HYDROPROTECTOR

TECHNICAL SPECIFICATION

PROTECTOR

HYDROPROTECTOR

SAVING NATURE.

WARNING: this information applies exclusively to the Hydroprotector unit specified above. Do not use this manual as a guide to install any device that is not the specified unit.

For further information visit our website at **protector.com.au** or email **technician@protector.com.au**

INTRODUCTION

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Protector is a company excelling in the design, manufacture and production of fibreglass tanks to be utilised in stormwater treatment technologies. The Hydroprotector, a bypass separator, is an impeccably designed and manufactured high quality unit, designed and tested in accordance with the european standard BS EN 858-1 and meets the requirements of the environment agency's pollution prevention guidelines (PPG3) and the construction products regulations. Once treated this water is then returned into the water system, efficiently keeping our water clean.

Protector separators are filament wound by an advanced patented chop hoop filament winding process. This process produces not only circumferential strength ads found in the helical wound tanks, but also high longitudinal strength. The interlaminar shear strength permits tanks to be cut for manholes and pipework without undue loss in strength.

Leaks and spillages of oil and fuel are washed down drains every time it rains and, unless intercepted, in their way into water courses polluting reservoirs and rivers. This can have a disastrous effect on plants and wildlife. A substantial amount of oil pollution is collected in sites such as garage forecourts, large car parks and fuel storage depots and this must be intercepted to avoid the risk of prosecution.

Protector products, manufactured by the Australian-based manufacturer, Protector, provide high quality solutions for fast and efficient installation, needed for today's fast track building methods. Built to the highest specifications, the Hydroprotector product is designed and built to BS4994-1987 and ASME RPT1. Popular with councils, municipal, water authorities, civil and construction customers and incorporating state-of-the-art technology, our stormwater treatment solutions provide simple solutions to some of the most complex problems in the water and waste water industry.

Hydroprotector products are designed to reduce operating costs and optimise operating efficiency. Above and below ground options can be used in a multitude of applications, in both domestic and commercial environments, from small, single pump units to dual pump systems, with capacities of up to 250,000 litres per unit. The entire range is easy to install, easy to handle, light and robust.

Protector's dynamic enterprise has roots in the industry that go back to over 40 years of engineering, design experience and product knowledge passed from generation to generation to where it is today. Protector products, known as the leading edge of composite manufacture here in Australia are renowned for their quality with painstaking attention to detail that has become the product and basis for the company's operation formed by years of experience and knowledge in the fibreglass and water industry.

Today Protector's plant, based in Sydney, comprises of modern 'state of the art' filament winding and computerised robots to ensure fast operations and precision from concept to completion. The basis for the company's operation, with continuous success, both yours and ours!

Fibreglass reinforced polymer are strengthened materials that shows higher resistance to the corrosion which makes them ideal to be implemented for the tanks. They can be exposed to the water for years without being corrupted. Light weight, being resistant to high temperature and easy on-site installation are some of the desirable features that FRP indicates. Furthermore, FRP plates have higher mechanical strength which enables them to carry higher loads compared to plastics.

The environmental agency has published pollution prevention guidelines 'use and design of oil separators in surface water drainage systems: PPG3'. These set out the standards with which separators must comply and assist in deciding on the need for a separator at a site and the size and type that is appropriate. These pollution prevention guidelines PPG3 require separators to be tested in accordance with the standard test procedure based on the european standard BSEN858-1:2002

This document provides an in-depth and detailed collation of the technical information on the Hydroprotector including its installation practices, suitable usage, advantages and limitations. Information is also provided on the filtration system, its design and its maintenance.

The Protector company supplies a range of stormwater filtration technologies for all situations, and is always available for enquires and queries at any time.

SCOPE OF PRODUCT

SAVING NATURE.

WHY WE TREAT STORMWATER

Storm water is water that is produced from rain, and possibly melting snow and ice, which flows over solid surfaces, capturing gross pollutants, sedimentation, nutrients, heavy metals and a wide range of other pollutants. The majority of this water infiltrates into the soil, or evaporated or run off and enter nearby waterways. In natural areas, free from construction, buildings, motorways and agriculture etc. the water just soaks and absorbs into the soil or evaporates. In developed areas, not only does the range and concentrations of pollutants grow and grow, but the areas in which the water is usually absorbed or evaporated is removed, the storm water is funneled through stormwater drainage systems and directly into our rivers, streams and waterways. The natural processes of stormwater removal such as infiltration evaporation and filtering are greatly reduced, causing the concentrations and size of pollutants entering our waterways to drastically increase.

Stormwater treatment and management is about protecting our environment. When we develop stormwater treatment systems we are designing ways in which to protect our environment, and rid our environment and ecosystems of pollution and contamination. Hence the need for these systems is vital for our environment and ecosystems health and prolonged life. From gross pollutant traps which remove larger plastics, debris and sedimentation from our waterways, keeping our oceanic and water ecosystems protected from the well-known dangers of ocean and marine life coming into contact with plastics, to our tertiary treatments to remove heavy metals, organic nutrients and colloidal fine particles from our water systems and prevent from poisoning the environment. If the management of stormwater is conducted properly, with effective and efficient technologies in place, we can improve our water ecosystems and effectively lengthen our environments life.

Not only does proper stormwater treatment and management protect our environment, it also has several other benefits that are less widely known. These management systems can reduce flooding to protect people’s lives and properties, reduce the demand on public stormwater drainage systems, support healthy streams and rivers, and create healthier, more sustainable and viable communities. Effective stormwater management provides not only vital environmental benefits, it also provides social, economic and communal benefits.

It’s important in society to maintain a clear image of the bigger picture. As our society continues to grow in population and city size, we increase the area covered by impervious and non –absorbent surfaces that do not allow infiltration and absorption and in turn increase the amount of polluted runoff. We must continue to implement these stormwater treatment technologies not for just the current benefit, but also for the future and more vital benefits.

THE HYDROPROTECTOR

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The Hydroprotector is an underground installed horizontal stormwater treatment tank. The entire stormwater treatment system is made from FRP (fibre reinforced polymer) due to the materials reliable longevity and strength. Fibreglass reinforced polymer are strengthened materials that shows higher resistance to the corrosion which makes them ideal to be implemented for the tanks. They can be exposed to the water for years without being corrupted. Light weight, being resistant to high temperature and easy on-site installation are some of the desirable features that FRP indicates. Furthermore, FRP plates have higher mechanical strength which enables them to carry higher loads compared to plastics.

PRODUCT PURPOSE

There is an endless need for improving the environmental stability of our society. Pollution and environmental impacts is something that every company needs to have in mind in everything they do. We at Protector are designing solutions to the problems we face, attempting to solve one of the biggest pollutant issues in Australia; water pollution. Pollutants from run off that include chemicals, nutrients, hydrocarbons and gross pollutants contaminate our water supply and cause major environmental issues. We here at Protector are solving this with our wide range of stormwater treatment systems that are all designed to treat all forms of stormwater pollution and any sites demands.

APPLICATIONS

The Hydroprotector is suitable for many applications. Its high filtration rate and large array of configurations and sizes allows for this system to be suitable in almost all situations. Its ability to also be combined with other filtration systems, such as the Ecoprotector, as a combined system ensure that this system can be used in a wide range of applications. The most common applications are listed below:

- Power Stations
- Substations & Switchyards
- Mining & Heavy Vehicle
- Windfarms
- Waste Transfer Depots
- Re-fuelling Areas
- Service Stations
- Asphalt Plants

HYDROPROTECTOR PROCESS

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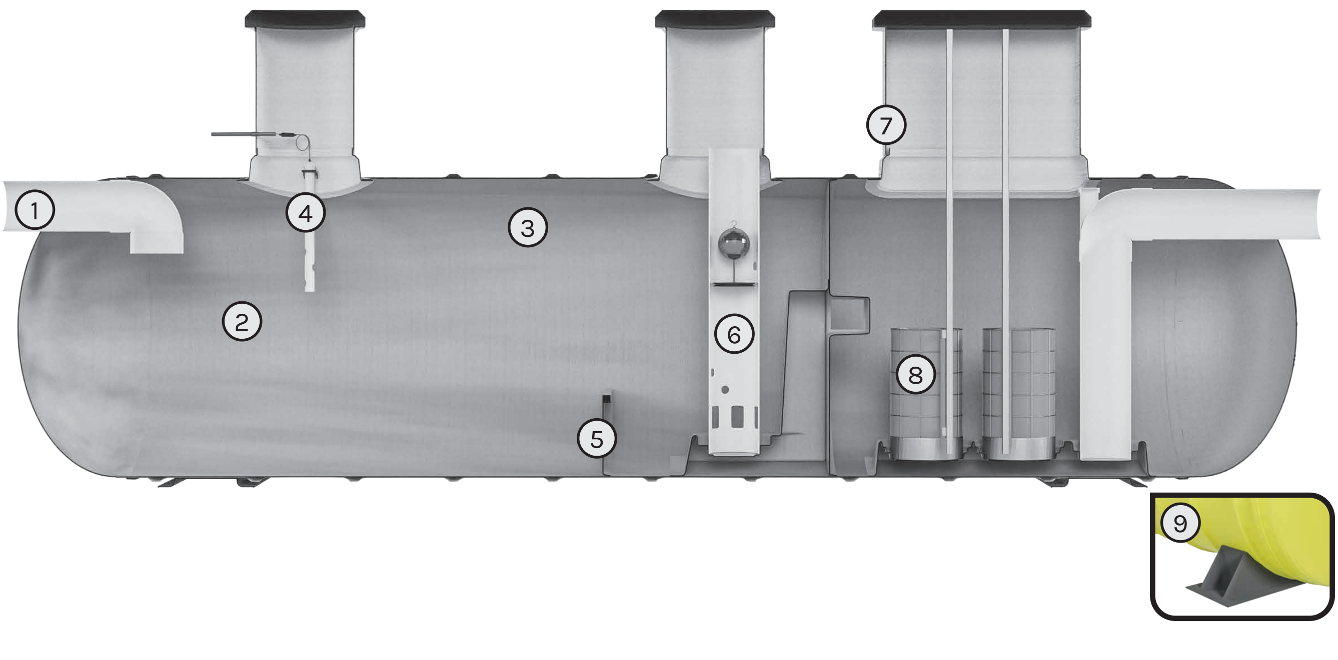
1. The inlet pipe features a flame trap which works by eliminating air from the liquids entering the primary chamber.
2. The primary chamber of the Hydroprotector is designed to slow down and separate pollutants from stormwater runoff, allowing dense particles to settle at the bottom of the chamber and the lighter fluids and debris to rise to the surface while the cleaner water flows into the secondary chamber for further treatment.
3. Captured hydrocarbons rise to the surface of the storage chamber and are retained behind a weir which stops them from flowing into the secondary chamber without resuspension during high flow events.
4. The oil probe and control panel are crucial components in monitoring and maintaining oil spills. The probe detects any oil leaks and sends signals to the control panel, which alerts the maintenance team. The Vapor Y Seal is an essential component installed in control panel conduits to prevent vapors from escaping the unit. It is designed to maintain the integrity of the unit and prevent hazardous vapors from escaping into the environment.
5. For unsealed sites with high silt loads Hydroprotector units have an integrated sludge weir which prevents the build up of silt from clogging the outlet of the first chamber and facilitates effective sealing of the Automatic Closure Device in the event of a spill.
6. The automatic closure device is calibrated to float in water and sink in light hydrocarbon liquids. If the maximum oil spill capacity of the primary chamber reached, the device will shut off flow of liquid to the secondary chamber and therefore protecting the environment from a catastrophic event.
7. Protector have created a slip joint riser design to eliminate the need for flange to flange installation. This excludes the need for fasteners, saving time and reducing safety hazards during installation.
8. The secondary chamber is fitted with a finely perforated coalescing unit which removes the remaining globules of light liquid to a certified 5mg/l. The Coalescing unit is installed on guiderails for ease of installation and maintenance.
9. Hydroprotector tanks are manufactured with a combined feet and anchor system which eliminates additional anchor system requirements. This makes installation safer as the installer does not need to access the base of excavation.



