

Appendix D. Water Quality Devices – Product Specifications



Stormwater360

OPERATION AND MAINTENANCE GUIDELINES

Enviropod

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1 INTRODUCTION

The following report details the recommended methods for cleaning and maintaining the Enviropod Stormwater Gully Pit Insert. The aspects associated with cleaning included in this manual are methods for grate removal, filter bag cleaning, unit inspection, filter bag rejuvenation and the re-installation of the filter bags. This plan should be used in conjunction with the appropriate traffic management plans and site safety plans produced for each project. Other Stormwater360 (IES) documents which IES staff should use in conjunction with this report include the IES Employee Health and Safety Manual. It is recommended that contractors develop their own health and safety plans for activities to ensure that the workers are placed in a safe work environment.



Enviropod filter in service.

Each stormwater treatment device must be inspected and maintained regularly to ensure it is working properly throughout the estimated design life. The Enviropod filters require servicing every 1 - 6 months depending on site characteristics, however the maintenance requirements are less labour intensive than alternate traditional treatments. During each inspection and clean, details of the mass, volume and type of material observed should be recorded to provide ongoing data for future management plan revisions and the optimisation of the maintenance frequency. It is essential that maintenance (including inspections, recording and reporting) be carried out in a systematic manner and is carried out by qualified and experienced personnel. It is also advisable that the treatment device owner has a nominated person responsible for overseeing the management process.

Maintenance is an essential component of stormwater management enabling ongoing at source control of stormwater pollution. Maintenance will also prevent failures such as structural failure (e.g. prevents blocked outlets) or aesthetic failure (e.g. debris accumulation). All stormwater treatment devices require maintenance to ensure the ongoing performance of the system.

Stormwater360 (IES) is a specialised stormwater consultancy with trained and experienced staff. The company has a comprehensive database with detailed information on every Enviropod filter sold and serviced by IES (formerly Enviropod), collecting site-specific data that can be easily accessed and analysed as required.

This document consists primarily of the processes and tasks associated with the hand maintenance and inductor maintenance procedures. It does not include detail of the traffic management requirements or occupational health and safety requirements. Contractors or IES staff should utilise their own Employee Health and Safety Manual, which details the policies and procedures for safe work.

2 Enviropod Health and Safety

The following section details some of the considerations which may be required for a contractor to comply with relevant health and safety regulations regarding the manual handling activities, hazards associated with the waste material and issues associated with working on roads.

Cleaning of Enviropod filters is a specialist activity. Material collected can be harmful if not handled correctly. Sediments may contain heavy metals and carcinogenic substances as well as harmful objects such as broken glass and syringes. As all of the Enviropod units are located on roads particular care must be taken due to the potential build up of hydrocarbon based products and other vehicle based contaminants which may be carcinogenic or toxic. It is essential that Occupational Safety and Health guidelines are followed at all times, and that the following steps are carried out to ensure safe and successful maintenance operations.

In addition to the hazards associated with the cleaning handling of material in the filter bags, there are also hazards associated with traffic at the work site, the removal of the grate, pedestrians and other non-worker personnel, and general work place hazards associated with working outdoors.

This section is not intended to address all the safety issues associated with Enviropod maintenance, providing only information and suggestions on safety aspects associated with the maintenance procedures. A separate safety plan should be prepared for each project address the specific requirements of the project.

The procedures indicated in the Operations section of this manual are recommended as the safest and most efficient manner in conducting the maintenance of Enviropod Units (Section 3), however contractors and cleaning staff may vary the procedure in response to the site conditions, varying work practices or general preferences in the cleaning techniques. Please note that procedures outlined in this manual are not exhaustive, and that any changes should still comply with general safe work practices.

2.1 Personnel Health and Safety

All contractors and staff shall comply with all current Health and Safety Legislation and take all practicable steps to:

- Comply with all applicable laws, regulations and standards.
- Ensure that all employees, contractors and visitors are informed of and understand their obligations in respect of current Health and Safety Legislation.
- Ensure that employees understand and accept their responsibility to practice and promote a safe and healthy work environment.

