# PRODUCT OVERVIEW DAF

water | wastewater | treatment | recycling

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# Overview

The MAK Dissolved Air Flotation (DAF) systems are designed to separate the suspended solids and lighter liquid contaminants, e.g. Fats, Oils and Grease (FOG) and hydrocarbons, from the water.

The MAK DAF systems are available as skid mounted or containerised systems.

**The MAK Water Advantage:**

- Designed to achieve maximum treatment efficiency in a compact footprint
- Designed to remove a variety of contaminants with a single system
- MAK standard designs for fast lead times
- Optimised designs to suit client's objectives
- Fully customisable to accommodate client specific engineering standards, vendor data requirements and site preferred electrical equipment
- High quality Australian designed and built systems
- Nationwide service & maintenance capabilities
- Remote monitoring for expert process support

*MAK DAF System at Enoggra Barracks*


*MAK Skid Mounted DAF System*

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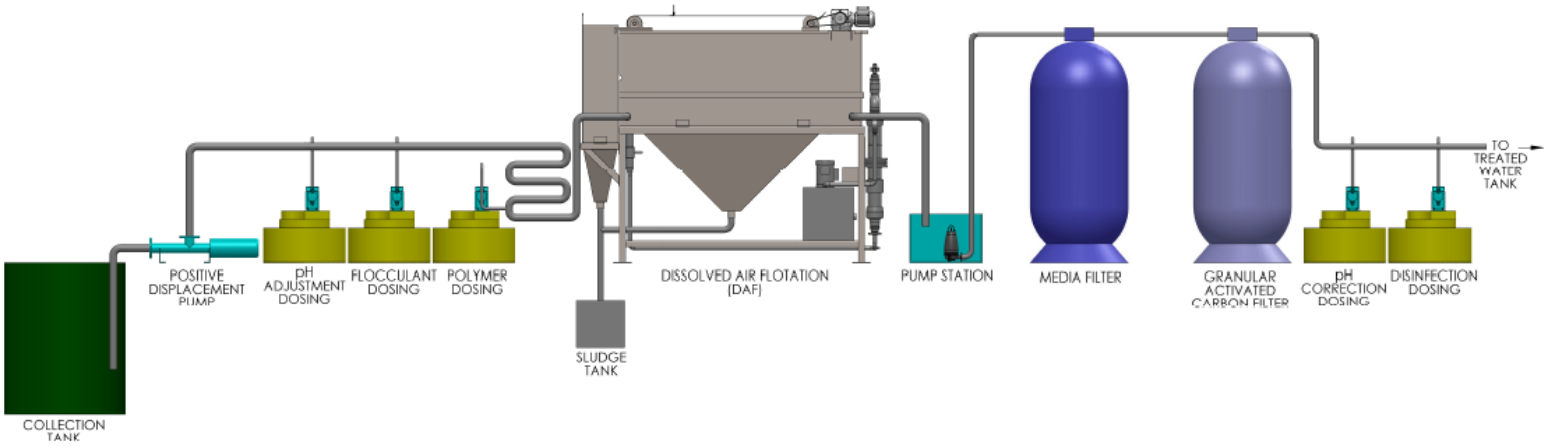
# Overview




The DAF separates the suspended solids and lighter liquid contaminants from the water by moving them to the surface of the DAF vessel and then scraping them off the surface.

A pressurised, stream of air-saturated treated water is mixed with the flocculated water, and with the release of pressure a cloud of very fine air bubbles carries the suspended solids and lighter liquids to the tank surface. Clean water overflows from the DAF tank, via an under/over-weir, to sewer, or to the next stage of the treatment process.

The overflow level is adjustable and controls the level in the DAF flotation section.

The sludge on the surface of the DAF is scraped into a sludge hopper by a mechanical scraper. The DAF system can be automated via a programmable logic controller (PLC) mounted within a control cabinet on the system.

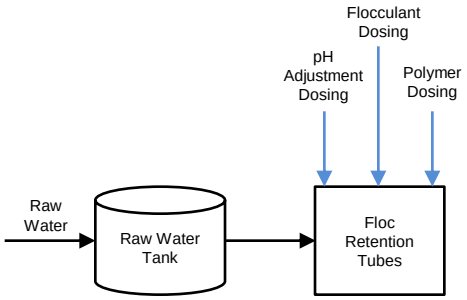
# Overview

The following table summarises typical plant performance parameters:

| Parameter | Unit | Treated Water (typical) |
|---|---|---|
| FOG Removal | % | 85~95 |
| TSS Removal | % | 70~90 |
| COD Removal | % | 20~40 |
| BOD Removal | % | 20~30 |

NOTE: MAK Water recommends a water analysis be carried out prior to detailed design. DAF process only removes particle associated BOD.

