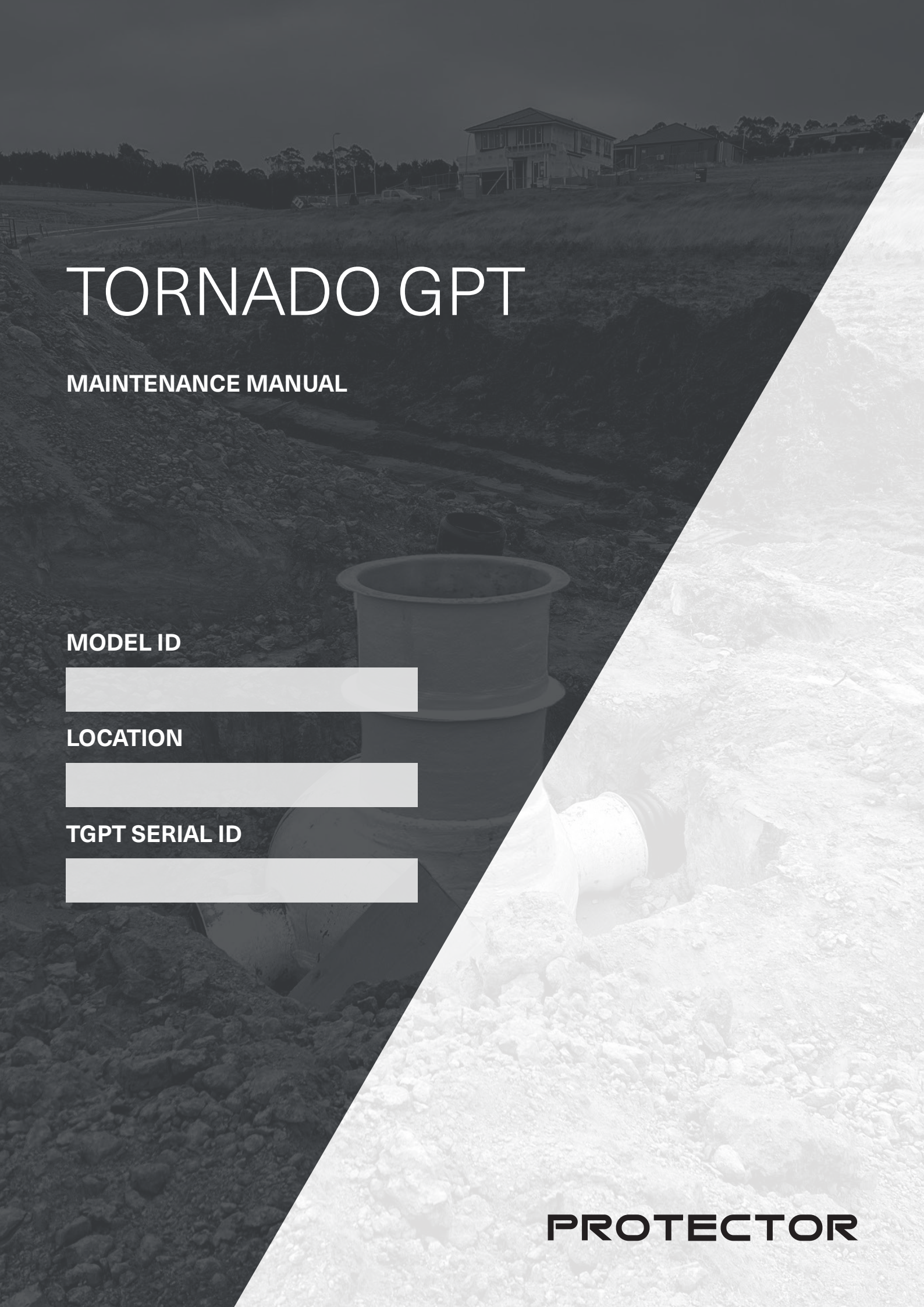

TORNADO GPT

MAINTENANCE MANUAL

MODEL ID

LOCATION

TGPT SERIAL ID

PROTECTOR

TORNADO GPT

HIGH VOLUME VORTEX GPT FILTRATION SYSTEM

SAVING NATURE.

