MACTRAP

WASTEWATER SYSTEMS SPECIALISTS

What we’ll cover

- Separation Principles
- Greasy Water Lift

Types of Separation

- Chemical/Flocculants
- Filtration
- Delay & Decay
- Electromechanical
- Gravity

Stokes Law

Stokes law is based on the forces acting on a globule in a fluid.

It contains a mathematical equation that expresses the rising or settling velocities of small spherical globules in a settled fluid medium.

$$V = (2gr^2)(d1 - d2)/9\mu$$

V = Velocity of rise (cm/sec)

where

g = Acceleration of gravity (cm/sec^2)

r = Equivalent radius of globule (cm)

d1 = Density of particle (g/cm^3)

d2 = Density of medium (g/cm^3)

μ = Viscosity of medium (dyne sec/cm^2)

Considering the Variables

Globule radius

- A 100-micron-radius grease globule with a SG of 0.865 will rise at approximately 7.3cm/t, if we were to divide that globule size in half to 50 microns the globule would rise at 1.8cm/t where (t = time period)

Globule density

- Bacon grease has an SG of 0.87 while zero-trans fat oils are closer to an SG of 0.96.

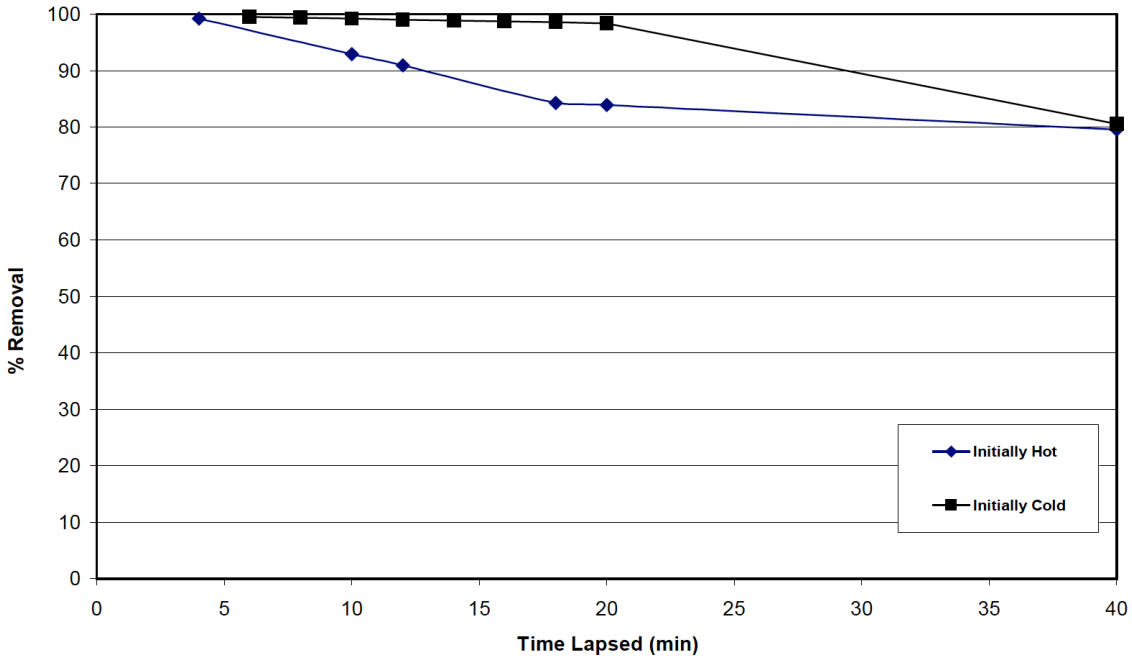
Water temperature

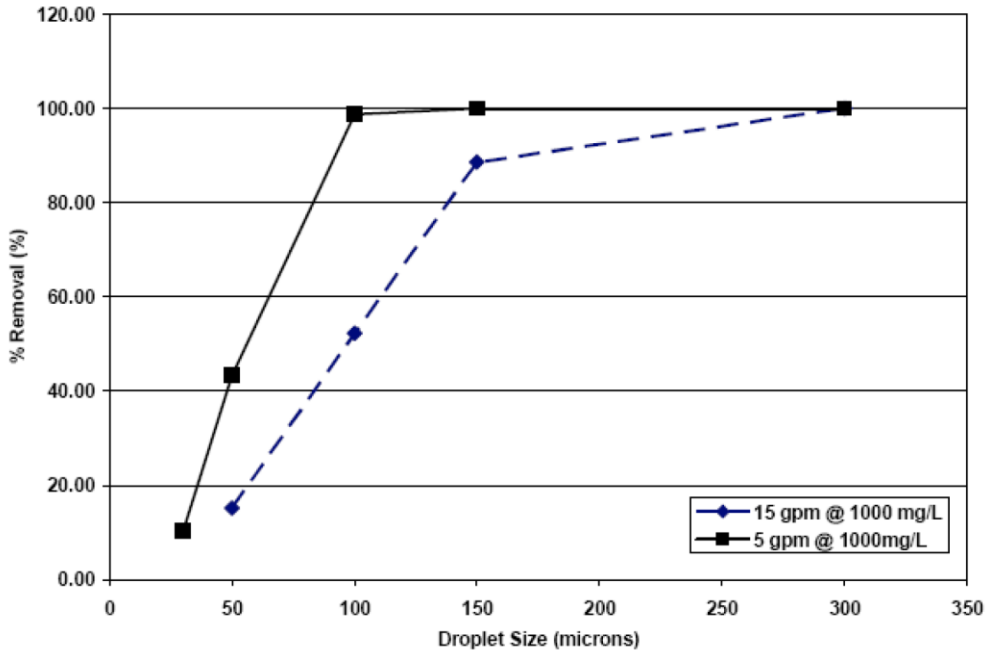
- At higher temperatures, hot water tends to slow coalescence. As such, hotter water may result in smaller grease globules.

Static water