# Process Steps



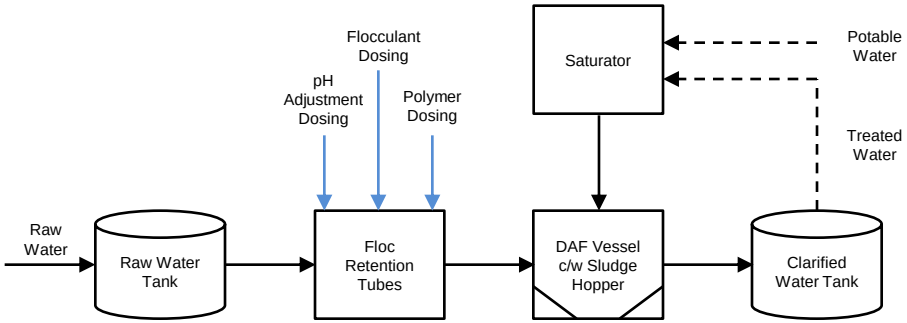

**pH Correction and Flocculation**

The feed pump takes flooded suction from the raw water tank and pH (if required) of the raw water is adjusted inline, based on pH transmitter reading, so as to optimise conditions for downstream removal of contaminants in the flocculation and clarification stages. Typically ideal pH is in the slightly alkali range (8-9) but the final set point is determined during commissioning.

Once the pH correction process is completed, two flocculation chemicals, a coagulant and flocculant are injected into the waste water in preparation for the clarification process. The flocculant retention tube is designed to allow sufficient mixing time before the water is discharged into the DAF.

All chemical storage tanks are fitted with a low level switch for auto-shutdown & to alert the operator of a low level condition; the tank levels should be checked regularly and topped up as required.

# Process Steps



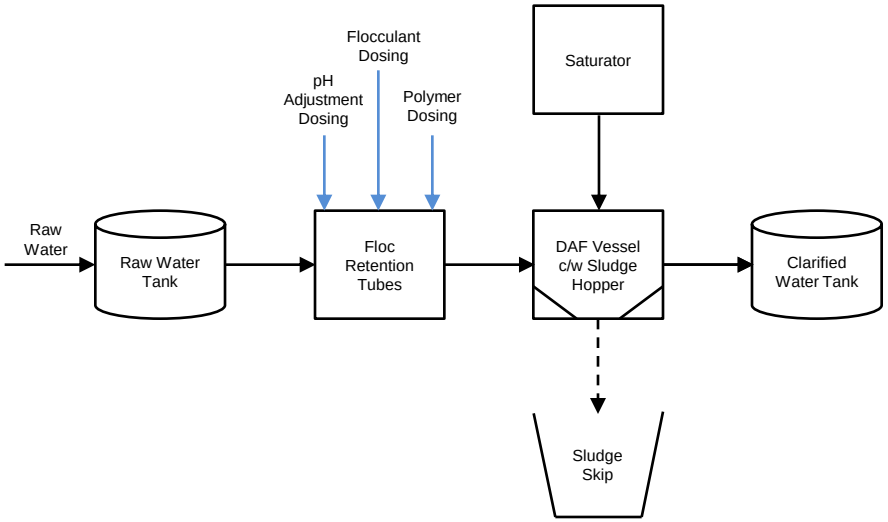

**DAF Clarification**

The dissolved air flotation (DAF) clarification stage separates the flocculated particles (suspended solids) from the water. A pressurised stream of air-saturated water is mixed with the flocculated water and, with the release of pressure, a cloud of very fine air bubbles carries the contaminates to the tank surface.

Clean water overflows from the DAF tank, via an under-weir, to the sewer or clarified water tank for the next treatment step. The overflow level is adjustable and controls the level in the DAF flotation section.

Where practical (e.g. where additional filtration is included) treated water can be used for saturator feed water, otherwise potable water is used.

# Process Steps




**Sludge Removal**

A low speed scraper, mounted on top of the DAF, continually moves this surface sludge layer over a 'beach' plate and into a skip prior to removal and off-site disposal. If a sludge pump is installed this can transfer the sludge to a holding tank for liquid waste disposal.

In this process, clarification and thickening happen at the same time. Separation of solids and FOG from the aqueous liquid stream occurs to produce a clarified effluent with low suspended solids & FOG levels.

# Options – ClearAccess™

Optional ClearAccess™ Remote Monitoring enables personnel to view and operate the plant remotely. This saves time in response to emergencies and assists local operators to diagnose problems. It prevents unnecessary service call-outs and improves reliability and plant uptime.

*Process Support via ClearAccess™*

**Key Functionality:**

- Remotely view and operate the plant on your PC, smart phone or tablet
- Automatic alerts (email or SMS) on alarm conditions
- Automatic report generated daily and emailed to your inbox
- Real time monitoring of process data, such as flow rates, pressure and alarm conditions/status messages
- Password protected system with two login security levels


*ClearAccess™ from your Smart Phone or Tablet*

**Inclusions:**

- Additional electrical instrumentation (premium package)
- Additional PLC hardware and programming
- Programming of email alert system

NOTE: Remote monitoring requires an internet connection or mobile network coverage (client to provide SIM card).