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WARNING: this manual applies exclusively to the Tornado GPT unit specified above. Do not use this manual as a guide to operate or maintain any device that is not the specified unit.

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

PROTECTOR

SAVING NATURE.

Protector Stormwater quality Improvement Devices, manufactured by the Australian-based manufacturer, Protector Australia, provide high quality solutions for stormwater treatment and management for fast and efficient installation and maintenance, needed for today's fast track building methods. Built to the highest specifications, the Protector Stormwater quality improvement device range of products designed within FRP tanks are 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 packaged Stormwater Quality Improvement Devices provide simple solutions to some of the most complex problems in the stormwater treatment industry.

Protector Stormwater quality Improvement Devices are designed to reduce operating costs and optimise operating and installation efficiency whilst providing the highest quality stormwater pollutant removal.

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 Stormwater Quality Improvement Devices and treatment systems 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. With all FRP parts being manufactured in Australia, you can be assured of the highest quality system.

Today Protectors plant, based in the picturesque Southern Highlands, 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.

Protector Australia has designed and manufactured SQID systems utilizing FRP in order to provide a quality product that is high in strength and have a long life with high corrosion resistance. Tornado GPT systems have a better durability, and highly resistant to any impact and corrosion.

This document provides an in-depth and detailed collation of the technical information on the Protector Stormwater Quality Improvement Device range including its installation practices, suitable usage, advantages and limitations.

Information is also provided on the filtration system, its design and its maintenance.

PRODUCT OVERVIEW

SAVING NATURE.

The Tornado GPT is a compact stormwater management solution that combines a Gross Pollutant Trap (GPT) and Nutrient Filter in one unit. It is designed to remove large debris, pollutants, and excess nutrients from stormwater runoff in residential, commercial, and industrial settings. The Tornado GPT's compact size makes it easy to install in limited spaces, and its low maintenance requirements and internal bypass system reduce installation and upkeep costs. The Tornado GPT's innovative design, including its high-quality materials and internal hydrocarbon baffle, ensures it can withstand harsh environmental conditions and heavy traffic loads. The GPT and Nutrient Filter work together to provide high-performance capabilities for efficient stormwater management. Overall, the Tornado GPT offers a cost-effective and practical solution for stormwater management in any setting.

The Protector Tornado GPT is designed to combine GPT and filtration design elements to create an exceptional all-round filtration system suitable for almost any site demand. The Protector Tornado GPT is designed to capture Gross Pollutants, filter stormwater runoff and remove a large proportion of the contaminants in the process. This filtration device when implemented into treatment trains will remove fine sediments, heavy metals and phosphorus from stormwater runoff. The system consists of a Triple chamber filtration process targeting mass capture of pollutants. Filters are also easily deconstructed, and the filter media is easily cleaned and maintained.

During high flow situations such as in storm conditions with heavy rainfall, the system employs an effective bypass system. In the Full Flow event the extra water that the system cannot handle will by-pass through the indirect screen direct to the outlet. The System is designed with the By-Pass Screen at 60 degrees to flush clean in high flow conditions, preventing the block up of the Screen and to give a full aperture of the flow bypass duct, resulting in no reduction to flow. The specified removals of nutrients through filters is effective up to 24 litres Per second after which the effectiveness of the Gross Pollutant Trap continues to be effective up to 140 litres per second. After this the system is in high bypass mode. This bypass process still removes gross pollutants and heavy sediments using the bypass screen, but does not complete the removal of fine sediment, hydrocarbons and oils.

TYPICAL MODEL RANGE

SAVING NATURE.

Tornado GPT is an advanced gross pollutant trap that utilizes a combination of vortex separation and indirect screening to remove particles larger than 1mm from stormwater runoff. Its unique design enables it to handle higher flows, prevent screen blinding, and retain a wide range of pollutants, including floatables, settleable solids, and neutrally buoyant substances. Additionally, the internal hydrocarbon baffle captures free hydrocarbons and oils and prevents their release into the environment. If flows exceed the treatable rate, an internal weir diverts excess water to the outlet, while treated and bypass flows exit via the outlet pipe. With its high-performance capabilities, Tornado GPT is an efficient and effective solution for managing urban stormwater quality and reducing the impact of urban runoff on natural ecosystems.