MODEL CONFIGURATIONS

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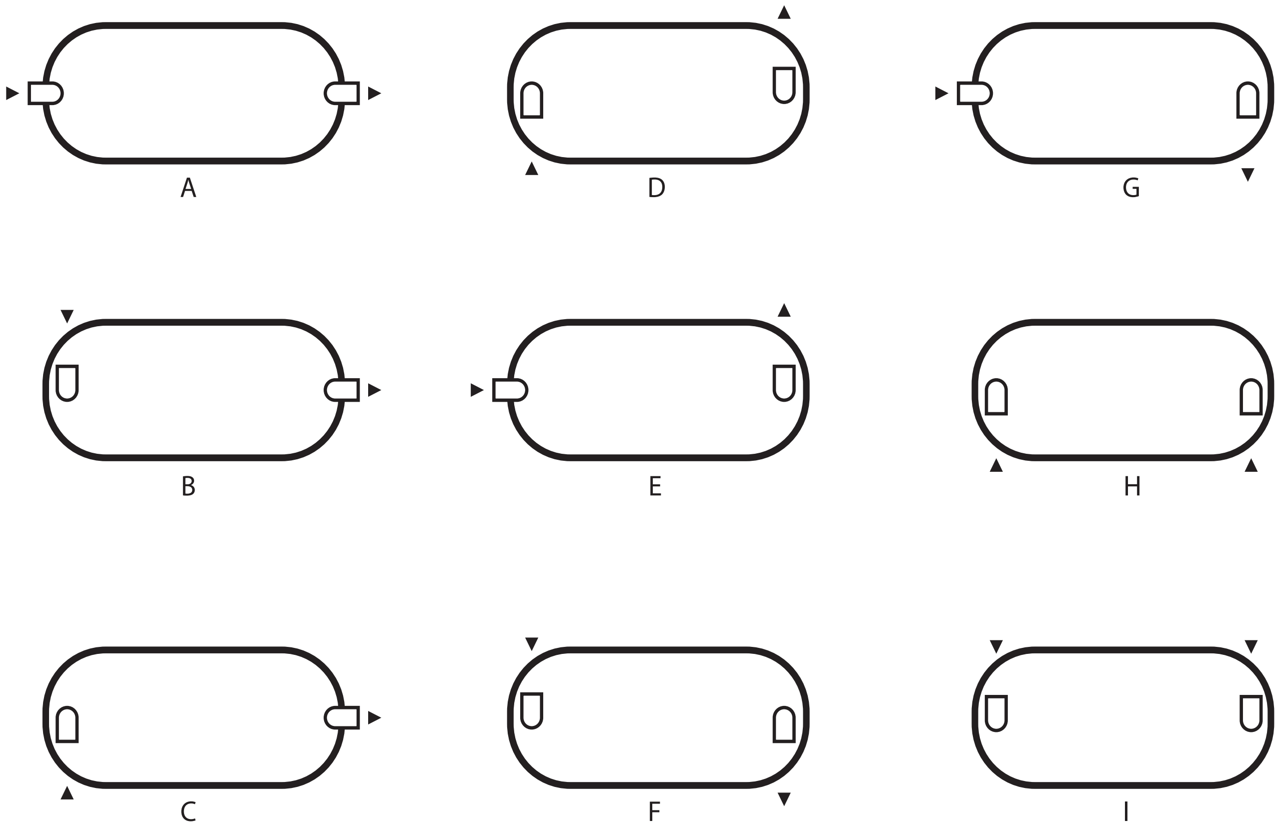
The Hydroprotector has a large range of sizes, varying in diameter, length of tank and inlet and outlet sizes. This makes the Hydroprotector suitable to any site demand.

UNIT DIAMETER	1050	1200	1500	1850	2200	2500	3000	3500
UNIT LENGTH	1099 - 2100	3000	2370 - 3750	3350 - 9550	7900 - 11,000	9950 - 13,350	11,000	9000 - 15,150

INLET AND OUTLET CONFIGURATIONS



1200 - 1500 SERIES

1200/1500 series the popular range of Hydroprotector for small to medium parking areas associated with smaller supermarkets and industrial estates. These consist of 1200 diameter or 1500 diameter tanks that vary in length from 2 to 8m long and 2.5 to 9m long respectively.

1850 - 2200 SERIES

1850/2200 series large capacity Hydroprotector for supermarkets, hypermarkets and large vehicle parking areas, industrial complexes, docks, airport aprons etc. This series consists of the 1850mm diameter and 2200 mm diameter. These have lengths of 4m to 10m and 4.5m to 12.5m respectively.

2500 – 3000 SERIES

2500/3000 series the largest Hydroprotector range, for catchment areas from eight hectares upward to more than 30 hectares. Details are supplied against specific schemes. This series consists of the largest diameter cases, that being 2500mm or 3000mm diameter tanks. These have lengths of 4.5m to 16m and 5m to 18m respectively.

CLASS CONFIGURATIONS

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TYPE 1

Class 1 separators, which are designed to achieve a concentration of less than 5mg/l of oil under standard test conditions, should be used when the separator is required to remove very small oil droplets, such as those arising from car park runoff.

Features

- Good access to all parts for desludging.
- Large and fully accessible primary chamber for silt capacity and its removal.
- Outlet junction chamber-approved sampling point.
- Dip pipe inlet for minimum turbulence and to prevent inflammable vapors passing upstream in drainage system.
- Most models can provide a choice of nine different inlet/outlet orientations to suit site drainage lay-out (check before specifying).
- Protect unit/s incorporated within the main separation chamber provide an efficient coalescing separation process to reduce the hydrocarbon content in the outlet to 5mg/litre or less. These strong stainless steel units incorporate robust high volume reticulated foam inserts. The inserts efficiently coalesce the finer globules of hydrocarbons for gravity separation and due to their large volume, last for long periods before requiring cleaning.
- Cleaning is then a simple operation using normal pressure water. The inserts can be reused again and again, rarely requiring replacement.
- Handle and/or lifting retaining cables with security fixing provided with each coalesce unit (see optional extra systems). See 5.6.
- Designed for high performance and low maintenance over a long life span.
- By-pass separator with silt capacity.

TYPE 2

Class 2 separators are designed to achieve a concentration of less than 100mg/l oil under standard test conditions. They are suitable where a lower quality requirement applies, for example where the effluent passes to a foul sewer.

Features

- Good access to all parts for desludging.
- Large and fully accessible primary chamber for silt capacity and its removal.
- Outlet junction chamber-approved sampling point.
- Dip pipe inlet for minimum turbulence and to prevent inflammable vapors passing upstream in drainage system.

CHAMBER CONFIGURATIONS

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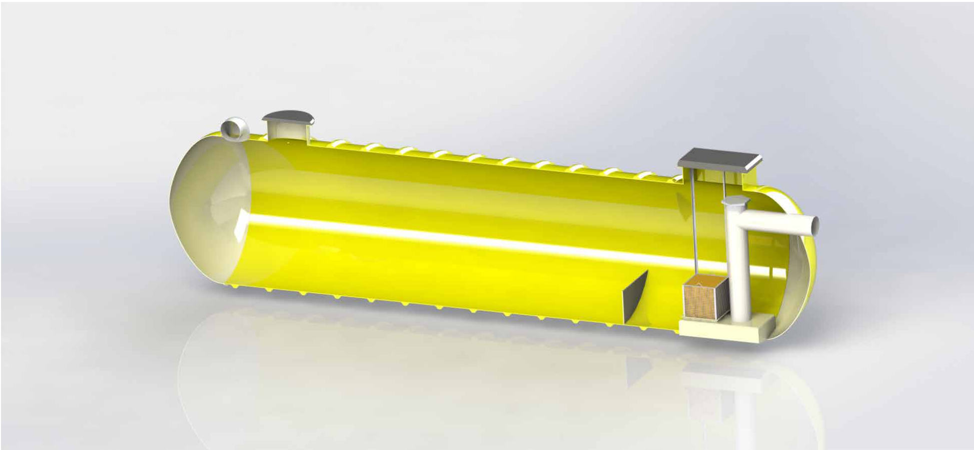
SINGLE CHAMBER

Consists of a baffle, coalesce filter, flow director, discharge riser and inspection cap. Also includes the guiderail insertion system.