# Options – Containerised Plant

MAK DAF plants can be installed in ISO sea container(s) for safe, fast deployment by sea, road and rail. Installing the plant inside sea container(s) is an ideal way to protect the plant and equipment from harsh operating conditions in remote sites. The durable construction assures the plant is able to be transported through rough terrain and perform to the design requirements on arrival at remote sites (plug and play operation).


*Standard 20' Container*


*Premium Fit Out (insulation, floor coating and access door)*

**Standard Inclusions:**

- As new, freshly painted inside and out (high gloss enamel)
- Distribution board with separate circuits for lights & aircon
- Overhead internal lighting & reverse cycle air conditioning
- GPO's for maintenance work

**Premium Container Fit Out Options:**

- Chemically resistant, non-slip floor coverings
- Wall and ceiling insulation
- Personal access doors & windows
- Smoke detectors and alarming
- Safety shower & eyewash station with flow switch & lighting
- Winterisation for extreme climates (-40ºC/-40ºF)
- High spec/high build two-pack epoxy container painting


*Containerised WTP with access door, window and safety shower & eyewash station*

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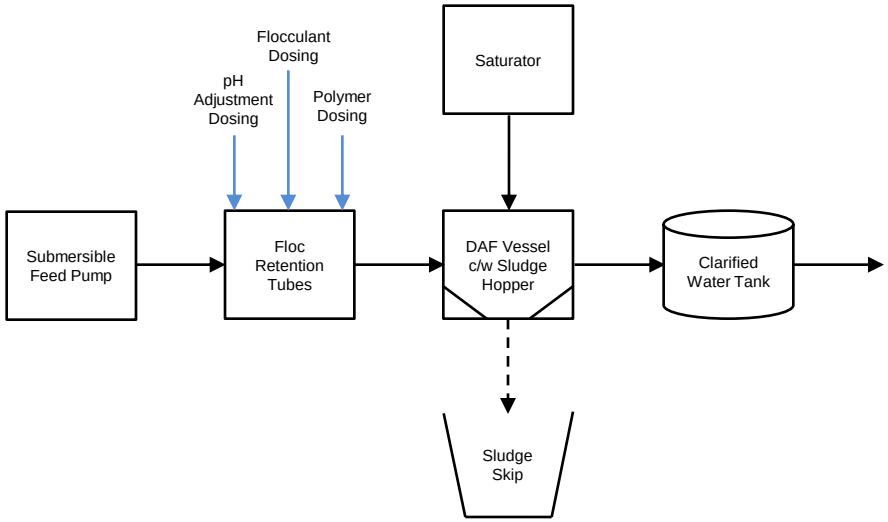
# Options – Submersible Feed Pump

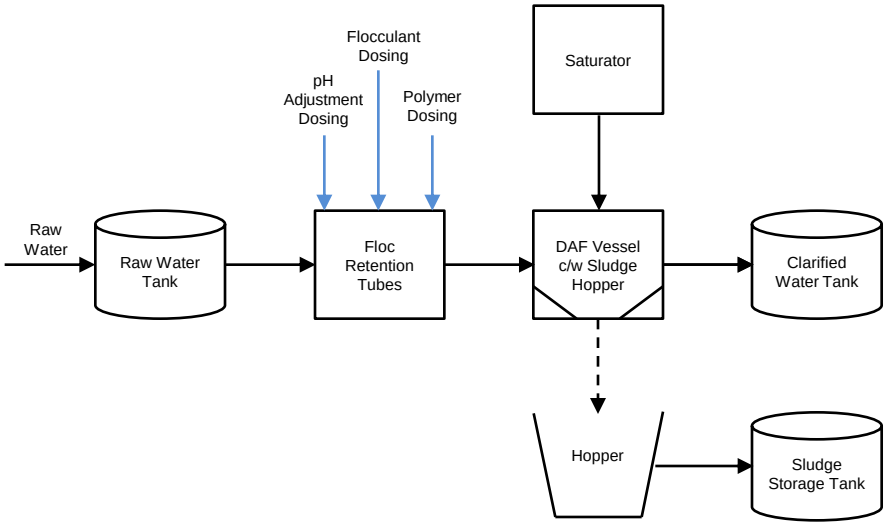



**Submersible Feed Pump**

Where the waste water is collected in a suitable underground collection pit/tank, a submersible feed pump can be provided to transfer wastewater directly from the collection pit into the DAF, eliminating the need for an additional tank and feed pump.

The system is controlled by level switches that automatically switch on/off the submersible feed pump.