- Stokes's Law is only applicable in static water, meaning the environment is calm and without velocity spikes and currents.

Impact of the Variables





ASSESSMENT OF GREASE INTERCEPTOR PERFORMANCE
Supplemental Report to 03-CTS-16T, Water Environment Research Foundation

Separation Principles

- Separate as close to source as possible
- Avoid lifting or applying shear forces to greasy water
- Calculate separator volume to ensure static water
- Calculations based on laminar flows

When is lifting required

1. When the waste source is lower than the separator
2. When the separator location is difficult to access
3. When the separated outlet is lower than the sewer or stormwater

Greasy Water Lifting Risks

- *Pump action* reduces globule size, increases velocity
- *Pump chamber* becomes a primary separator
- *Pump system* is an electromechanical point of failure
- *Pump location* introduces flooding risk

Lifting systems should be installed behind the separator.
If this is not possible in exceptional cases, conveying equipment should be used upstream of the separator that does not adversely affect the separation process.

Risks Mitigation

Pump action

Positive displacement pumps, limit differential pressure

Pump chamber

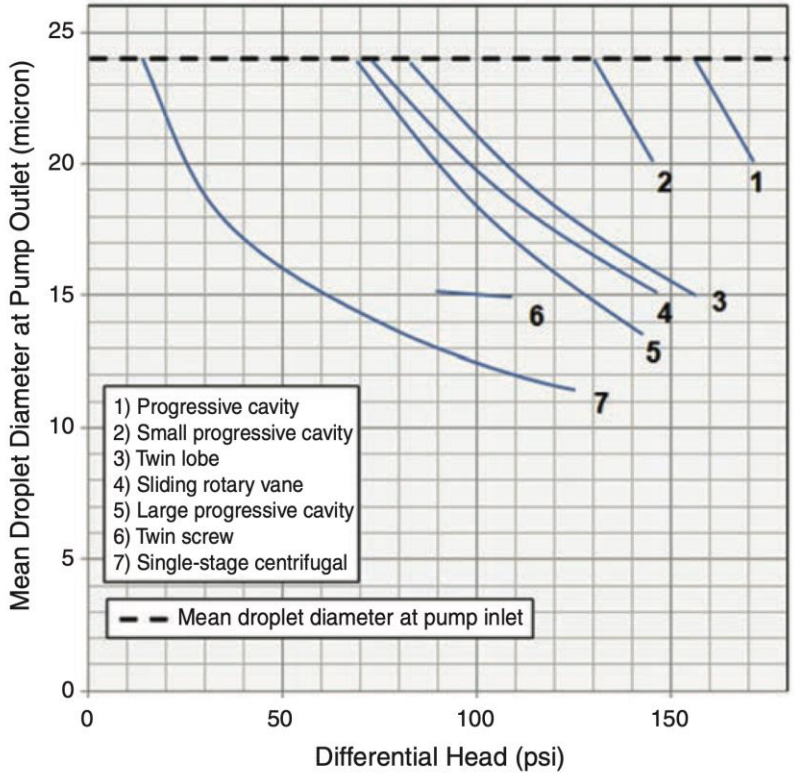
Automatic cleaning system, sensor, servicing