Typical sites: Medium to high risk oil/fuel storage and handling areas. Filling stations (Protector Water PureProtector forecourt separator FP1C). Commercial vehicle/plant maintenance yards and heavily contaminated industrial areas

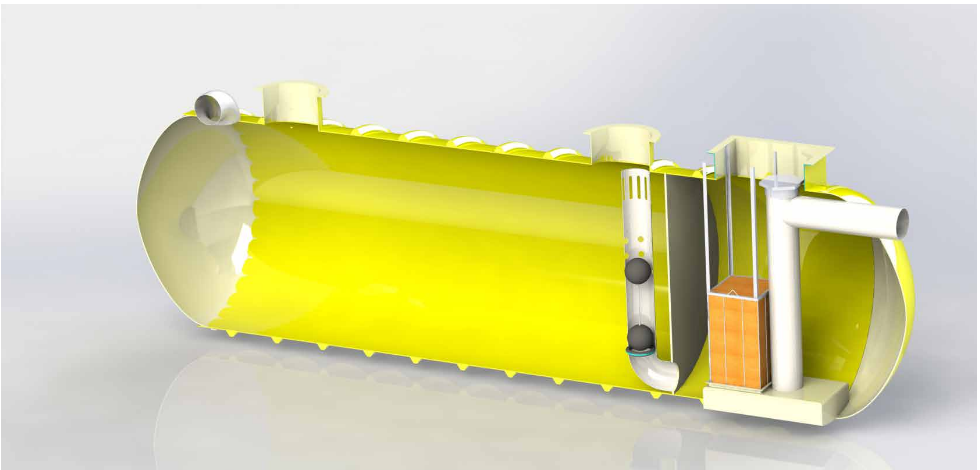


DUAL CHAMBER WITH AUTOMATIC CLOSURE DEVICE

This system has the first chamber being a sedimentation, solids and oils containment and trap. This system retains all of the heavy substances and gross pollutants and protects the coalescer filter. The second chamber consists of the coalesce chamber to filter out oils and substances, along with the guiderails, the outflow pipe and the flow director.

Additional extras for the dual chamber system include automatic closure device, coalesce filter in second chamber, dropper unit, dual access manways.

Typical Sites: High risk oil/fuel storage and handling areas, filling stations (Protector Water PureProtector forecourt separator FP2C), heavily contaminated industrial areas, commercial vehicle/plant maintenance yards, power stations and sub-stations. Two chamber models provide protection to the coalescer foam inserts from silt and heavy fuel/oil contamination by causing the gross pollutants to settle on the chamber floor.



CHAMBER CONFIGURATIONS

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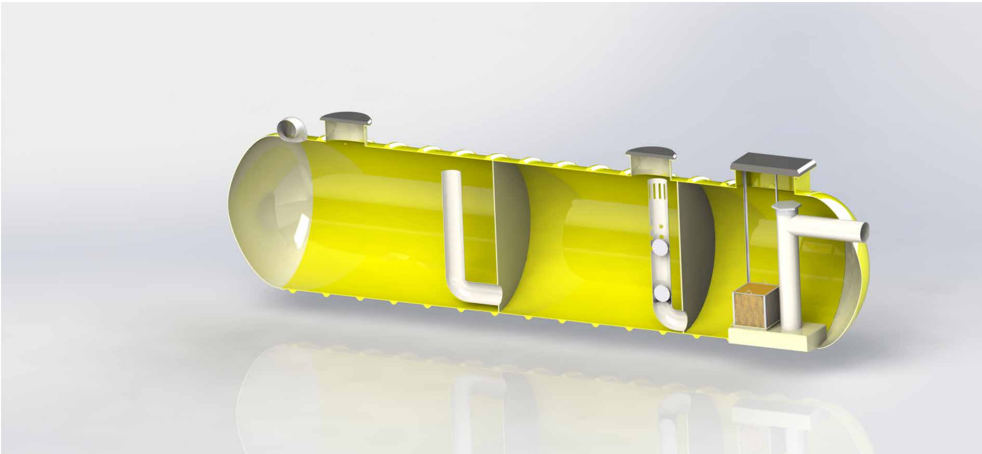
TRIPLE CHAMBER

Initial Containment Chamber 1: Total Suspended Solids (TSS) silt, sediments, sludge and gross pollutants are trapped and settle on the chamber floor. Light liquids are skimmed off into Chamber 2.

Containment Chamber 2: Light liquids are contained and non-turbulent flow through two horizontal treatment chambers uses the under flow principle to retain light liquids in all flow conditions.

Third Coalesce Chamber: Light liquids separation is enhanced, reducing to 5mg/L or less prior to discharge



TRIPLE CHAMBER, DOUBLE CHAMBER WITH PUMP CHAMBER

Initial Containment Chamber 1: Total Suspended Solids (TSS) silt, sediments, sludge and gross pollutants are trapped and settle on the chamber floor. Light liquids are skimmed off into Chamber 2.

Coalesce Chamber: Light liquids are contained and non-turbulent flow through two horizontal treatment chambers uses the under flow principle to retain light liquids in all flow conditions.

Pump Chamber: Fitted with guiderails and pumps for discharge in areas with shallow grade or head.

COALESCER FILTER SIZES

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The coalesce filter devices provide in this Protector system can come in a wide range of sizes and flow rates to suit the water flow characteristics of your site. Each filter can be made to suit a specific oil removal goal, as we have various types of coalescing foam available for our filters. Each rang of size can hence be combined to create the oil ppm necessary and withstand the appropriate flow rate that is require of your site. The coalescing filters are given below:

MODEL ID.	LENGTH AND WIDTH (MM)	HEIGHT (MM)	SURFACE AREA AVAILABLE FOR FILTRATION (MM2)	FLOW RATE (L/S)
M.200	200	360	328,000	8
M.250	250	480	542,500	45
M.350	350	650	1,032,500	30
M.450	450	800	1,642,500	60
M.500	500	930	2,110,000	80

OPTIONAL EXTRAS

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OPTIONAL EXTRAS FOR ALL PROTECTOR SEPARATORS

- Chemical resistant inner lining for aviation fuels, toluene etc. (CR and HCR specification available).
- Protector Coalesce unit guide rail system is available for easy removal and re-insertion of coalesce units during maintenance.
- Extension shafts 600mm diameter available ex. Stock in standard 0.5m, 1.0m, 1.5m and 2.0m lengths. Other lengths to special order. Extension/access shafts for man access, 750 or 900mm diameter available to order.
- Extension/access shafts with GRP ladder and stainless-steel fixings available to order. Automatic alarm/monitoring system available ex. stock.
- Tripod and hoist for raising and lowering Protector coalesce units during maintenance. Where surface water run-off has a high silt content the coalesce units can become filled, making them heavy to lift out. To facilitate easy withdrawal of coalesce units the tripod & hoist is recommended. A stainless-steel lifting hook is included for automatically engaging the coalesce unit, even under water. This enables coalesce units to be lifted out safely from ground level.
- ‘3L’ system lifting, locating & locking system for simple lifting of coalesced units with tripod and hoist it. Provides positive locating and locking when in correct position.
- Protector skim light liquid/oil skimming and separate containment system for 400, 500 and 600 series separators in automatic or manual versions.
- Flex-Seal/Band-Seal or similar flexible couplings are available for connecting to site pipe work if required.
- Access shaft safety grating can be incorporated under the manhole cover for additional safety when carrying out an inspection.

CONFIGURATIONS WITH ADDITIONAL PROTECTOR PRODUCTS

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A great advantage of the Hydroprotector design, along with the additional Protector products that are available, is their ease of combination. As the Hydroprotector is a gross pollutant trap with bypass and oil capture, it is often used in combination with other Protector Products.

BIOPROTECTOR WITH HYDROPROTECTOR

These two systems in combination provide a full treatment almost all contaminants present in stormwater runoff. These two in combination provide an efficient oil, nutrient, chemicals, bacteria and hydrocarbon treatment with a high capacity storage and filtration of contaminants and gross pollutants. Hence the Bioprotector system can be used in conjunction with the Hydroprotector as a first initial treatment system, with the Hydroprotector being used as a secondary high capacity storage system, and removal of smaller oil molecules.

ECOPROTECTOR WITH HYDROPROTECTOR

These two systems in combination provide a full treatment of sediment, oil capture, hydrocarbon removal and coalesce filtration. They provide an efficient oil and hydrocarbon treatment with a high capacity storage and filtration of contaminants and gross pollutants. Furthermore, the Hydroprotector becomes more effective with the Ecoprotector due to its efficient and highly effective gross pollutant removal that the Hydroprotector does not achieve.

REMOVAL TECHNIQUES

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SEDIMENTATION

Sedimentation is a physical water treatment process that uses gravity or otherwise to remove sedimentation particles of various sizes from water. Once the water enters the silt chamber, due to the higher level of the baffle through the Hydroprotector, the sedimentation settles at the bottom of the silt capture chamber where it can be removed in maintenance.

FILTRATION

The coalesce unit provides the filtration in this system. This filtration process is based off the interception and attachment techniques. The interception technique occurs when the contaminant becomes trapped in the filter media, effectively removing it from the stormwater runoff. Usually involving sedimentary particles, these sediment particles usually become stuck within the filter media. Similarly, to the adsorption process, these particles that become trapped are then removed when the filter media is replaced.