# Options – Sludge Pump

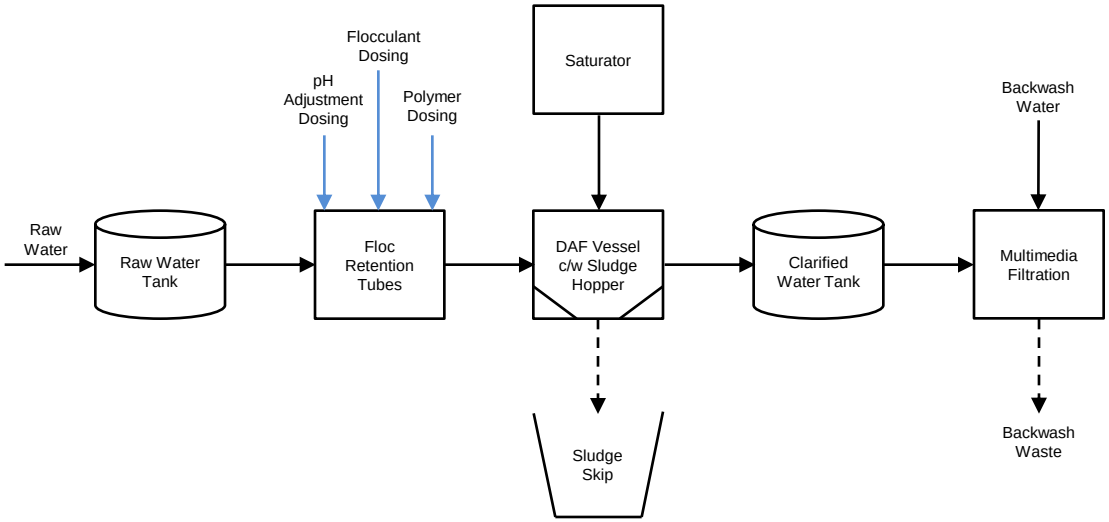



**Sludge Transfer Pump**

Where a sludge pump and holding tank are provided, the sludge pump transfers the waste from the hopper to the sludge tank, prior to liquid waste off site disposal.

The system is controlled by level switches that automatically switch on/off the sludge pump.

# Options – Multimedia Filtration



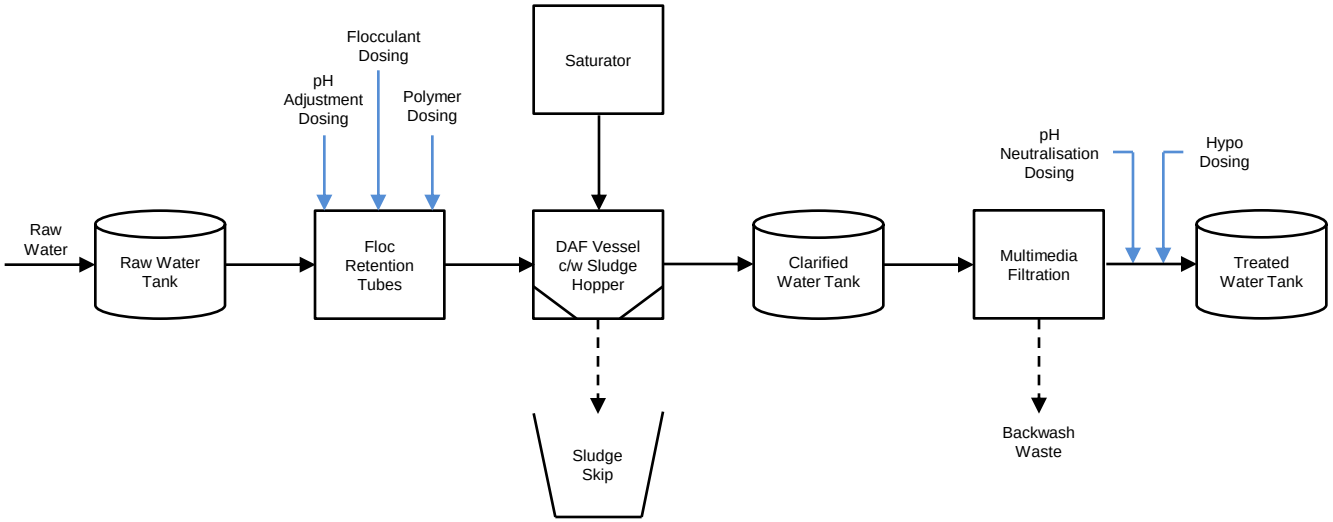

**Post Treatment – Media Filtration**

Where final effluent polishing (i.e. for recycling applications) is required, a multimedia filter can be provided.

The filter feed/backwash pump takes flooded suction from the clarified water tank and supplies clarified water to the multimedia filter(s), which removes carried over suspended solids (20 micron or greater) from the water. The filter is periodically backwashed with potable or treated water (application dependant), based on operator adjustable time clock setting, via an electrically actuated valves.