All relevant precautions must be taken to prevent contact with sediment and litter when maintaining filters. The following personal protective equipment (PPE) safety equipment should be worn:

- Puncture resistant gloves.
- Steel capped safety boots.
- Fluorescent safety vest.
- Overalls or similar skin protection.
- Safety apron. (if necessary)*
- Eye protection. (if necessary)*

*Higher personal safety conditions may be required when maintaining units that may contain more hazardous material, for example pits where syringes have been observed or pits located in areas associated with such activities.

2.2 Traffic Control

All stormwater collection pits are typically situated either in/on roads and car parks or adjacent to roads in the footpath or swales. Traffic control requirements at each of these locations is typically the same, with most of the state and local road authorities requiring the same controls implemented whether the work is to be conducted on the road or on the road reserve.

As traffic requirements vary based on the road usage and the specific road configuration, traffic control plans should be prepared for each site. Given that maintenance is typically a quick process, the contractor should liaise with the relevant road authority to determine the specific road safety requirements for each location to ensure that on site workers can conduct the cleaning operations safely and efficiently, while complying with all laws and regulations.

NSW RTA working on roads safety manual indicates the signage requirements, placement of barricades or witches hats and the positioning of traffic control personnel. In addition to standard safety requirements IES recommends that the maintenance vehicle be used to increase safety, through shielding the work area from on coming traffic.

Plate 1 indicates the vehicle placed to shield the work area with cones placed around the vehicle. Plate 2 indicates at head on view, note the vehicle is positioned to allow access to the drive, whilst still blocking the pit from on-coming traffic. The vehicle has a flashing light on the roof and the hazard lights switched on.



Plate 1 Vehicle positioned near pit, preventing traffic from passing close to the pit.



Plate 1 Head-on view, indicating the placement of the vehicle near the pit.

2.3 Confined Spaces

Confined spaces poses a serious safety hazard for all personal, however during the normal maintenance procedures there should be no reason to enter a confined space. All maintenance procedures are able to be conducted from the surface. Confined space entry procedures are not included as part of this manual, for IES employees confined space entry procedures are included as part of the IES Safety Manual. It is recommend that all contractors evaluate there own needs for confined space entry and compliance with Occupation Health and Safety regulations.

When repairs or maintenance activities cannot be conducted from the surface, the contractor/cleaner should evaluate the need to enter the confined space, considering all alternative options. Where there is a need to proceed in a confined space, only staff with current confined space training shall operate in a confined space. Appropriate measures and controls shall be put in place to meet confined space entry requirements. Safety equipment must be worn where deemed necessary and where gas or oxygen hazard occurs, staff trained in its use will only use BA gear. **Non-trained staff must not go into confined spaces.**

3 Operations

This section details the specific activities required to clean the Enviropod units. Please note it has been written for use by someone who has never encountered a stormwater pit or an Enviropod unit, providing a step by step process for each of the cleaning stages.

3.1 Maintenance & Monitoring of Enviropod filters

The maintenance frequency is dependant on several variables, such as catchment area, surrounding land use, vegetation type, traffic loading and rainfall patterns. IES recommends that during the first year of operation the units should be monitored monthly, with maintenance as required.

To ensure that the unit performs optimally, the material collected by the filter bag should be emptied when the level of material is approximately **half to two thirds** of the total bag depth or when there is evidence of material overflow. Although the bag has greater storage area, it is recommended that it is not left to fill completely prior to emptying, for the following reasons; the bags are capable of retaining a heavy mass of material (in excess of 50kg); material near the top of the bag can be resuspended during high to extreme rainfall events; and blockage of the overflow sections can occur, when material is allowed to build up above the filter bag.

Maintenance frequency should be adjusted to accommodate variable rainfall patterns. Regions east of the Great Dividing Range typically are dominated by greater rainfall during summer and Autumn Months, as such more maintenance is typically required during these periods. It is recommended that biannual inspections be carried out in November and April, while quarterly inspections should be conducted in February, April, July and November.

It is also recommended that additional monitoring should be conducted following moderate to extreme rainfall events, in particular, when preceding months have had little to no rainfall. This monitoring is considered necessary to accommodate for higher volumes of runoff generated during major rainfall events, an anticipated greater accumulation of surface contamination during low rainfall periods and to ensure that the units have not been damaged due to high pipe velocities.

