one hand, the vehicle wash bay process unleashes detergents, fuel, grease, oil, and coolants that need to be intercepted before entering the wastewater networks.

On the other hand, the sealed expanse of the wash bay is a high-volume collector of stormwater that needs to be kept away from the wastewater network.

DESIGN REQUIREMENTS

Local Authorities have differing requirements for the management or wastewater from wash bays. These requirements are determined by the strengths and weaknesses of the wastewater and stormwater infrastructure, and the associated risk to the local environment. Mactrap can supply different designs based upon the Local Authority objectives, for example:

1. Covered Wash Bay

   All effluent flows to a fuel/oil separator and the outflow flows to wastewater. There is no impact from stormwater on the wastewater network.

2. Uncovered Wash Bay

   a) Combined flow to wastewater

      The Council considers risk the from stormwater in the wastewater network to be low. All effluent flows to a fuel/oil separator and the outflow flows to wastewater.

   b) Combined flow to stormwater

      The Council considers risk of light oils in the stormwater to be low. All effluent flows to a fuel/oil separator and the outflow flows to stormwater.

   c) Diverted flow between stormwater and wastewater

      The Council does not allow stormwater in the wastewater network, and the stormwater network must also be protected from light oils. The flow is diverted between the stormwater and wastewater networks and each flow has fuel/oil separation.

Calculations

The following sample calculation is for a truck wash down with combined flow to wastewater. A combined flow separator will be sized to the higher of the load from rainfall catchment or from vehicle wash down effluent. In this example the load on the separator is approximately the same for stormwater and wash down effluent.

Calculation for separator load from vehicle wash down

a. *Vehicle wash time 30 mins*
b. *Higher end commercial water blaster 1000l/hr*
c. *0.5m³/30mins*
d. *3x 30min inflow volume for separator size = approx. 1500l*

Calculation for separator load from maximum rainfall catchment

a. *The wash pad is 12m x 6m for a total are of 72m²*
b. *10mm/30min (exceedance event every 2 years)*
c. *75% of ARI = 7.5mm/390min average max rainfall event*
d. *0.54m³/30mins*
a. *3x 30min inflow volume for separator size = approx. 1500l.*

FUEL/OIL SEPARATORS

Functional Description

Mactrap Fuel/Oil separators separate light fluids and sludge out of the wastewater by means of gravity. Light fluids[1] float up in the separation chamber and collect at the surface. Sludges, which are heavier than water, sink to the bottom and form a sludge layer.

Coalescence separators, like oil-fuel separators, work on the principle of gravity. To increase the separation performance, the tank also contains a coalescence insert. This cylindrical insert has two functions. Firstly, it affects the flow in the separator and secondly, it filters all the wastewater through the coalescence material.

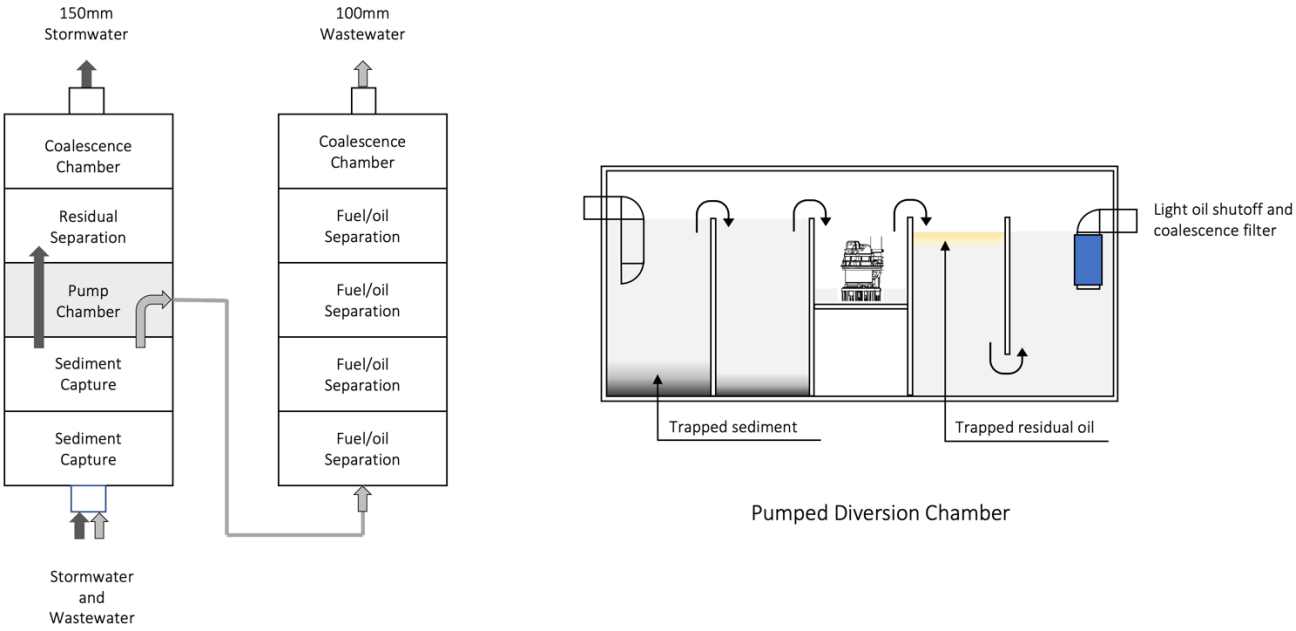
[1] Light fluids refer to fluids of mineral origin with a density of ≤ 0.95 g/cm3, which are insoluble or only slightly soluble in water.