Where ClearAccess™ remote monitoring is installed, pressure transmitters continuously monitor the differential pressure across the media filter; the filter is automatically backwashed when the differential pressure set point is triggered.

# Options – Post-DAF Chemical Dosing



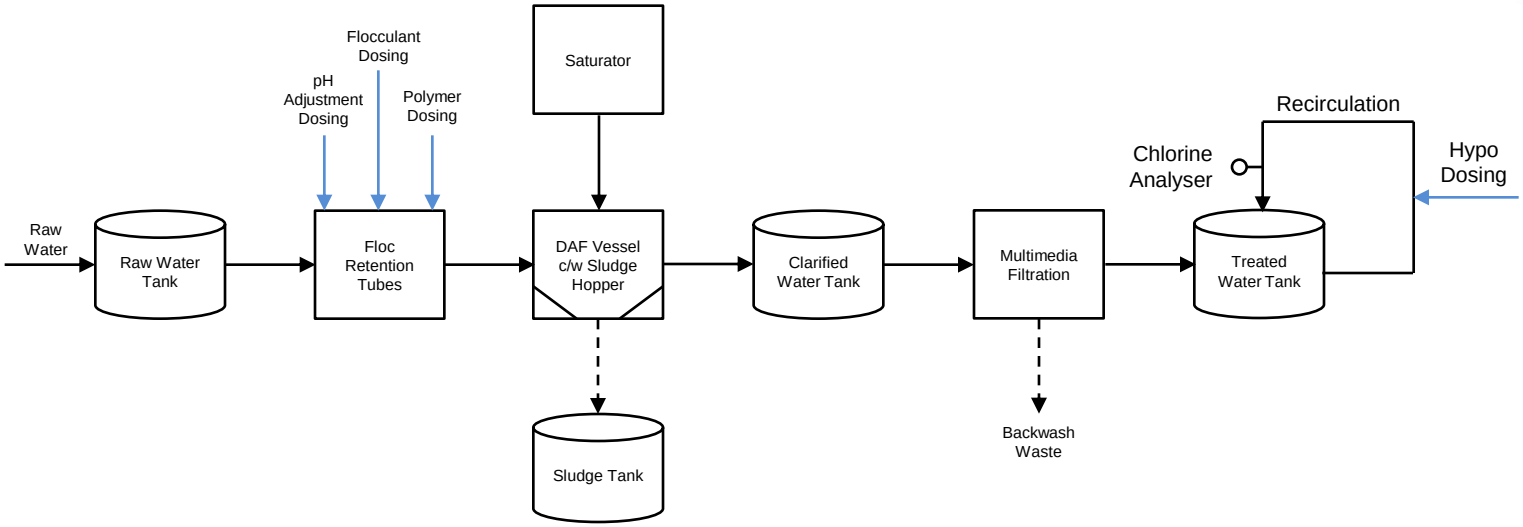

**Post-DAF Chemical Dosing**

Post-DAF clarification chemical dosing systems may be added as required to suit treated water quality requirements. Typical chemicals include acid/alkali for pH correction and sodium hypochlorite for sterilisation (i.e. for recycling applications).

Depending on the application, chemical dosing rates are pre-set based on flow rate (flow paced), or automatically controlled by the PLC, based on online instrumentation (such as pH, ORP or chlorine analysers) downstream of the dose point.

All chemical storage tanks are fitted with a low level switch for auto-shutdown & to alert the operator of a low level condition; the tank levels should be checked regularly and topped up as required.

# Options – Hypochlorite Sterilisation

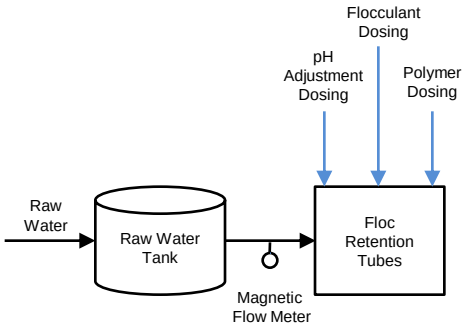



**PLC Controlled (Residual Trim) Hypochlorite Dosing, with Recirculation & Monitoring**

The recirculation pump circulates the contents of the treated water tank on a continuous basis; a chlorine analyser monitors the free residual chlorine, and the PLC controls dosing of sodium hypochlorite as required to ensure correct free chlorine levels are maintained in the tank at all times. Alarms are generated by any abnormal readings.

The hypochlorite storage tank is fitted with a low level switch to alert the operator of a low level condition; the tank level should be checked regularly and topped up as required.