Pump system

Duplication, duty cycle, S1

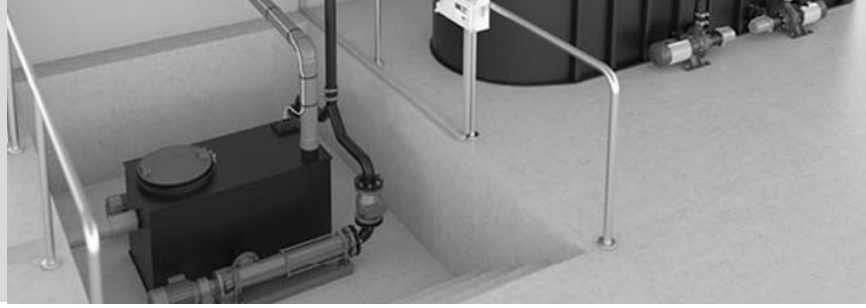
Pump location

Inflow shutoff, chamber sizing for backflow

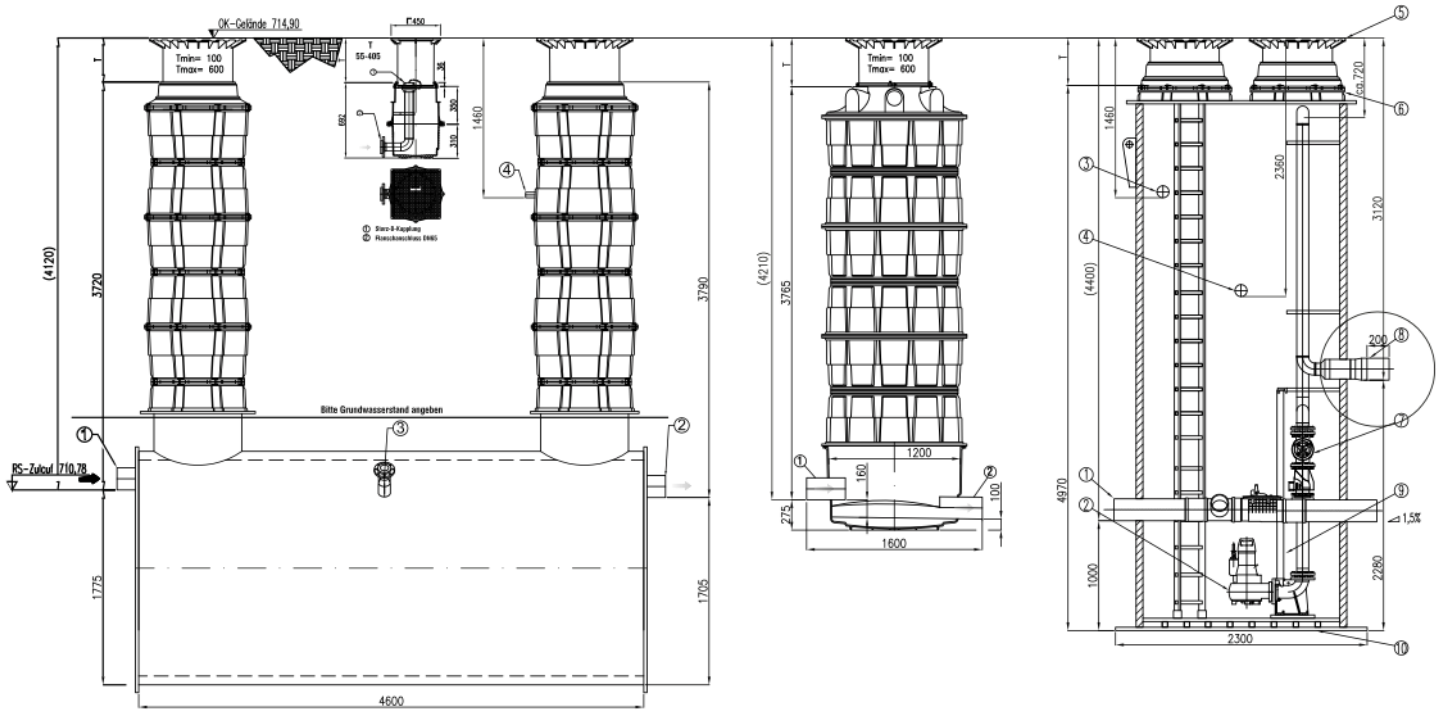


FLANNIGAN et al. 1988