ADSORBTION

Another main method of removal of contaminants is through adsorption. The adsorption process is involving the adhesion and chemical bondage of the ions of the contaminants to the surface of the filter system and throughout its media, effectively removing the contaminants from the stormwater runoff. The media used in the Xtreamprotector contains proprietary media that has activated particles to enhance the attraction of the contaminate ions to the media. This process creates a thin film of adsorbate in the media which the requires replacement, which shall be discussed later in the maintenance section.

OIL CAPTURE

The system also employs a simple oil trap system. With the combination of the Automatic closure device, the Hydroprotector can prevent the flow of denser oils and fuels into the coalesce section of the tank. This prevents the coalesce to avoid contact with oils, removing the oil from the system.

COALESCENCE

In water treatment, the energy that is input into water is very low, causing the process of coalescence to occur in what small oil droplets collide and form bigger droplets, and due to the low energy these particles do not disperse. This process allows for the particles to be removed more simply.

FILTRATION

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THE FILTER

Robust stainless steel coalesce unit with long life foam insertion and lifting handle. The Hydroprotector Dual Chamber Separator incorporates a coalesce unit. The system is made up of effectively design foam inserts designed to remove all light liquid pollutants to less than 5ppm. The foam filter is contained in a stainless steel mesh encasing that is mounted in the secondary chamber and connected to a guiderail system to provide ease of removal and maintenance of the coalesce. The unit will be fitted with an automatic closure device which closes the separator off automatically once the maximum storage capacity of light liquid pollutants is reached (e.g. major fuel spillage) so preventing them passing into the stormwater. . These strong stainless-steel units incorporate robust high volume reticulated foam inserts. The inserts efficiently coalesce the inner globules of hydrocarbons for gravity separation and due to their large volume, last for long periods before requiring cleaning. Cleaning is then a simple operation using normal pressure water.

PROTECTOR COALESCE UNIT GUIDERAIL SYSTEM

To facilitate easy insertion of Protector, coalesce units, the guide rail system manufactured in stainless steel can be incorporated into Hydroprotector and class 1 Storm Protectors. Brackets fixed to the top and bottom of the coalesce unit simply engage the stainless-steel guide rail fixed to the top of the stub access shaft. The coalesce unit is then lowered in the normal way, being guided at the correct angle into the conical base which finally locates the coalesce unit into its final position. Extension guide rails can be incorporated into extension shafts to suit (preferably when ordered with the separator).

PROTECTOR COALESCE UNIT LIFTING, LOCATING AND LOCKING SYSTEM

The lifting, locating and locking system is manufactured in stainless steel and replaces the standard coalescer unit handle. It enables easier removal of heavily contaminated coalescer units for maintenance, especially when using the tripod and hoist designed for this purpose. The locating/locking handle ensures the coalescer unit is seated and locked in its correct position

OPERATION

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PASSIVE HYDRAULIC OPERATION

Passive hydraulic operation refers to the systems ability to continue efficient and full operation in the event of power failure. This means that the Ecoprotector and its process will constantly work and require no power.

AUTOMATIC CLOSURE DEVICE

The automatic closure device is an optional extra that is able to be added into the Hydroprotector in the dual and triple chamber systems. The device is designed to automatically cut off water flow when the suspended oil and hydrocarbon levels become high enough to require a cease of flow. This device prevents the flow of water into the coalesce chamber to prevent large quantities of oils from coming into contact with the filter, requiring less maintenance and service frequency. At a point of designed oil and hydrocarbon limits, the automatic closure device will lower the dense rubber stopper (designed to be at a low density) which will in turn block of the secondary chamber dropper and cease water flow. This system also acts as a baffle for sediment, as the inlet for the automatic closure device is at a height where the sediment will not be able to enter the secondary chamber.

SEDIMENTATION CHAMBER

The sedimentation chamber is a feature of the Hydroprotector, like the Hydroprotector, that is designed to remove all forms of gross pollutants, TSS and sedimentation particles. The water flows in through the flame dip inlet pipe and due to the large area of the silt chamber, and the non-turbulent flow, the water begins to settle. Once the water settles the sedimentation begins to also settle, removing it from the flow. As the inlet is at a higher point of the chamber, the sediment will never reach the secondary chamber inlet and will hence not clog the coalesce filter.

AUTOMATIC ALARM/MONITORING SYSTEM

The automatic alarm/monitoring system provides a warning when the separator requires emptying of its contained pollutants. The system comprises a probe mounted in the main separation chamber which senses when the designed maximum volume of light liquids has accumulated and passes a signal to the electronic control panel activating a lashing ‘EMPTY NOW’ warning and an audible alarm. The probe is placed into the factory-fitted probe protection tube for accurate on-site positioning. When separated oil reached the pre-determined level covering the top of the probe, the circuit breaks and activates the alarm. It is a ‘fail-safe’ system with no moving parts. Silt monitoring can also be incorporated, if required.

FULL RETENTION

Full retention separators are designed to treat the fill flow that can be delivered by a drainage or sewerage system. These systems are designed to be able to treat the full flow of rainfall intensity in the environment they are installed in, being considered as 65mm/hr as per Australian standard. Hence these systems are used when there is a high risk of regular oil contamination and high spillage percentage (such as vehicle maintenance and refuelling sites). These systems hence ensure that all volumes of water gets retained and treated to the maximum standard applicable, preventing any oils or hydrocarbons from entering waterways.

TREATMENT TRAINS

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The concept behind the use of treatment trains, being a series of storm water treatment systems, is so that the total system of the site in question covers every environmental treatment required. The Protector systems come easily combinable to form treatment trains in such a way to remove all the required contaminants from the water flow, as well as protecting the tertiary and finer treatment systems from clogging and increased system maintenance. The usual need for the use of Protector treatment trains come in the shape of requiring to cover a wide range of pollutant removal and the need to reach a certain percentage of contaminants remaining in storm water as set by environmental government standards, specifically in oil removal and hydrocarbon reduction. Furthermore, these treatment trains may be required to have large retention systems for storage, as well as pumping stations to ensure that the flow of storm water and its treatment is constant and controlled.

There are 4 Levels of treatment, these consist of:

PRIMARY TREATMENT

This is the treatment of gross pollutants and large sediment. The need for these systems seems redundant in various circumstances, but in terms of the need for their existence in treatment trains cannot go overlooked. These systems remove all forms of large debris, gross pollutants and large sediment that would otherwise cause blockages in the later stages of treatment. This level of treatment comes in the form of our Ecoprotector. It is included in almost all forms of treatment trains.

SECONDARY TREATMENT

These systems remove fine particles, sedimentation and attached particles from storm water. They are required for hydrocarbon capture and are used in these treatment train systems to lower the percentage of hydrocarbons and oils, as well as being standalone systems (specifically the Hydroprotector) for use in hydrocarbon heavy areas such as mining and refueling stations. This level of treatment comes in the form of the Stormprotector and the Hydroprotector. They also have high levels of storage and retention in their systems so can double as retention tanks as well.

TERTIARY TREATMENT

These systems are used in the final stages of treatment trains to remove fine and colloidal nutrients and heavy metals. These systems are used when requirements for water are stricter and require removal of more difficult to remove pollutants. These systems include the Enviroprotector, Maxiprotector, Xtreamprotector and the Bioprotector.

RETENTION SYSTEMS

These systems are usually placed at the end of our treatment train systems, or at any point where storage, detention or retention is required. These come in the form of our Stormbrake system, or our horizontal retention tanks coming in any size or capacity required.

TREATMENT TRAINS FOR APPLICATIONS

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MINING SYSTEMS

With the mining industry being the second largest industrial water usage sector in the world, there is a dire need to completely and successfully filter and maintain the water quality in these areas. Water management is critical in mining, and due to the high standards instructed in the Australian industry in mining, rigorous systems must be used. The treatment of water for these sites can then be used to be implemented in process such as dust suppression, cooling systems such as in boilers, reuse in non-drinking purposes, vehicle washing and wet screening. Due to these requirements of reuse of water a high filtration percentage is not required and hence several primary and secondary systems in conjunction with retention systems.

There is also a large amount of waste water produced in these systems, mainly in the form of sedimentations and hydrocarbons. In any situation where the water that is being treated is not being reused in site activities as previously stated, we recommend the use of tertiary treatment systems as an aim to reduce the heavy metal percentage upon discharge into the environment. In this case we recommend the use of the Enviroprotector system for these such situations.

Hence it is recommended that the Hydroprotector systems be used in attempts to reduce hydrocarbon percentage and remove fine sedimentations from the water systems and the use of our pumping station retention tanks to move the water throughout the site.