# Options – Flow Based Chemical Dosing



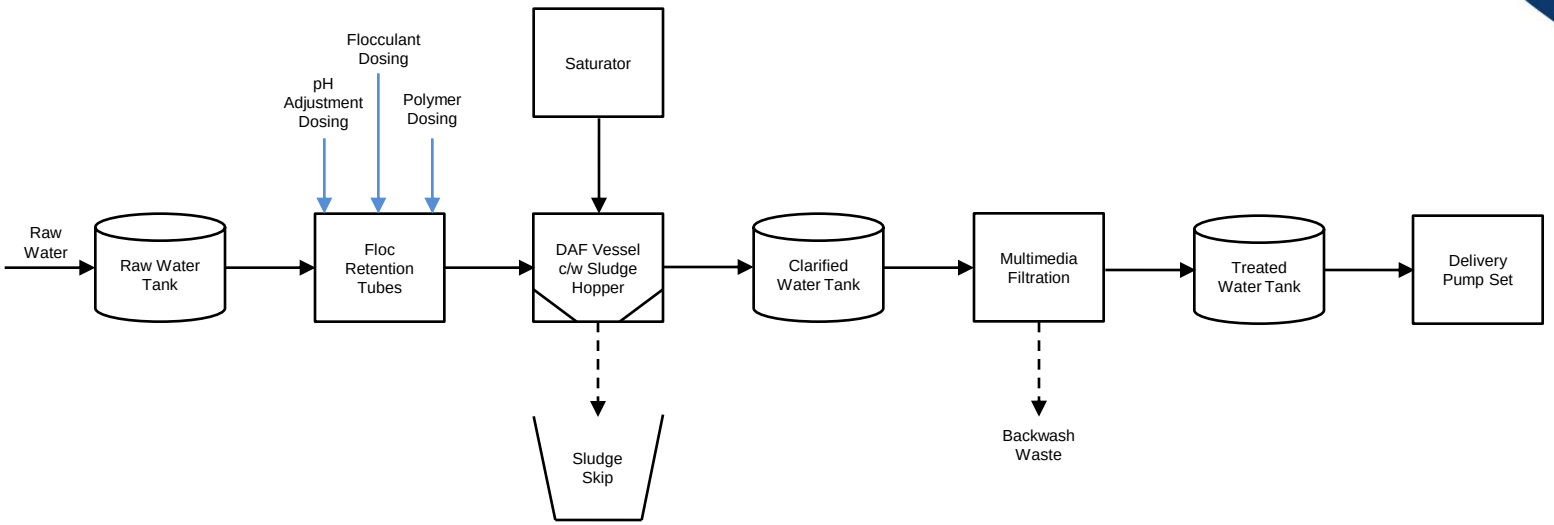

**Flow Based pH Correction and Flocculation**

The pre-clarification chemical dosing can be optimised by the addition of a magnetic flow meter and variable speed dosing pumps.

The magnetic flow meter sends a reading back to the PLC which then controls the chemical dosing to enable precise dose rates, based on flow rate and predetermined dose rates.

This provides operational flexibility and minimises chemical wastage by overdosing.

# Options – Delivery Pump Set




**Treated Water Delivery Pump Set**

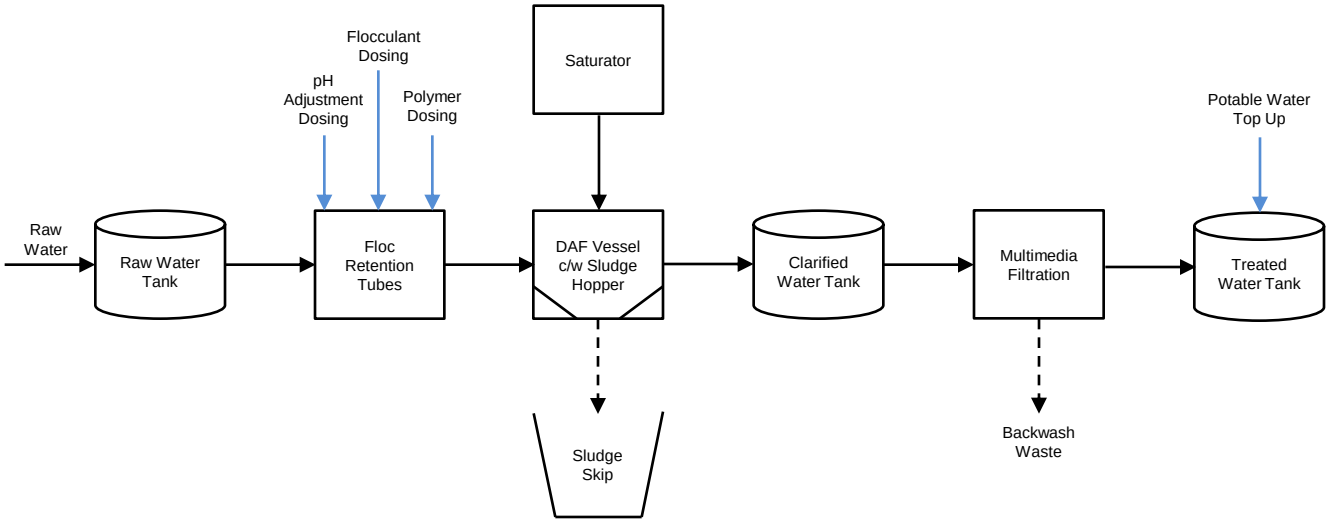
A treated water delivery pump set can be provided to deliver treated water to end users.