Gold Class Solution – Don’t Lift



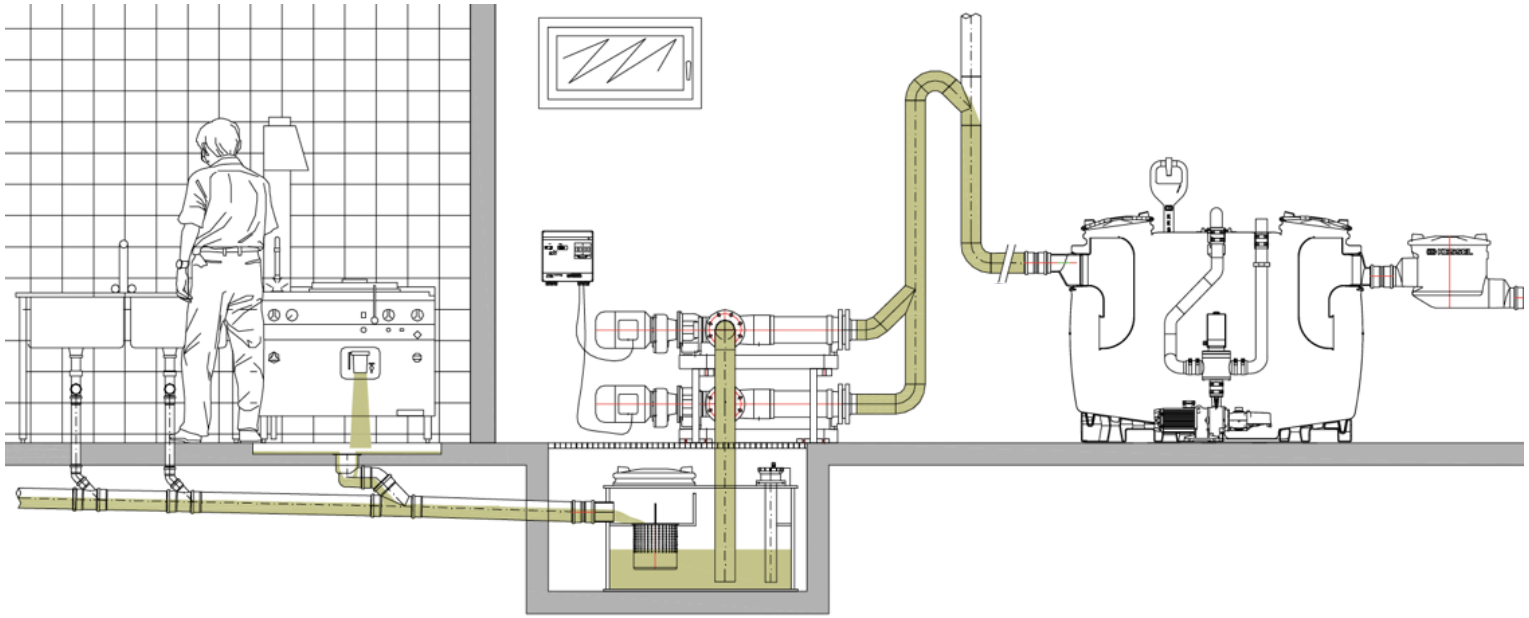
Elegant solution but high cost of deep installation and servicing



Take the grease trap to the greasy water level rather than the greasy water to the grease trap.