THIS TREATMENT TRAIN SYSTEM CAN ALSO BE APPLIED TO:

- Building sites
- Petrol stations
- High industrial areas
- High locations of hydrocarbon production

TREATMENT TRAINS FOR APPLICATIONS

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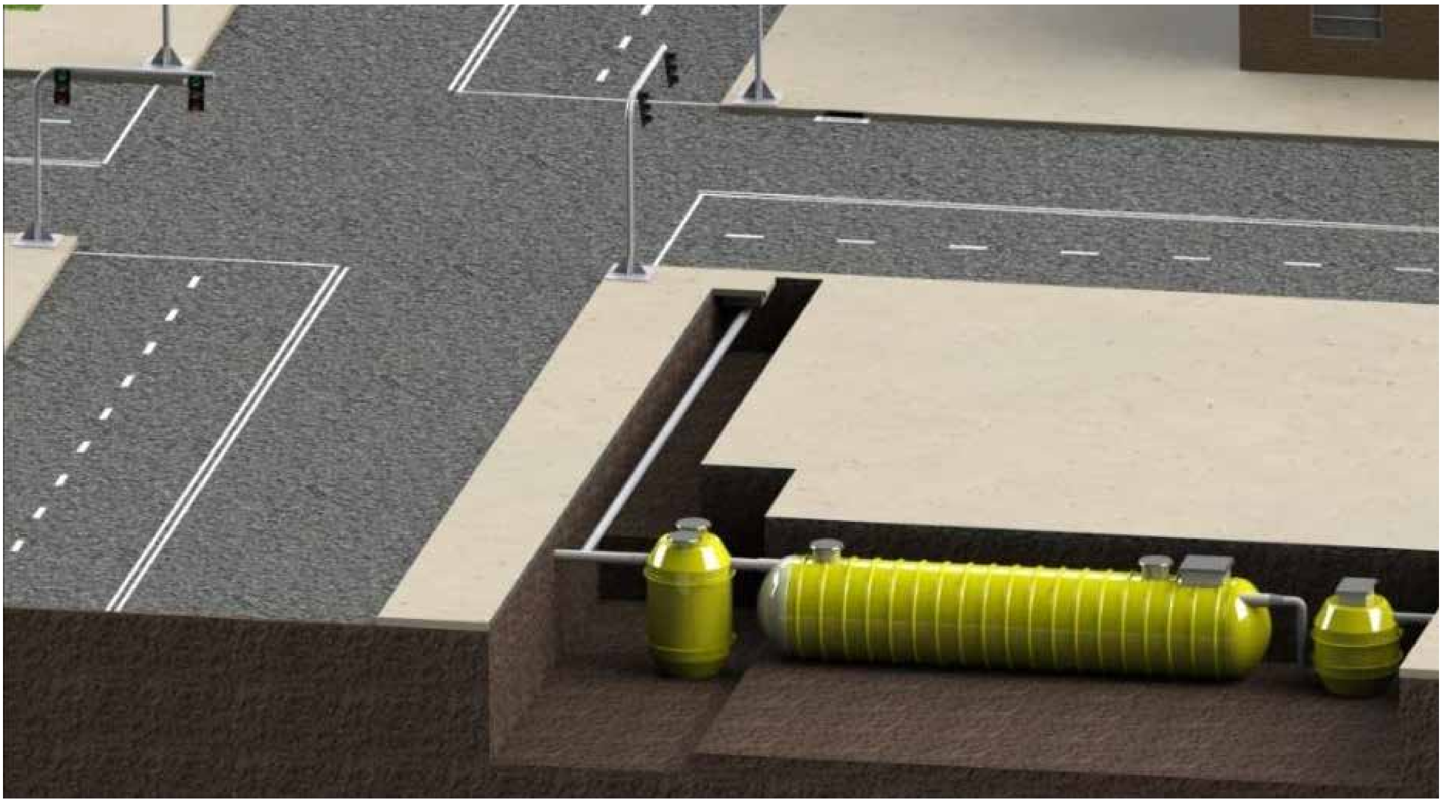

HEAVY TRAFFIC AREAS

High traffic areas have a series of pollutants that remain a big issue in treatment of these systems. High traffic areas produce contaminants such as high amounts of hydrocarbons, high levels of gross pollutants, heavy metals and fine sedimentation. Hence solutions are required to remove these pollutants are produce water for the environment with as low percentages as possible. Hence a combination of primary, secondary and tertiary, and depending on the weather conditions and flow rates of the area, retention systems.

We recommend the use of the Ecoprotector, Stormprotector and any of the Enviroprotector, Maxiprotector and the Xtreamprotector. These tertiary treatments use modern filtration media and techniques to remove high percentages of the heavy metals in these water ways. They also have the capacity to remove all colloidal particles and fine sedimentation that go through the first two stages. This combination is the most effective for high traffic areas.

THIS TREATMENT TRAIN SYSTEM CAN ALSO BE APPLIED TO:

- Tunnels
- Airports and Tarmacs
- Rooftop runoff and rainwater treatment systems
- Industrial estates
- Transport depots and loading bays
- Highways and any areas of high traffic

TREATMENT TRAINS FOR APPLICATIONS

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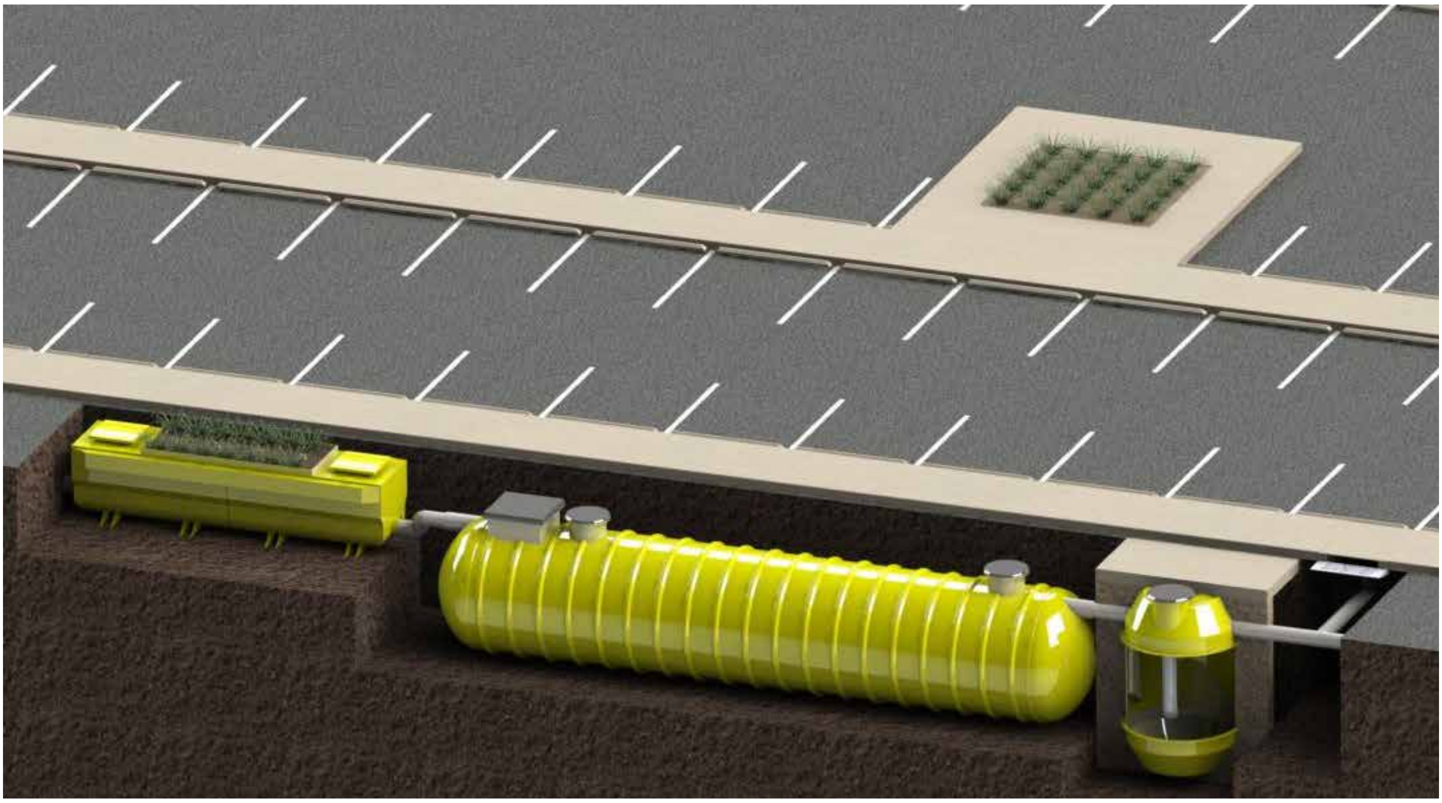

CARPARKS AND URBAN DEVELOPMENTS

Carparks and urban developments, have the tendency for high levels of oils, hydrocarbons and heavy metals produced from cars ad rooftops. These areas need to be thoroughly treated for discharge back into the environment, as usually is the requirement for water treatment in these areas. Hence the tertiary treatment systems are required for these areas, with all of the protector tertiary designed systems removing the required contaminants that are produced from these areas.

THIS TREATMENT TRAIN SYSTEM CAN ALSO BE APPLIED TO:

- Urban settings
- Shopping precincts and carparks
- Industrial areas

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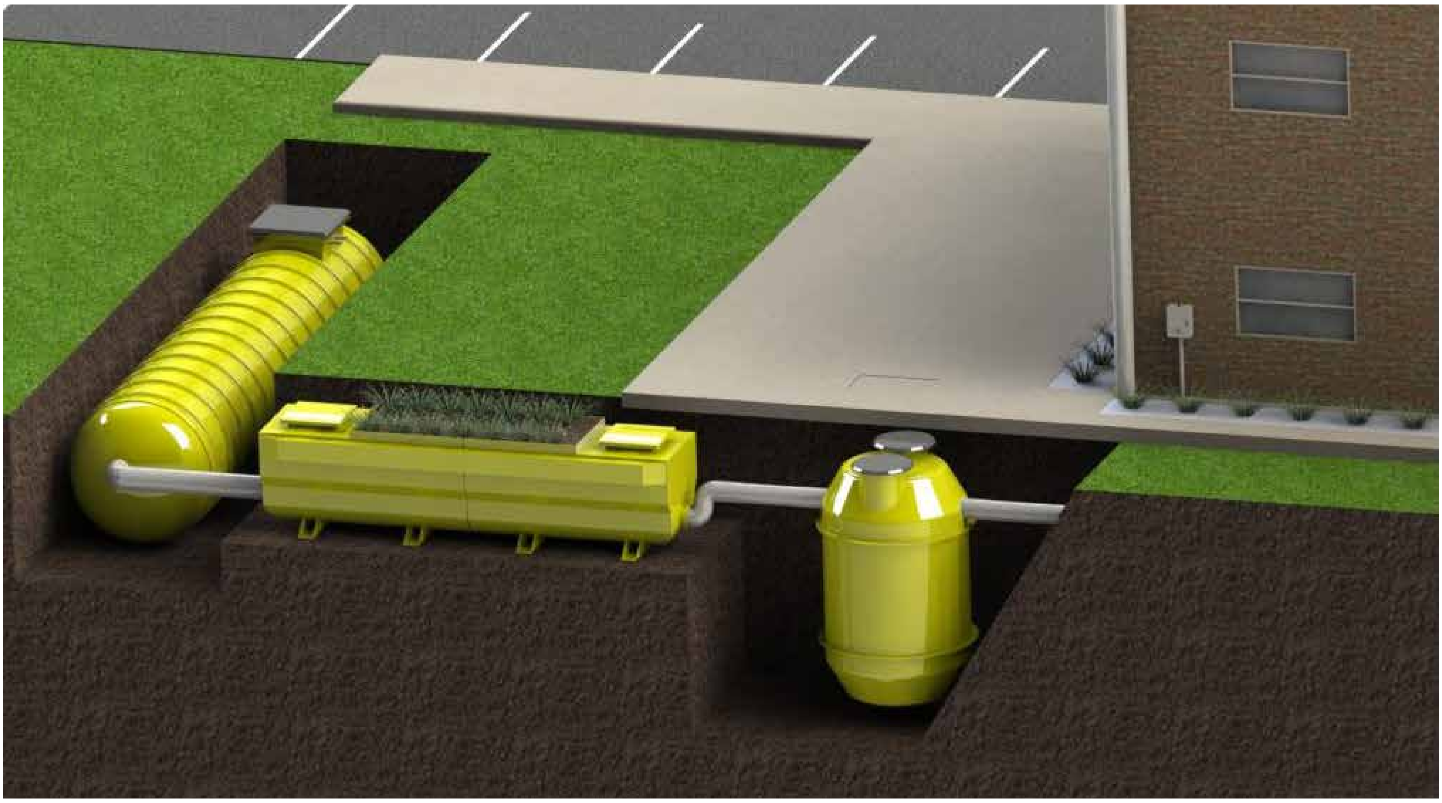