Offline units prefix TGPT.OL.

MODEL ID	TREATMENT FLOW RATE (L/S)	MAX FLOW RATE (L/S)	UNIT INTERNAL DIA (MM)	UNIT DEPTH BELOW INLET INVERT (MM)	UNIT WEIGHT (KG)	MAX CONNECTION SIZES (MM)
TGPT.48.0606	48	360	1200	1200	177	450
TGPT.80.0608	80		1200	1700	239	450
TGPT.120.0612	120		1200	2200	283	450
TGPT.130.7510	130	660	1500	1800	417	600
TGPT.160.7512	160		1500	2400	452	600
TGPT.190.9012	190	1064	1850	2200	656	750
TGPT.230.9015	230		1850	2700	777	750
TGPT.260.1015	260	1480	2200	2700	1236	900
TGPT.310.1018	310		2200	3300	1353	900
TGPT.340.1315	340		2500	2700	1951	900
TGPT.410.1318	410		2500	3300	2092	900
TGPT.500.1618	500	1700	3000	2900	2975	1050
TGPT.620.1622	620		3000	3500	3231	1050
TGPT.720.1626	720		3000	4100	3489	1050
TGPT.820.1826	820	1940	3500	4100	5213	1200
TGPT.980.2028	980	2400	4000	4300	6929	1500

TORNADO GPT PROCESS

SAVING NATURE.

The Tornado GPT system is based on the vortex whirlpool flow process, which forms the basis of its operation. This natural separation technique is combined with Protector's unique screen design to ensure the highest efficiency is achieved.

1. **Polluted stormwater flows from capture areas such as car parks, residential areas, shopping precincts, or commercial developments into the Tornado GPT system.**

2. **The stormwater enters the Tornado GPT system, deflecting off the bypass weir and into the vortex chamber. The walls of the vortex chamber promote the rotational flow of the polluted stormwater, creating a vortex whirlpool. This whirlpool movement forces trash, debris, floatables, and sediment towards the center of the deflector screen.**

3. **The deflector screen has its ingress at an angle of 120 degrees from the direction of flow, making it difficult for any debris, trash, or non-dissolved particles to pass through the screen during flow, while still allowing water to flow freely. The screen is designed to prevent any particle larger than 4mm from passing through, ensuring that the Tornado GPT system efficiently captures gross pollutants and removes them from the stormwater flow.**

4. **The motion of the water in the Tornado GPT system forces trash and debris down to the bottom of the chamber, where sediments settle. Once the water flow and whirlpool in the Tornado GPT system subside, sediments settle while floatables are able to rise back to the water level of the tank, as defined by the invert level of the inlet and outlet. At this point, all sediment and smaller, heavier particles will have settled to the bottom, allowing only large floatables to rise. Due to the small 4mm gaps in the screen, no particles will float through. Regular maintenance of the Tornado GPT ensures a long and efficient life.**

5. **The outlet section of the Tornado GPT system is designed to be simple and efficient. After passing through the deflector screen chamber, the water is separated from the floatables and flows out through the outlet. The water then gradually fills the outlet chamber before flowing out of the system.**

6. **During periods of high flow, the bypass system in the Tornado GPT operates through a simple weir design. The height of the weir is set according to the inlet size, and as the water level rises above it during high flow, the water flows directly over the weir and towards the outlet. This straightforward design ensures effective flow management during periods of heavy rainfall.**

CAUTIONS AND SAFETY INFORMATION

SAVING NATURE.

Access and maintenance of Tornado GPT will involve several processes that will require careful attention to OH&S practices to ensure the safety of all personnel involved in the processes. Such processes include Removal of heavy access covers and grates, confined space entries, traffic management and handling of debris that can range from sticks and plastics to glass and sharp waste. Due to this it is vital that all personnel adhere to Occupational Health and Safety (OH&S). Doing so will ensure all working personnel and non-working personnel of the public are always able to remain safe.

The materials collected in the maintenance of the Tornado GPT vary in the composition and may include harmful materials and debris. Due to this, all waste must be handled correctly. Examples of this may include; gross pollutant debris such as broken glass, syringes and other sharp objects which may cause physical harm to workers. Some systems may also contain heavy metals harmful poisonous substances if consumed. It is Vital that OH&S guidelines are followed carefully. Practices for working with heavy systems such as covers, as well as working outdoors also means that precautions are needed to be taken for a wide range of issues.