Gold Class Solution – PD Pumps

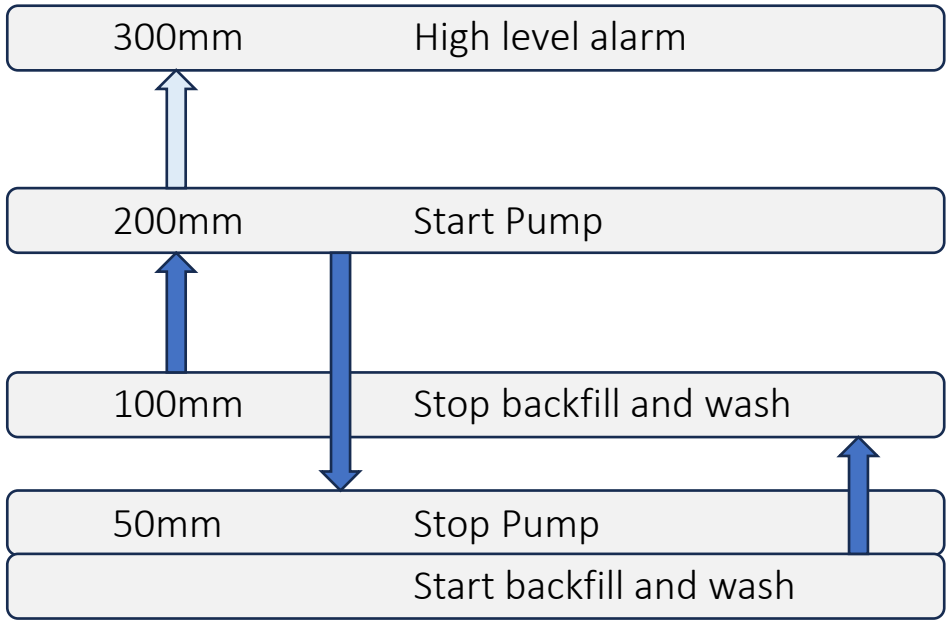
Elegant solution but high cost of positive displacement pumps



Lift from contained chamber using low shear (positive displacement) pumps and ultrasonic level measurement.

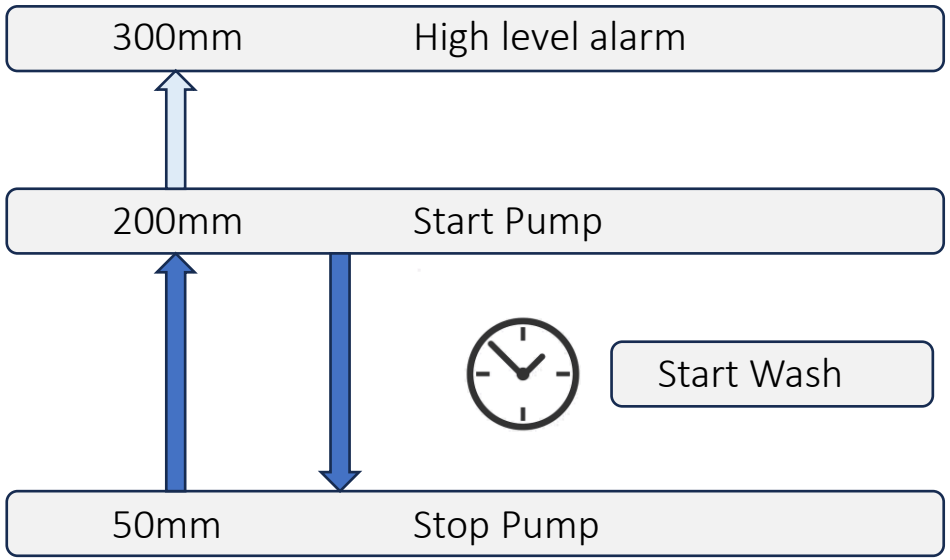
Pragmatic solution #1
Restaurant with new iVario & Combi