When wastewater containing oil flows through this filter fabric, very fine oil droplets that can no longer be separated out by gravity collect on the coalescence material and combine to form large oil droplets. When these reach a sufficient size to create buoyancy, they detach themselves from the filter material and rise to the surface. Mactrap Fuel/Oil separators are equipped as standard with a self-actuating closure[2]. When the maximum oil storage volume is exceeded, this device closes the outlet into the drainage system. This prevents the escape of light fluids into the drainage system. This safety device consists of a guide tube full of water, which houses a float. The float is carefully designed for the specific gravity of the weight, so that it floats in water, and sinks in light fluid (up to a density of 0.95 g/cm3). When the maximum oil storage quantity is reached, oil flows through the lateral openings into the float guide tube. The float then sinks, reliably shutting off the outlet of the separator.

AUTOMATIC ACTUATED DIVERSION

Chambered Pump Diversion

Mactrap manufactures the Chambered Pump Diversion (CPD) system. The system is an electrical control system with pump for washdown areas exposed to rainwater, automatically diverting wash water as well as the 'first flush' to sewer or treatment, whilst allowing unpolluted rainwater to enter stormwater.



Mactrap chambered pump diversion system

The CPD system solves a number of problems that can impede the effective operation of actuated systems.

1. The first two chambers of the CPD act as a sediment trap, capturing sand, dirt or other heavier than water sediments, preventing them for blocking the pump or downstream components.
2. The programmable pump control allows modifications to delay time, run time and pre/post flush times to increase the effective diversion of polluted water.
3. The final two chambers act as a fuel/oil trap catching any residual light oils that may be trapped in the pump chamber or settling out in the sediment chambers. The stormwater system is further protected from residual light oil with a light oil shutoff valve that prohibits any light oils from exiting the system and can be optionally equipped with a shutoff alarm.

[2] *The self-actuating closure of a separator is an "emergency closure valve". When actuated in an emergency, the separator must be taken out of service and maintained.*

How does it work?

The CPD system works by activating a pump whenever the wash down facilities are operating to divert waste water to treatment or sewer. Waste water flows into the system through initial sediment chambers and into a pumping chamber. The pump activates to pump to waste under electronic control from a combination of chamber level and wash down operation. If the chamber level increase while there is no wash down in operation the pump will activate for two minutes to empty the chamber of any residual light oils. Storm water flows out of the system through secondary fuel/oil chambers, trapping any light oils that may have passed through the pump chamber.

Capacity

Pumps are specified based on the combination of mean hourly max rainfall for the area and the max flow from the wash down operation. Options are available for dual pumps in duty cycle with level sensors or simple float activation.

Fuel/oil interception can be integrated into a single chambered system or separated depending upon the volumes of stormwater and wastewater being managed.

Valve Diversion

Mactrap supplies the Fox Demand Driven Washdown Diversion System. The model DD600 is an effective control device for any unroofed washdown area automatically diverting wash water to sewer or treatment, whilst allowing unpolluted rainwater to enter the stormwater network.

At the heart of the Fox Diversion System is a Fox Demand valve which is fitted inline before the wash point and the Fox Diversion Valve, which comes fitted in a range of varied pit sizes or can be set up on 10mm marine grade aluminium plate to suit custom formed concrete pits.

How does it work?

A hydraulic signal is sent from the demand valve to the diversion valve when washdown commences, automatically opening the diversion valve protecting the environment from contaminated wash water.

At the end of the washdown operation the diversion valve will automatically close, allowing rainwater to exit through the stormwater outlet, avoiding flooding of the treatment system, which then leads to the subsequent local sewer network.

LIFT PUMPS AND PUMPING STATIONS

Mactrap supplies Kessel Aqualift pumps and/or chambers.

The Aqualift cope with large quantities of wastewater and is suitable not only for typical residential buildings but also for commercial and industrial use. The pumping station has been designed as a modular system and can be combined variably with engineering and chamber modules.

The Aqualift is available as a Mono or Duo system with pumps in different capacity classes. A wide selection of upper sections and covers ensure that the pumping station can be installed flexibly at different installation locations.

The pumps can be operated in potentially explosive areas, this means at locations where explosive gasses may occur due to wastewater and/or light fuel/oil liquids.

COVERS AND RISERS

Mactrap fuel/oil separators can be installed in ground or above ground. The upper surface of the separator is not load bearing, so if the installation will carry load, then risers and covers must be installed.

- Mactrap separators are available with HDPE trafficable lids in Class A (pedestrian) and Class D (vehicular).
- Flexible coupling allows easy installation into the surrounding medium and are fully sealed.
- Surrounding concrete or other medium must be engineered to the appropriate loading.

Type	Class	Typical Use	Nominal Wheel Loading (kg)	Serviceability Design Load (kN)	Ultimate Limit State Design (kN)
	A	Areas accessible strictly by pedestrians. Not suited to vehicles. Purpose – residential backyards, walkways not accessible by vehicles.	330kg	6.7kN	10kN
	D	Major roads including freeway and motorway shoulders. Warehouse and loading docks. Purpose – major roads.	8,000kg	160kN	240kN

WARRANTY

The Mactrap fuel/oil separator is warranted for impermeability, fitness for use and structural stability for thirty (30) years when installed underground and ten (10) years when installed above ground. The manufactured unit is warranted for quality of manufacture for five (5) years provided the separator is installed and operated in accordance with the specifications provided with each unit. Mactrap warranty does not include maintenance and servicing of the separator.