RESIDENTIAL SYSTEMS AND ESTATES

Residential systems require a fair amount of filtration, but not to the drastic level of high industrial areas, high traffic areas and fueling areas. Due to a lack of high oil percentages, it is not a requirement for the secondary filtration systems that provide the most efficient hydrocarbon removal systems to implemented, instead the use of gross pollutant traps and tertiary treatment. The Bioprotector system is recommended for these areas due to its ability to fit into urban design settings, as well as providing natural filtration processes. It is able to remove high enough levels of hydrocarbons and heavy metals as would be required, as well as removing phosphorus, nutrients and organic compounds naturally.

This system is recommended in use of anywhere where expelling directly into environmental systems is likely and required.

Due to the high distance needed to travel and head required in these sorts of environments, retention tanks with a pumping station incorporated are recommended. Retention is a common requirement for residential and municipal estates and hence the implementation of these devices is highly recommended.

THIS TREATMENT TRAIN SYSTEM CAN ALSO BE APPLIED TO:

- Residential areas
- Council recreational areas
- Beaches and parks
- Natural developments

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HIGH INDUSTRIAL AREAS

High industrial areas produce large amount of wastewater, with this wastewater containing contaminates that are difficult to treat and hence remove. This wastewater is high in heavy loading of contaminants such as heavy metals, as well as being high in salinity. Designing systems that are suitable for the treatment of heavy contaminants and high salinity is vital as this water is expelled directly into the environment or into sanitary sewer systems. Common sources of industrial wastewater include:

- Battery manufacturing
- Electric power plants
- Food industry
- Iron and steel industry
- Petroleum refinery

Removal techniques that need to be present in these types of applications include the removal of oils and grease, solids, biodegradable organics and heavy metals. The best systems for this type of filtration include a system which incorporates the Bioprotector as a biofiltration system that can also be incorporated into the surrounding water environments, as well as the need for heavy metal removal, organic removal and hydrocarbon removal. This system should also be combined with a gross pollutant trap, the Ecoprotector, and in industrial sites high in oil the system should be equipped with a Hydroprotector. With the variations in size of the Bioprotector available, we can manage any size of wastewater flow.

PARKS AND COUNCIL RECREATIONAL AREAS

Parks and recreational areas produce the least amount of tertiary contaminants and hence require the least amount of complex treatment. Oils are not a high produce of this environment, so oil removal is not of a high concern. Gross pollutants provide the highest concentration of pollutants in these areas hence an Ecoprotector is the most suitable and required system for parks and council recreational areas. These areas also may produce soils contaminated with organic materials, as well as biodegradable contaminants. Hence in systems where these contaminants may be present we recommend the combination with the Bioprotector.

PUMPING STATION

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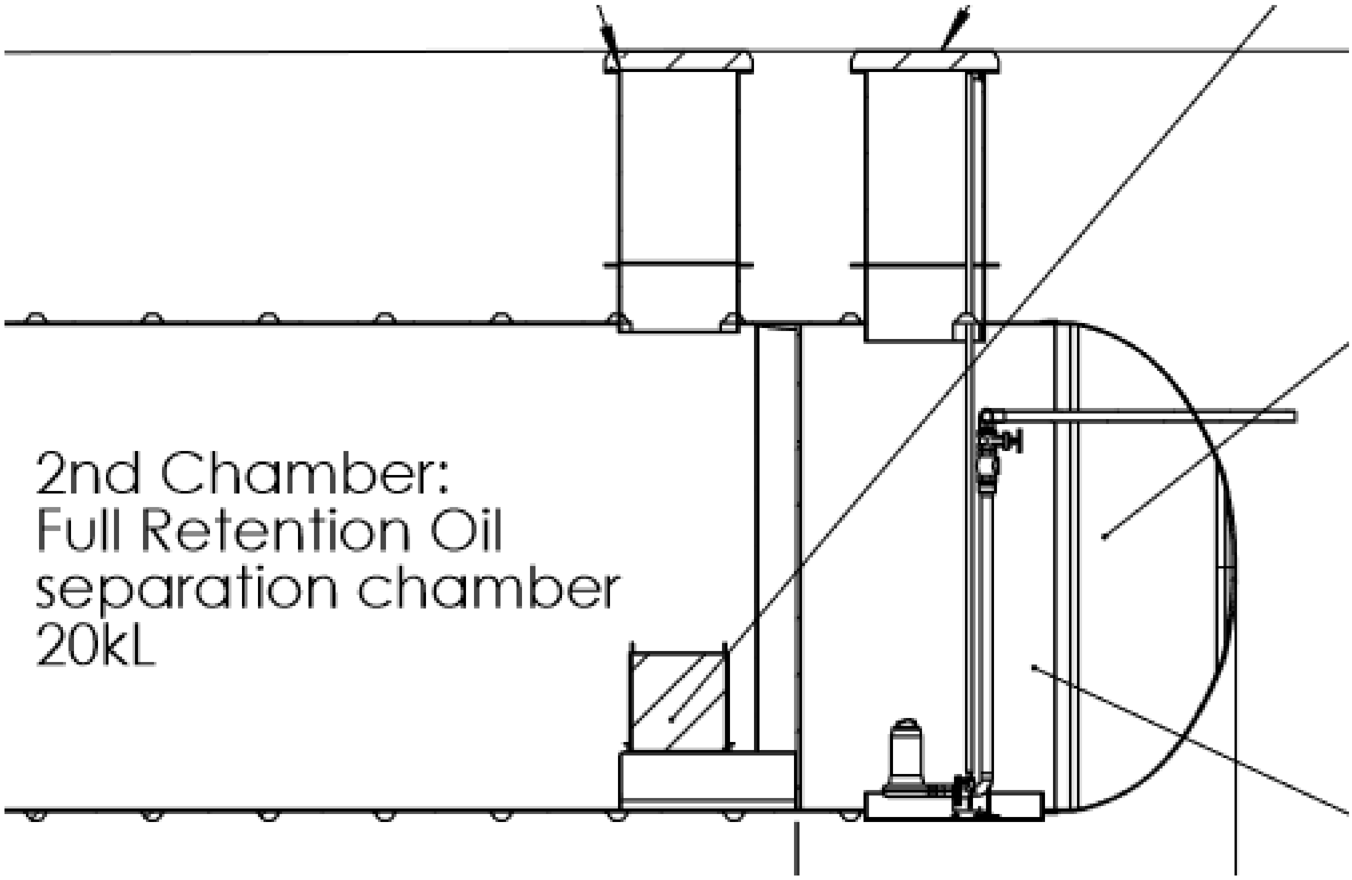
Another benefit of the hydroprotector design is the ease of addition of a pumping station. This pumping station would exist at the final chamber, and only require a small amount of capacity. The cleaned and treated water of would flow out of the coalesce filter, through the regular section into the pumping station, being separated by a baffle. This would technically be considered a fourth chamber system, and would take up minimal space. It is shown below:



This system comes in single, dual, triple or quadruple pumping system with the pumps as required. There are the options of Pipework type of varying size and material, guiderails, valve system (using gate valves, swing check, air valves etc.). We can design a pumping system to achieve the desired conditions for your site.