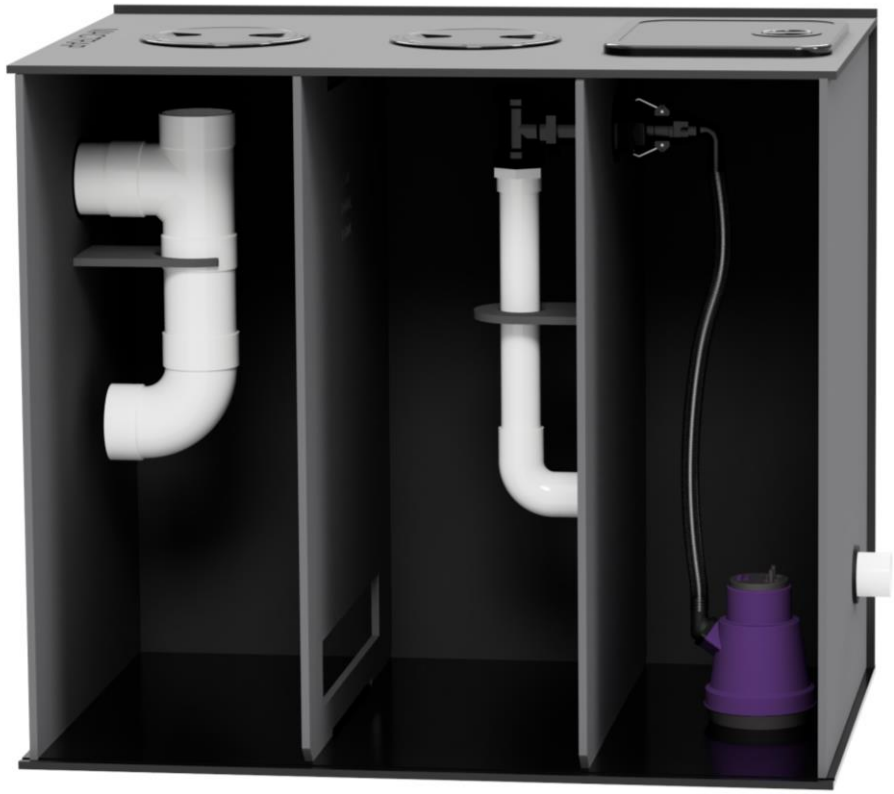
1. High volume from iVario
2. High temperature from Combi
3. Low touch maintenance required



Pragmatic solution #2
Service Station

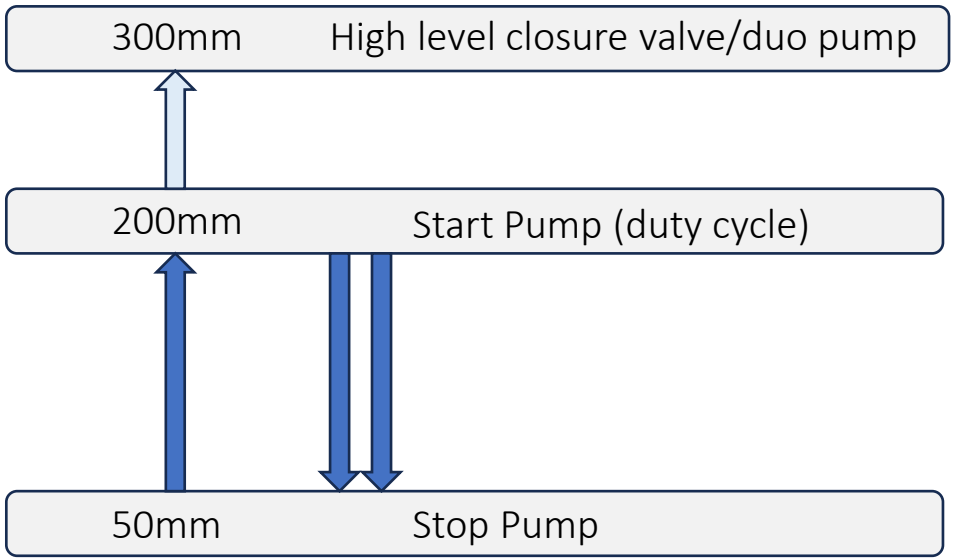
1. Prohibitive cost for inground installation
2. Invert inlet low
3. Location not suitable for internal lift or under bench units