Attached in Appendix A & B is an example of an Enviropod Service Receipt and Generic Monitoring Form which is to be completed by the Cleaning Contractor when servicing any Filters. Relevant information is recorded and forwarded to the client following each maintenance clean.

Table 1: FREQUENCY OF MAINTENANCE ACTIVITY

	INSPECTION/MINOR MAINTENANCE (TIMES/YEAR)	MAJOR MAINTENANCE (TIMES/YEAR)
Enviropod	12 (and after major storms)	2-6 (except in case of a spill)

3.2 Stormwater Pit Cover Removal

There are several different types of stormwater pit covers used throughout Australia. These grates/lids are constructed of three main materials, cast iron, galvanised steel and concrete. Stormwater pits covers will either be hinged (lockable) or simply placed on a recessed frame, with cover which are not hinged are typically heavy, to prevent the grate being easily knocked open by passing traffic. Each different pit cover requires different techniques to safely remove the cover to gain access to the Enviropod Unit.



Plate 2 Hinged galvanised steel pit grate



Plate 3 Heavy duty hinged galvanised steel pit grate



Plate 4 Hinged cast iron grate



Plate 5 Non-hinged heavy duty galvanised steel pit grate



Plate 6 Non-hinged cast iron grate

3.2.1 Hinged Pit Grates

Hinged pit grates are typically either light duty galvanised steel, heavy duty galvanised steel or two-piece cast iron. Generally hinged pit grates can be opened by one person, however heavy duty galvanised lids and cast iron lids may require two people. If you are unclear about the type of grate, always use two people.

To open a hinged pit grate follow the following steps:

1. Insert the lifting hooks beneath the grate. (Position indicated in Plate 7)
2. Check hinge point is not damaged and debris is not caught in the hinge area.
3. Note many cast iron hinges are not hinged securely (to enable the removal of the grate). This may result in the pit grate not being able to sit in an open position. Additionally the hinge pins may also be damaged or corroded, which may allow for the pit grate to fall into pit. Such pit grates can be removed using the method indicated below for non-hinged grates.
4. Fully open pit grate, ensuring that the grate will stay in the open position without any external forces applied. Grates which do not remain open without being held should be removed or secured during cleaning or maintenance activities. Plate 8 and Plate 9 indicate the grate being opened and grate resting freely in the open position, respectively.



Plate 7 Lifting the grate



Plate 8 Opening Grate



Plate 9 Fully open grate



Plate 10 Lowering grate

To close a open hinged grate

1. Place lifting hooks through grate. (same position to remove grate)
2. Gently lower grate into position. (Plate 10)
3. Note some grates have offset hinges points that prevent the grate from falling over, such pits require the hinged side of the grate to be lifted while the grate is lowered into position. (insert picture)

3.2.2 *Non-Hinged Pit Grates*

Non hinged pits are typically constructed of cast iron, concrete or heavy duty galvanised steel. As such the pit grates are generally heavy and difficult to remove, generally requiring two people to safely remove the lids.

To remove a non-hinged pit grate:

1. Place lifting hooks beneath grate, where possible in the four corners of the grate (Plate 11). Concrete lids may have Gatic lifting points, a key arrangement or holes in the lid, as such special equipment, such as Gatic lifters may be required.
2. Position each person either side of the grate. (Plate 12)
3. Lift the grate, ensuring that good heavy lifting posture is used at all times.
4. Place the grate on an angle on the gutter, to allow for the lifting hooks to be removed. (Plate 13)
5. For extremely heavy one piece grates and concrete Gatic covers, insert the lifters in place and slide the lids back. Note some lids may still require two people. (Picture required)



Plate 11 Insert hook near edge of grate



Plate 12 Position each lifter either side of the grate



Plate 13 Lift grate and move grate to one side



Plate 14 Lift grate above the support frame



Plate 15 Reinstated non hinged grate

To reinstate a non-hinged pit grate

1. Place lifting hooks through the grate. Note do not place hooks at the very edge of the grate, as this will make it difficult to place grate on the support.
2. Lift the grate into position and lower onto the supporting frame (Plate 14), ensuring that the grate sits level with the finished surface. If the grate does not sit securely remove the pit cover and check for debris in the pit cover frame, then try to lower grate again.
3. Check final position of the cover, ensuring that the cover sits flush with the surface and does not create a trip or traffic hazard. (Plate 15)

Note all grates should be reinstated to the original condition.