The system typically is configured as a constant pressure system, with the capability to deliver variable flow rates in response to downstream demand.

A pressure sensor is installed on the discharge manifold to automatically control the operation of the pump.

Various options are available for pumping configurations (jacking pump, standby pumps etc), and electrical controls, to suit the client's requirements.

# Options – Potable Water Top Up

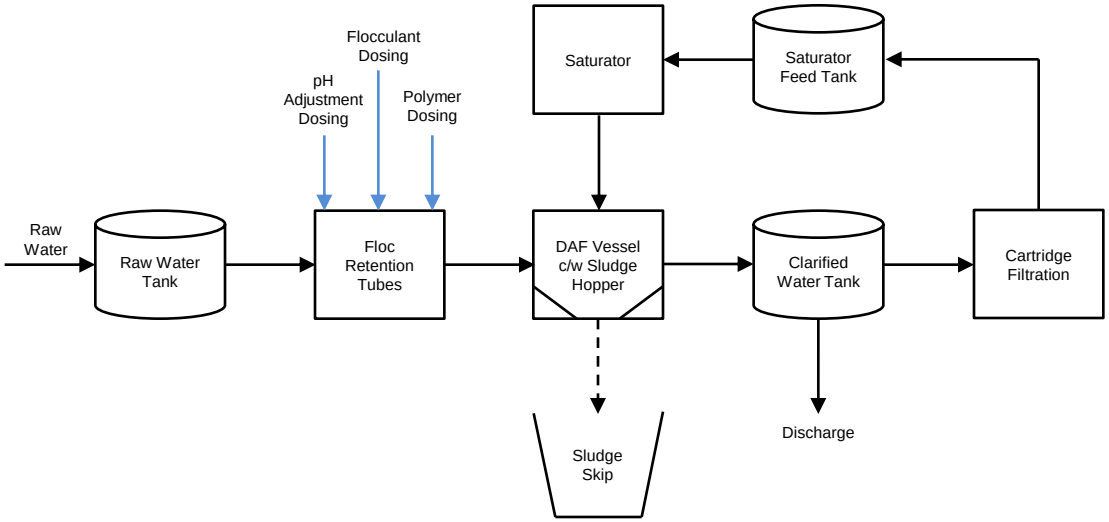



**Potable Water Top Up of Treated  Water Tank**

Where it is possible for the treated water tank to be empty when the DAF system needs to operate, potable water top-up of the treated water tank is required.

This ensures that there is sufficient water for  backwashing the multimedia filter (where installed), and re-use as saturator feedwater.

# Options – Treated Water Filtration



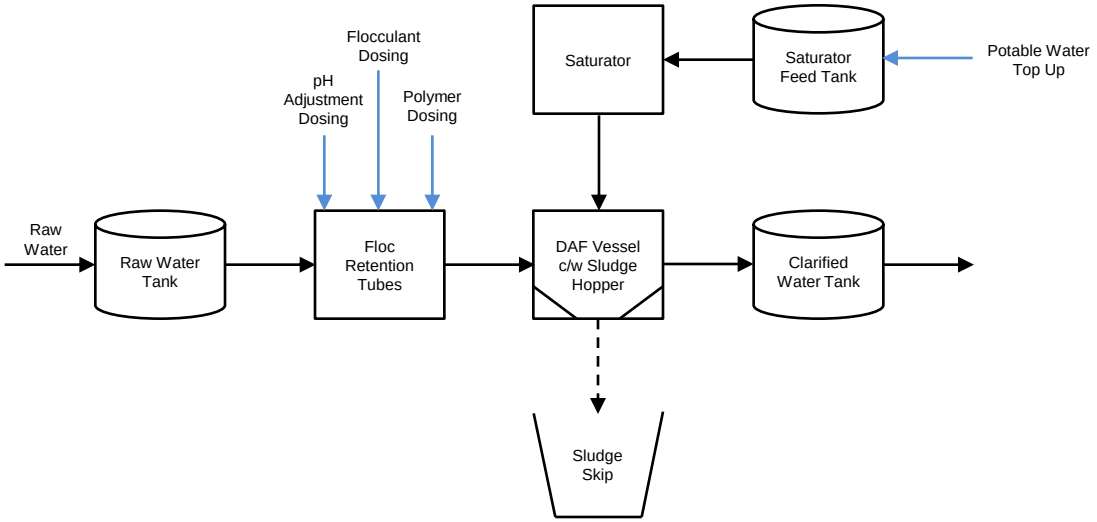

**Treated  Water Filtration**

Where treated water is to be re-used for saturator feed water, but there is no media filter installed, it may be necessary to filter the water prior to the saturator.