THE PPG3 STANDARDS

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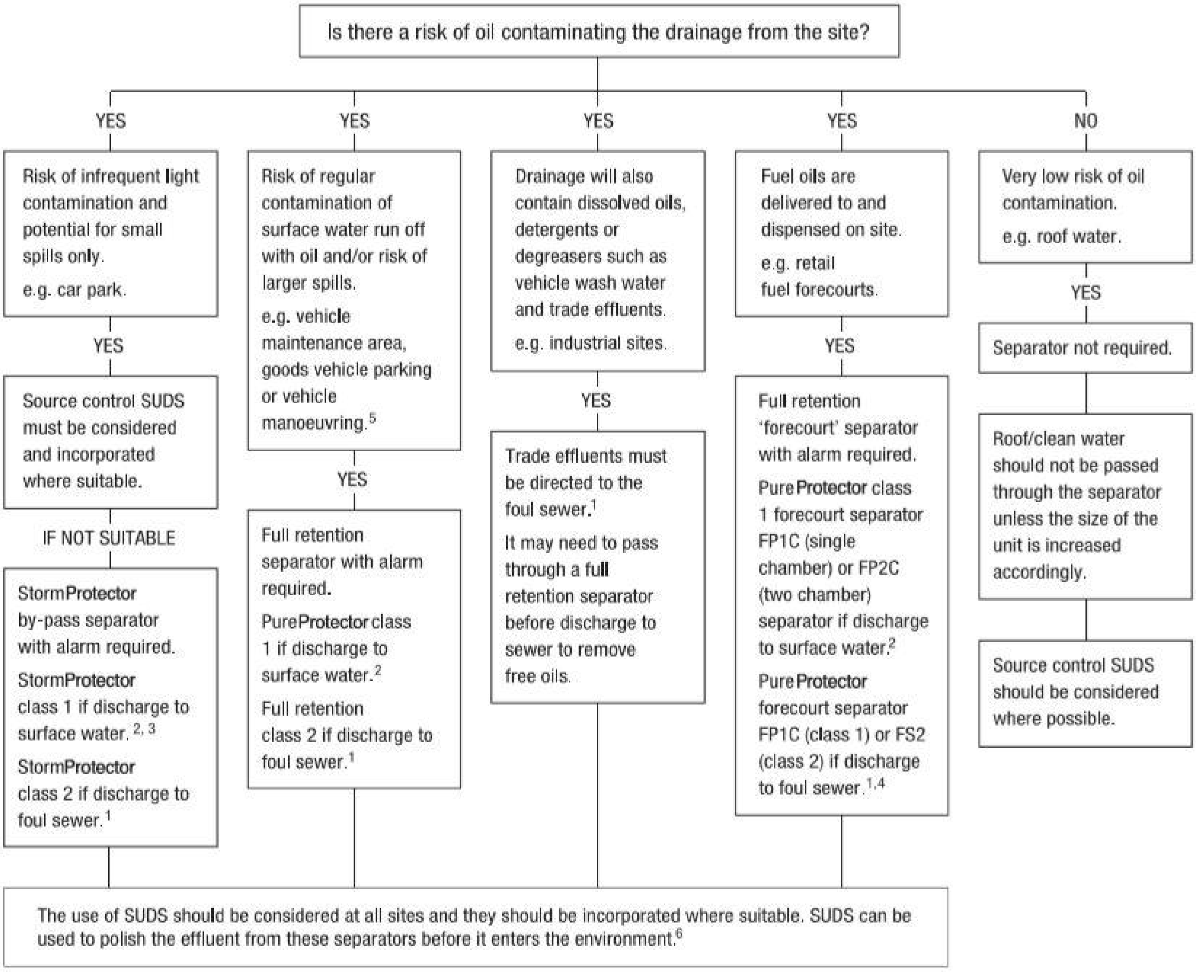

DESIGN GUIDELINES

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The first step that is necessary when selecting your Ecoprotector configuration is to calculate the treatable flow rate that is required to meet the demands of the site. There are several possible ways to determine the flow rates required for the stormwater quality targets in which you are trying to achieve. The use of MUSIC (Model for Urban Stormwater Improvement Conceptualisation is available in eWater Limited and this system is now becoming the industry standard for aiding in the design of urban treatment systems. If this system is not acceptable or available to you and your site, then there are several other ways to determine this information

The next step in determining your Ecoprotector configuration is in the use of selecting the inlet sizes, tank size and the other aspects of the Ecoprotector product from the information gathered. There are many different inlet sizes, tank sizes etc. for you to choose from to suit the demands of your site.

DESIGN METHODOLOGY

All Ecoprotectors have been individually engineered to handle the toughest environmental situations and proven in the toughest environments such as high-water tables and volcanic soils. Problems in these areas have been solved with the installation of the Ecoprotector.

TANK

The underground tank Design Methodology is based on the use of the above standards as described, where applicable:

The Packaged EcoProtectors are engineered to the following Standards:BS4994 – 1987, AS/NZS 1546.1:1998.

- **ASME RTP-1** is used to formulae the Design of the shell under external soil/groundwater loading is based on design for external collapse.
- **AS2634** – is used to formulae the design & manufacture and installation of the Penetrations to the stations
- **AS1546** is used to formulae the design load of soil/groundwater and use for the testing methods applied.
- **AS1170** is used to formulae the design loads from active loads that the stations are subject to, including the required roof slab design. This standard is also used to formulae the ballast requirements for anti-floatation.

Hydraulic and civil engineering can also be provided to your requirements.

TANK DESIGN AND MANUFACTURING STANDARDS

- **ASME RPT-1** Reinforced Thermoset Plastic Corrosion-Resistant Equipment
- **AS2634** - Chemical plant equipment made from glass-fibre reinforced plastics
- **AS1546** - Underground tank design
- **AS1170** - Loading code

CONSTRUCTION

Even though the EcoProtector is relatively light weight, pound for pound they are stronger than alternative structures. The EcoProtector has no joins leaving a smooth, clean internal surface that resists scum and sludge build up and allows no leakage to the external environment. The lightweight configuration of the EcoProtector simplifies handling and reduces costs in transport, labour and handling down time.

INSTALLATION

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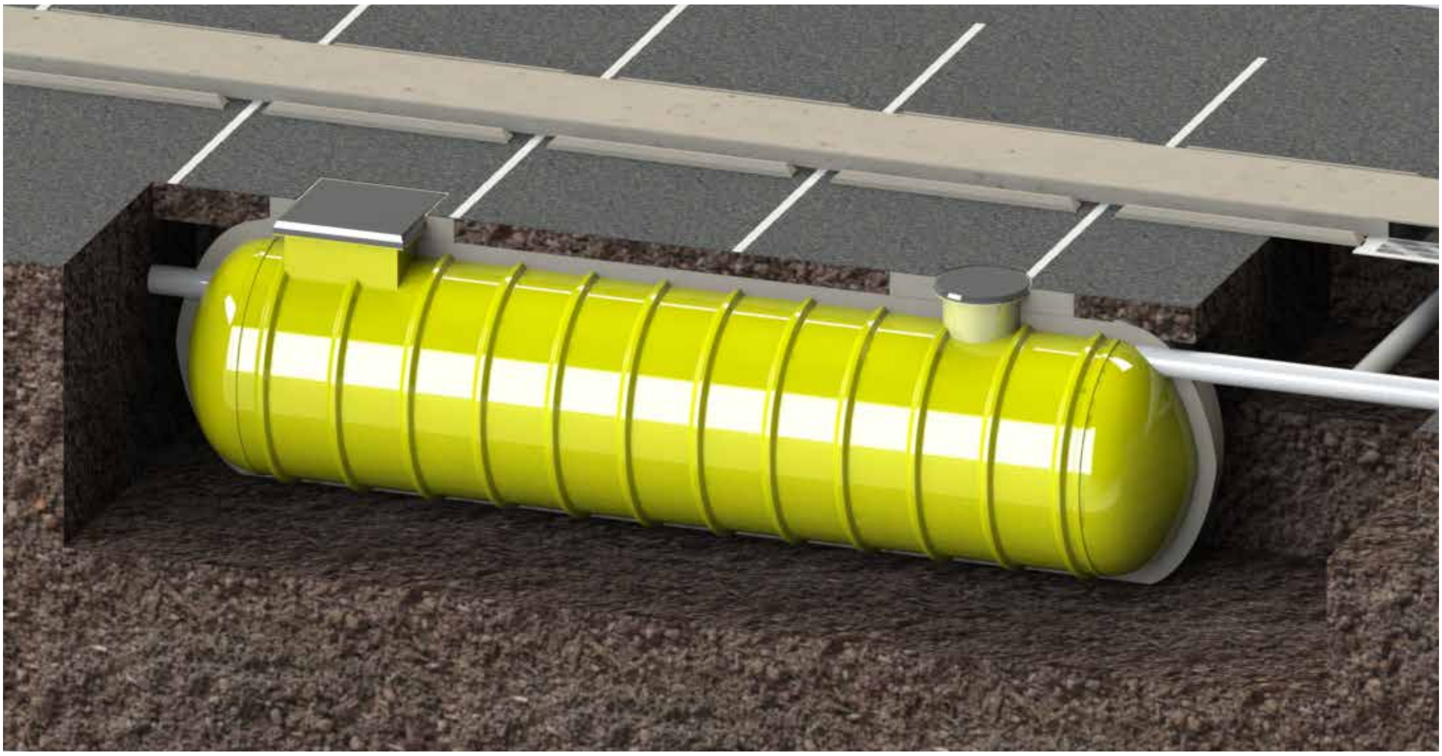

The installation of the Storm protector follows a simple process. A complete installation hand book is supplied to ensure the installation goes smoothly and to plan. The guide provides advice for lifting, OHS measures, handling techniques and other important requirements.

Installation is typically:

1. Excavate an area for positioning with suitable easy placing of the tank and filling as well as for consolidating concrete for backfilling.
2. Lifting and handling of the system must use appropriate processes. More details can be found in the Manual. All lifting apparatus (cables, straps, chains etc.) Must be provided by a contractor.
3. Installation can be conducted with or without appropriately designed feet for the product, each with their own following installation instruction details found in the Installation Manual.
4. The system can be secured in several ways including Pea gravel and concrete surrounds, stabilised sand surroundings, concrete base and concrete surround, pea gravel backfill, mechanical anchoring etc. All have been clearly outlined in the installation manual provide by Protector.
5. Allow for protection of inlets/discharge points/vents to be supervised by contractor. Connect each suitably designed fitting with the desired location for completion.