Care should be taken with old or damaged pit covers and grates. Grates or covers observed to be in poor condition should be first inspected to determine whether further damage will occur if an attempt to remove the grate is made. Pits grates which appear to be severely damaged or appear as though they would break while being removed should not be removed. Contact the client (and pit owner if not the client) and IES (IES Sydney office number is 02 9907 1401) to discuss an appropriate action. Pit grates and covers damaged by the contractor will be repaired at the cost of the contractor, or as part of an arrangement with the pit owner.

3.2.3 Pits unable to be opened

Pits may be unable to be opened for several reasons, including through corrosion, new road surfaces covering the pit lid, and foreign material jammed in the lid. The following steps may assist in opening the pits:

- Chip away new road coverings or concrete/bitumen spills using a pinch bar or similar device. **Care must be taken not to damage road surfaces.**
- Corroded or jammed pits may be loosened from the grate frame by using a lubricant such as RP7 and tapping the grate frame and grate. **Note if the grate or grate frame appears severely corroded, the grate should not be opened and IES and the client should be contacted to discuss options.**
- Pits which cannot be opened may require a hydraulic lifting arm to fully remove the lid.

3.3 Cleaning Methods

One of the following methods of maintenance should be used for the servicing of these Enviropod Filters:

- Cleaning using Inductor Truck.
- Hand Maintenance.

One of the advantages of the Enviropod units is that it doesn't require specialised equipment for maintenance. In certain situations it may be more feasible to maintain the units using the inductor truck method, while for other projects hand maintenance may be the preferred option. The cleaning method for the Enviropod units should be evaluated specifically for each project.

3.3.1 Cleaning using Inductor Truck

The following steps indicate a safe and efficient method to clean the Enviropod using an Inductor:

1. Open gully pit. (See Section 3.2)
2. Place the inductor hose over the material collected in the filter bag and switch on the inductor.
3. Using the inductor hose suck all of the sediment, organic leaf material, litter etc, collected in the filter bag
4. Allow the filter bag to be sucked up into the inductor hose for a few seconds to allow for the filter mesh pores to be cleaned. Care is to be taken by the operator not to damage the filter, ie ensure that there are no sharp edges on the inductor hose.
5. If material has build up around the overflows, use the inductor hose to clear the accumulated material.
6. Remove filter bag from the pit.

7. Sediment retained in the gully pit grate is to be removed.
8. Back opening channels are to be cleared of any debris to ensure flow is not hindered. Debris can be collected using the inductor truck.
9. All gully pit waste is to be removed from the pit.
10. Check the Enviropod unit. (See Section 3.4)
11. Check filter bag. (See Section 3.5)
12. Reinstall filter bag and gully pit lids.



Plate 16 Cleaning an Enviropod using the inductor method

Gully pit sediments under no circumstances are to be backwashed into the gully pit.

3.3.2 Hand Maintenance

Two people are generally preferred to maintain the units by hand. However for shallow units and units which contain mainly leaf material (low overall accumulated weight), may be cleaned by one person. Note additional personnel may be required for traffic management purposes or for general safety.

The following steps indicate a safe and efficient method to clean the Enviropod manually by hand:

1. Open gully pit. (See Section 3.2)
2. Place the lifting hooks in the lifting loops of the filter bag. (See Plate 17)
3. For extremely heavy and overfilled bags either use a hydraulic lifting arm to lift the bag, or remove excess material using a shovel or similar piece of equipment. IES prefers the use of a post hole shovel, due to the reduced strain on the back when digging and the ability of the shovel to grab material vertically. (Insert Picture)
4. Lift the bag vertically off the supporting frame, ensuring that no undue pressure is placed on the filter bag. (See Plate 18)
5. Lift the bag clear of the stormwater pit. (See Plate 19)
6. Position the bag over the truck or other collection vehicle, taking hold of the loops at the base of the bag. (See Plate 20 and Plate 21)
7. Lift and empty the filter bag by holding the bottom lifting loops only. (See Plate 22)
8. Completely empty the filter bag. (See Plate 23)
9. Brush the filter bag with a stiff brush to remove bound sediment from the filter pores. (See Plate 24)