The treated/clarified water passes though cartridge filter(s) to trap any remaining sediment/suspended solids, prior to transfer to the saturator feed tank. The cartridge filter elements are typically replaced on a monthly basis as part of routine planned maintenance procedure.

Note: This option is not required if the Multimedia Filtration option is installed.

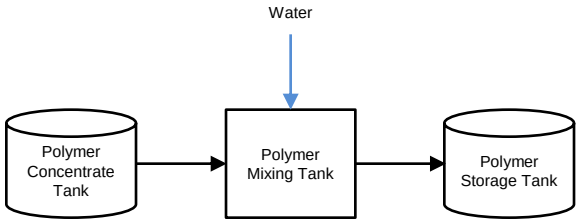
# Options – Potable Water Top Up




**Potable Water Top Up – Saturator Feed Tank**

Where the treated/clarified water is not available, or unsuitable, for re-use in the saturator, potable water top-up of the saturator feed tank is required.

# Options – Polymer Makeup System




**Automated Polymer Batching System**

In instances where there is high polymer use, it may be cost effective to purchase a concentrated polymer and mix on site. Noting that the mixed polymer will have a short shelf life (one week).

The polymer storage tank is automatically replenished as the polymer is used. The new polymer is produced from a polymer concentrate mixed with water.

The polymer concentrate dosing pump will slowly pump concentrate from the polymer concentrate tank into the polymer mixing tank. The polymer mixer will run for approximately 10 minutes to thoroughly mix the polymer. Once the polymer is mixed the polymer transfer pump transfers the new polymer into the polymer storage tank.

# Projects Experience

| | |
|---|---|
| **Project** | Container Wash Bay Recycling |
| **Location** | Hemmant, Brisbane |
| **Date** | 2013 |
| **Scope** | Design & construct, loading and transport to site, commissioning & operator training |
| **Capacity** | 1,500 L/hr |
| **Raw Water** | Container wash bay waste water |
| **Treated Water** | Discharge to sewer |
| **Features** | Skid mounted plant<br>Dual submersible delivery pumps<br>Pre Oil Water Separator (OWS) treatment<br>Post clarification pH neutralisation |

# Projects Experience

| | |
|---|---|
| **Project** | Train Wash Bay Recycling |
| **Location** | Hexham, NSW |
| **Date** | 2015 |
| **Scope** | Design & construct, loading and transport to site, commissioning & operator training |
| **Capacity** | 3,000 L/hr |
| **Raw Water** | Train wash bay waste water |
| **Treated Water** | Recycled for reuse in wash bay |
| **Features** | Skid mounted plant<br>Post clarification pH neutralisation<br>Post clarification sand filtration<br>Post clarification UV disinfection<br>Post clarification Chlorine disinfection dosing system |

# Projects Experience

| | |
|---|---|
| **Project** | Storm Water & Train Wash Bay Recycling |
| **Location** | Nebo, Queensland |
| **Date** | 2011 |
| **Scope** | Design & construct, commissioning & operator training |
| **Capacity** | 5,000 L/hr |
| **Raw Water** | Storm water & wash bay waste water |
| **Treated Water** | Recycled for reuse in wash bay |
| **Features** | Skid mounted plant<br>Post clarification pH neutralisation<br>Post clarification sand filtration<br>Post clarification granular activated carbon filtration<br>Post clarification UV disinfection<br>Post clarification chlorine disinfection dosing system |

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# Projects Experience

| | |
|---|---|
| **Project** | Bakery Trade Waste |
| **Location** | Dry Creek, South Australia |
| **Date** | 2014 |
| **Scope** | Design & construct, site installation, commissioning & operator training |
| **Capacity** | 1,800 L/hr |
| **Raw Water** | Process waste water |
| **Treated Water** | Discharge to sewer |
| **Features** | Rotary drum pre-screen<br>Skid mounted plant<br>Sludge handling system |


# Projects Experience

| | |
|---|---|
| **Project** | Compressor Station Drain Water |
| **Location** | Gladstone, Queensland |
| **Date** | 2014 |
| **Scope** | Design & construct, site installation support, commissioning & operator training |
| **Capacity** | 4,000 L/hr |
| **Raw Water** | Compressor Station Oily Waste Water |
| **Treated Water** | Reused for dust suppression |
| **Features** | Skid mounted plant<br>Post clarification pH neutralisation<br>Post clarification sand filtration<br>Post clarification granular activated carbon filtration<br>Sludge handling system |