TYPICAL INSTALLATION DRAWING

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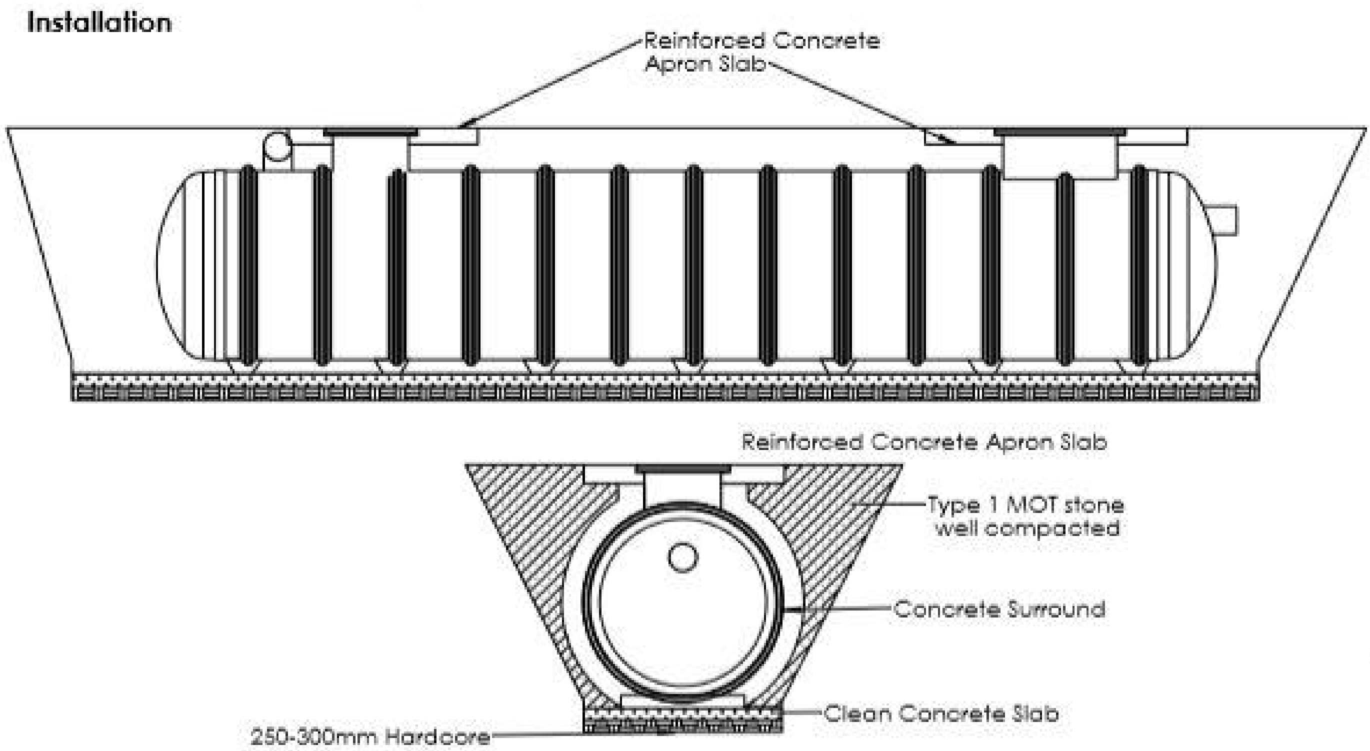

Installation procedures vary from series model, refer to each individual drawing for details on ballast sizing, or refer to the below table for further information on the installation size details. Follow all instructions carefully to ensure maximum efficiency of lifetime of the FRP Hydroprotector tank.

BALLAST INSTALLATION FOR THE HYDROPROTECTOR RANGE.

EXCAVATION DETAILS FOR CONCRETE SURROUND			**1000, 1200, 1500**	**1850, 2200**	**2500, 3000**
Maximum burial depths	Standard	Dry Excavation	4	5	5.7
	Heavy	Dry Excavation	5.6	6	7.25
		High Water Table	3	3.75	5
	Extra Heavy	Dry Excavation	6.5	7	8
	Special	Dry Excavation	7.3	8	9.2
Minimum Hardcore			200	250	300
Concrete Base Slab Thickness			150	220 - 240	240 - 300
Concrete Surround			150	220 - 250	250 - 300
Max Water Initial Fill Depths			300	400	500

MAINTENANCE

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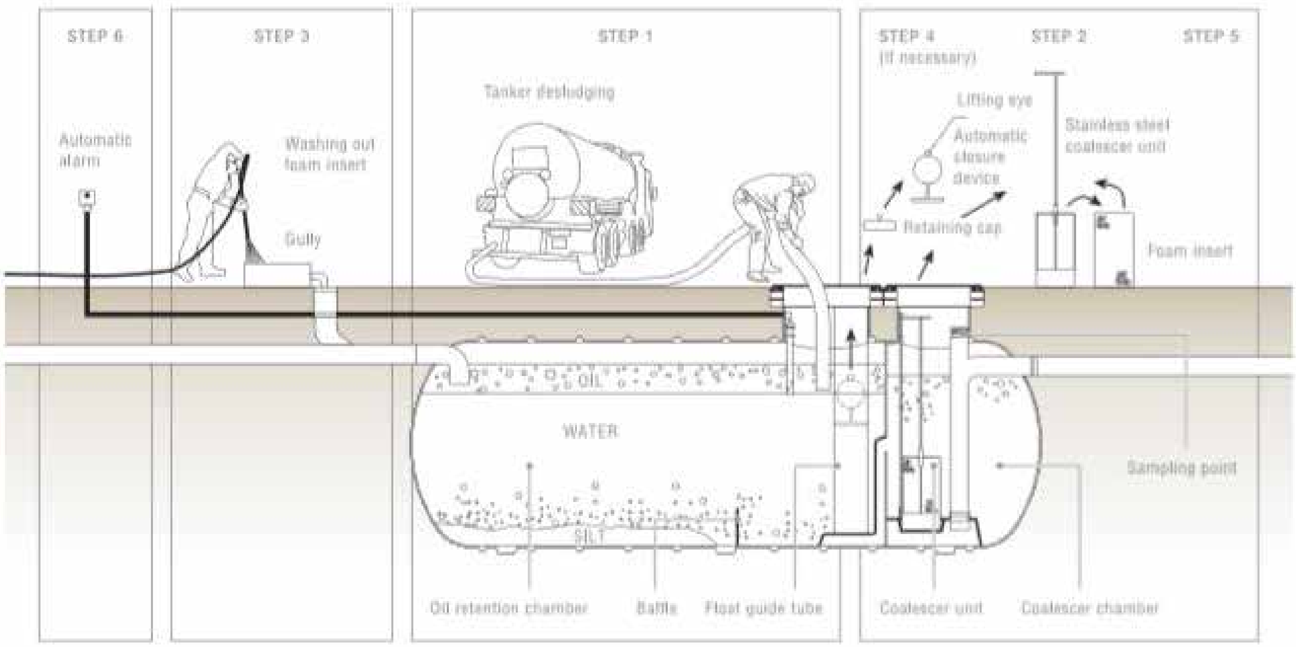
Maintenance procedure the automatic alarm/monitoring system will automatically warn you when the Hydroprotector requires emptying. Where an automatic alarm/monitoring system is not fitted, Hydroprotector should be checked at three-, six- or twelve-monthly intervals depending on site conditions, to determine 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 pre-determined design level, in accordance with BS EN 858-1,it should be emptied.

1. Sucking out oil/fuel and silt: Suck off the retained oil from both chambers of the Hydroprotector and then the silt deposited on the bottom, leaving sufficient water to ensure the ACD remains floating.
2. 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 Hydroprotector.
3. Cleaning foam insert: Remove foam insert and wash with normal water pressure ensuring the dirty water runs into the Hydroprotector.
4. Sucking out complete contents (if necessary): If the quantity of pollutants exceeds recommended levels, the complete contents of the Hydroprotector 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.
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 Hydroprotector. Re-clip the wire rope or location pin as provided with the lifting/locating/ locking system. Partially fill the Hydroprotector 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.
6. Automatic alarm/monitoring system: the 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.



MAINTENANCE

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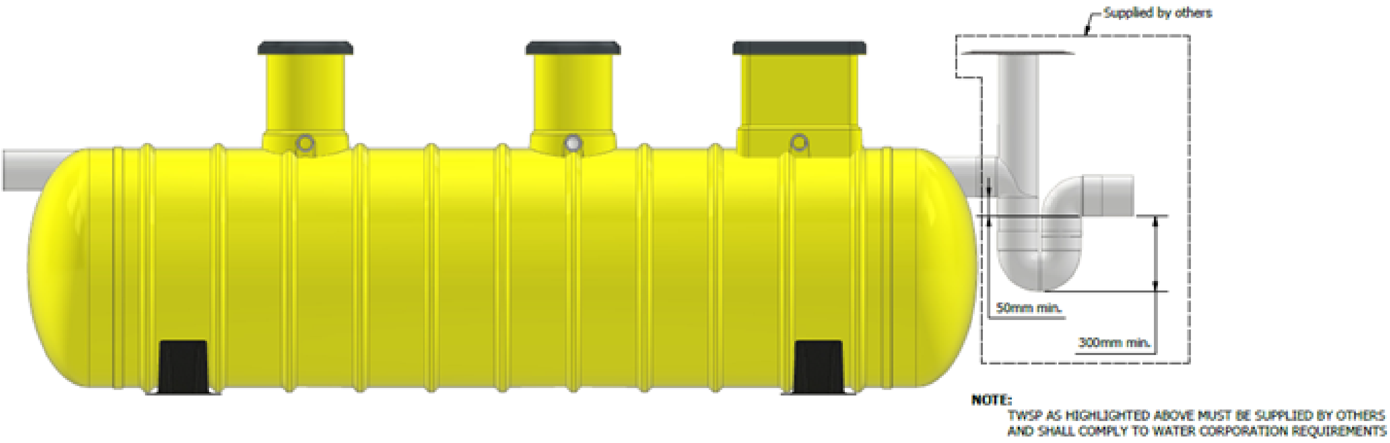
7. Some local authorities are required to install a Trade Waste Sampling Point (TWSP) at outlet, as shown below



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PROTECTOR