PROTECTIVE AND SAFETY EQUIPMENT

All personnel working with these systems in maintenance must ensure that all current workplace safety legislation adhered to. Whilst cleaning and maintaining these systems certain equipment a protective clothing must be used. These include:

- Puncture resistant gloves
- Steel cap boots
- Fluorescent vests
- Clothing covering all skin for protection
- Eye protection if necessary
- All first aid equipment
- Debris containment system for all waste and pollutants
- Lifting equipment if required such as tripods and hoists

TRAFFIC CONTROL

As Tornado GPT is often located in trafficable areas, foot traffic or vehicle traffic often must be dealt with to ensure safety is always maintained. These practices often differ from state to council, conversations with local authorities is recommended to ensure that the actions the maintenance team is to take are to the requirements of the local government.

CONFINED SPACES

Confined spaces are something that must be considered before enacting the maintenance on the Tornado GPT. Whilst there is no necessity to enter confined spaces during the maintenance of the Envirofilter system, it is advised that all personnel are trained in the confined space entry protocols.

MAINTENANCE SUMMARY

SAVING NATURE.

All parts of the Tornado GPT, any part of any treatment train, needs to be strictly maintained and regularly evaluated for product efficiency to ensure that these systems maintain their best performance. With the need for stormwater quality improvement devices and our need to ensure pollutants and harmful substances can't harm our fragile water environment, maintenance is as important as ever. These captured pollutants must be removed periodically to ensure that the systems are running at the highest possible efficiency. The regularity of maintenance is defined by the catchment area that it is in and the features and properties of the surroundings. Regardless of the catchment area features, it is recommended by Protector that there is a mandatory inspection after 1 month of use after installation to determine the amount of capture of gross pollutants and sediments and determination of regularity of maintenance can be taken from this.

This Manual consists of the vital processes of maintaining and ensuring the efficient process of stormwater treatment and management. Specifically, this document outline she required Health and safety, confined space requirements, traffic management, SQID access, maintenance and replacement (if required) of Protectors stormwater quality improvement devices.

WHY IS MAINTAINING YOUR TORNADO GPT SO IMPORTANT?

Continuous and frequent maintenance of any Tornado GPT system is vital for the ongoing capture and removal of gross pollutants, sediment, oils and hydrocarbons and any dissolved and attached pollutants. It prevents any blockages in a treatment train ensuring that the entire system is flowing continuously and there is no build up or stoppages in water flow. It also allows for the prevention of debris build up, an eye sore on any area. Maintenance also prevents the failures of stormwater systems and will most importantly allow the continual removal of harmful pollutants and protect the environment to create a sustainable future.

Regular maintenance is also vital as, during the process of removing and cleaning the pollutants from a system, data can be collected and collated to determine the current effectiveness of the maintenance frequency schedule in place. This can allow for the review of future maintenance processes to ensure that the system is maintained at the best possible quality.

EMERGENCY MAINTENANCE

SAVING NATURE.

System failures and overflowing of the Tornado GPT can have an immediate effect on the efficiencies of treatment trains and a detrimental effect on the environment. If there is any form of emergency in the use of these Tornado GPT, immediate action must be taken to ensure no damage to infrastructure and the environment. These usually occur after three scenarios:

1. An extremely high rainfall event which will cause large amounts of debris and pollutants to flow into the water management systems
2. After a period of little to no rainfall, and a moderate to high rainfall event occurs where a large build-up of surface pollutants, not washed away for a large period are thrown into a stormwater treatment system
3. Lack of maintenance and missing scheduled maintenance

If any of these occur, immediate action must be taken. In the event of a spill or overflow of a pit in which a Protector Envirofilter is installed, careful maintenance of the entire system must be taken to ensure no damages to structure. The bypass systems must be carefully inspected, check of outlet pipework below the filter system and attempt to dislodge all trapped debris and trash. If the outlet is blocked, a vacuum truck will likely be required for maintenance.

MAINTENANCE PROCEDURE

SAVING NATURE.