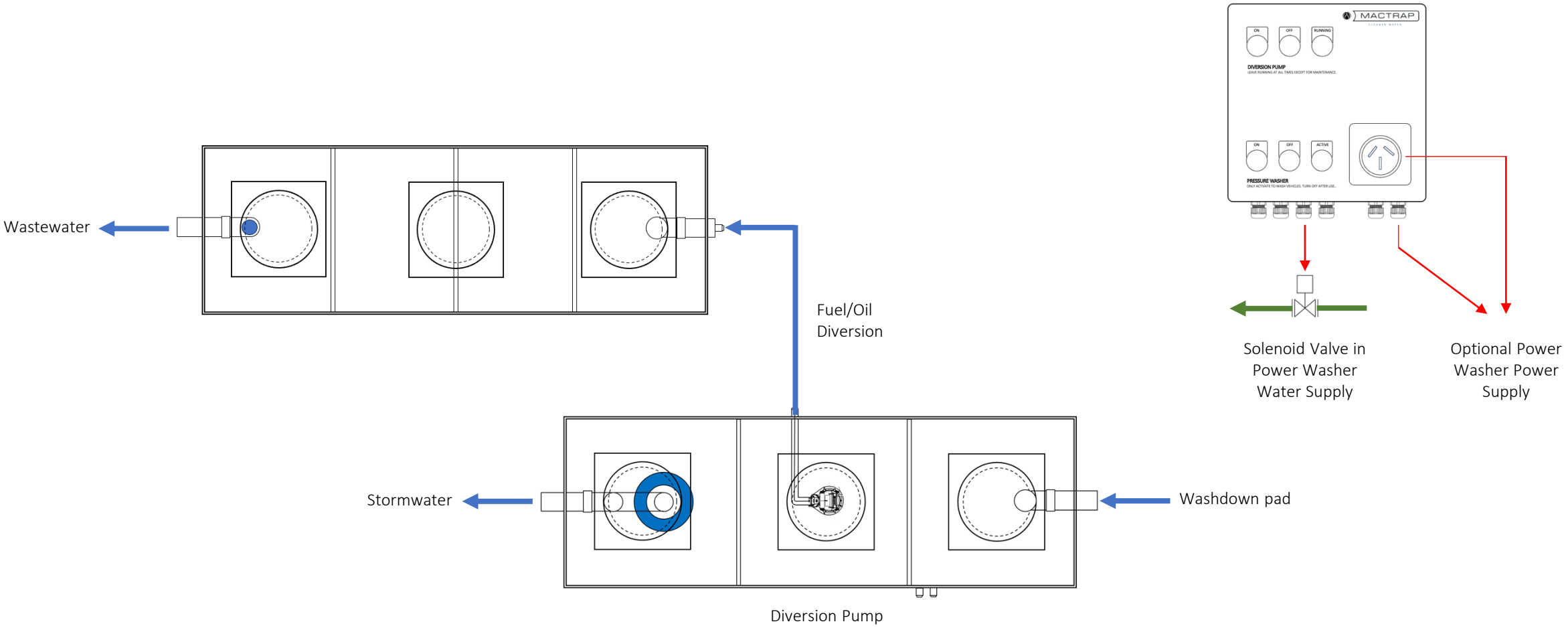


Pragmatic solution #3
Retrofit Café with Basement

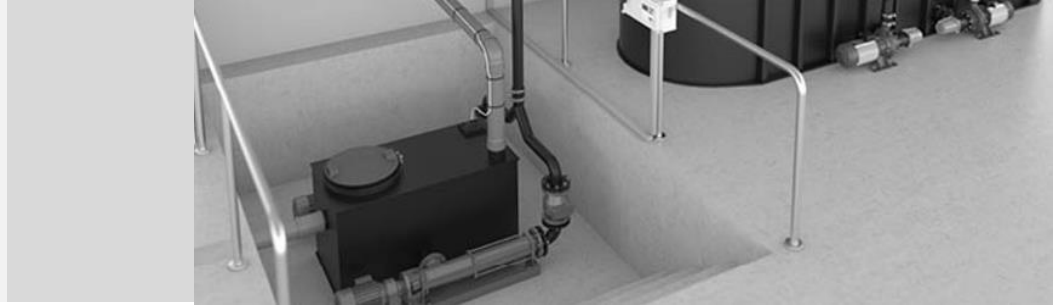
1. Pumping chamber in basement
2. Lift to external above ground grease trap
3. Protection from basement flooding



Pragmatic solution #4
Fuel Oil Diversion



Summary



- Avoid lifting prior to separation
- If lifting is the only viable option:
  - Use positive displacement pumps for large lifts or distances
  - Use appropriate lifting solution for small lifts
  - Consider longer settlement time
  - Systems should be designed for purpose

Mactrap Greasy Water Lifting Station - Less than 3m Head

Select Chamber Size	**Product Code**
Select a size capable of containg a single discharge from all fixtures	MTUB100MCJRV
○ 60 litres	**Budget Price**
◉ 100 litres	
○ 250 litres	

Pumps
Select single or dual pumps
◉ Single pump station
○ Dual pump station

Control system
Select float switch or ultrasonic level control
○ Float switch
◉ Control system with ultrasonic level control

Control System Additional Features
Select additional features to operate with the control system
☑ Hot water cleaning jets
☑ Cold water refill
☑ Actuated shutoff valve