COVER REMOVAL

Cover removal is usually the first step in maintaining a Envirofilter and always involve the use of a solid top cover. The first step that should be taken is to ensure that the solid top cover is still working and not damaged in a crucial way.

It is worth noting that all solid top lids have a significant weight (40-80kg), and care must be taken in their removal to ensure no injuries to personnel occur. The removed lid must also be moved away from maintenance area to ensure there is no interference with workers.

CLEANING METHODS

The recommended processes for maintenance of the Envirofilter system is as follows:

Before beginning the Protector maintenance procedure on the Envirofilter systems, ensure that all parts required for the maintenance and replacement of filters are provided. This includes:

- Replacement filter cartridges with filter media inside, already secured closed. Ensure that there are an equal number provided as are within the chamber.
- Vacuum truck is at maintenance site ready for use
- Tripod Hoist system and securing mechanism
- Protectors maintenance checklist

MAINTENANCE PROCEDURE

SAVING NATURE.

MAINTENANCE STEPS

1. Remove the cover
2. Before entering the system make sure the air is safe per OSHA standards or use a breathing apparatus. Use low O2, high CO, or other applicable warning devices per regulatory requirements
3. Using a vacuum truck remove any liquid and sediments that can be removed prior to entry
4. Once the Tornado GPT is clean of all sediment and water, enter the vault ensure that all OH&S regulations are followed
5. Unscrew the bypass pipework top section so that the filter can be removed without damaging the bypass pipework
6. Attach a hoist system to the eye bolt on the top of the filter
7. As each filter is not secured in place by any bolts or permanent methods, using a hoist tripod mechanism remove each filter through the manhole into the filter chamber
8. As the filter media itself comes as a single assembled piece, this installation process involves a simple empty and replacement process
9. Remove the top cover of the Envirofilter, and put to one side out of the way
10. Once the top of the filter media cover has been removed, using the vacuum truck suck out all the filter media to be disposed of
11. Insert the vacuum hose into the now open holes in the engineered filter floor where the filters used to sit and suck out all sediment, water and gross pollutants that remain until clean. Wash down with water to ensure no sediment remains on the walls of the Tornado GPT
12. Once the Tornado GPT has been cleaned, new, fresh filters can be placed back into the system
13. Close the cover and secure shut before operation can begin again
14. Pack the previous parts of the filter onto the truck and secure to be returned to Protector
15. All media and waste must be disposed of according to local government regulations

SYSTEM INSPECTION

System inspection is required at each maintenance action to ensure no permanent damage occurs to the Envirofilter. If upon inspection (taken place after emptying of debris, trash and sediment) a fault or damage is detected, replacement may be required. Inspection of each system is vital to ensure continual successful operation of each Tornado GPT. Inspection of the bypass along with the pit the system is installed with should also be taken to ensure continual successful operation.

REPLACEMENT, REPAIR AND WASTE DISPOSAL

SAVING NATURE.

REPLACEMENT AND REPAIR (IF REQUIRED)

If during inspection if there is a structure issue with the system, i.e there has been damage to the filter body or any of the securing apparatus (i.e. the screw system or the cover system) – these must be replaced as soon as possible. Contact Protector as soon as possible and a replacement system can be dispatched as soon as possible as a cost. If damage to any of the interior of the Tornado GPT, such as the filter floor or bypass, or any sign of leaking of water into the upper chamber through the filter floor and not through the filters themselves, please contact Protector immediately.

WASTE DISPOSAL

All waste removed from the Envirofilter systems are to be taken to an appropriate disposal location such as a transfer station. The waste material must be analysed and determined if the systems are able to be recycled or need to be disposed of under state guidelines.

DESIGNED MAINTENANCE SCHEDULE

SAVING NATURE.

Keep an accurate record of your Envirosave's service history.

DATE OF INSTALLATION:

MAINTENANCE SCHEDULE:

DATE OF SERVICE	PERSON (S) RESPONSIBLE	CHAMBER 1	CHAMBER 2	NOTES

If your Tornado GPT unit is frequently backflowing before scheduled maintenance dates, increase frequency of maintenance accordingly.

If complications persist, please contact technician@protector.com.au or call 1300 585 787.

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