10. Check the filter bag. (See Section 3.5)
11. Check the Enviropod unit. (See Section 3.4)
12. Reinstall filter bag, ensuring bag is installed the correct way. (See Plate 25 and Plate 26)
13. Reinstall gully pit lids. (See Plate 27 and Plate 28)



Plate 17 Place the lifting hooks through the bag loops



Plate 18 Lift the bag from the cage and support frame



Plate 19 Lift the bag from the stormwater pit



Plate 20 Lift the bag onto the collection vehicle



Plate 21 Grab the bottom lifting loops



Plate 22 Lifting the bottom bag loops empty the filter bag



Plate 23 Completely empty the contents of the filter bag



Plate 24 Brush the pores filter bag with a stiff brush



Plate 25 Reinstall filter bag



Plate 26 Ensure that the unit is positioned correctly, with the lifting loops on the inside



Plate 27 Correctly installed filter bag



Plate 28 Installed filter bag and sealed pit

3.4 Unit Inspection

After the Enviropod filter bag is removed, emptied and cleaned, the following should be checked to ensure that the unit has not been damaged:

- All connections and joints should be checked and broken rivets replaced (See Plate 29);
- The plastic pit seals should be inspected for unit movement or damage (See Plate 30); and
- The cage should be inspected for damage or movement (See Plate 31).

The overflow diversion channels, and the area between the Enviropod cage and pit wall should also be inspected for the accumulation of debris. Any observed debris should be removed and disposed of off-site. Accumulated material within the outlet pipe may need to be flushed.

Note: If the units are not cleaned regularly the mobilisation of material collected in the Enviropod unit may occur, as such cleaning of the units in accordance with this management plan is required. As this plan is based on observations and data collected during the monitoring period, ongoing adjustment of the cleaning frequency is generally required to improve the overall efficiency in the removal of collected material and prevent material overflow.



Plate 29 Check seals are pushed against the pit walls

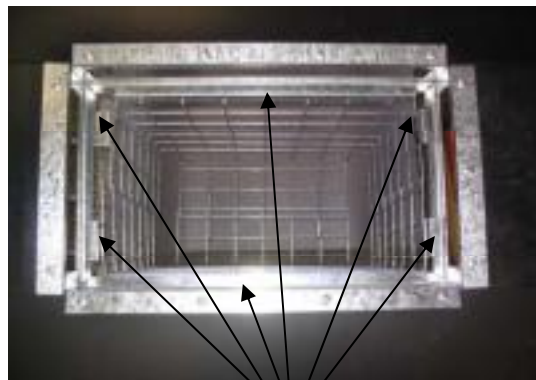


Plate 30 Check joining rivets (two piece unit shown above)

3.5 Filter Bag Inspection and Rejuvenation

Following the emptying and cleaning of the filter bags, the filter bag should be inspected to evaluate the bag condition. Given the nature of stormwater the filter bag from some Enviropod units can become considerably clogged with fine sediment. Filters can also be damaged by various objects in stormwater as well as fauna. Sharp objects such as sticks combined with high velocity water and a large mass in the filter bag can cause small tears in the filter material. Animals such as rats have also been known to chew through fine mesh filter bags located in gully pits near takeaway food outlets.

3.5.1 Clogged Filters

Clogged filter bags can be clean using several different methods. If the bag cleaning techniques described in the general maintenance sections above are not able to clean the filter bags the following options should be considered:

- Using a stiff brush and a bucket of soapy water scrub the filter bag surface.

- Remove filter bags from the pit and wash the bags using a high pressure water spray. Care has to be taken to not transfer the contamination elsewhere. Waste water from the process should be collected of and disposed of correctly.
- Remove the filter bags from the pits and the support rings and wash the bags in an industrial washing machine.

The final option presented above typically results in the bags appearing like new, with no visible stain or pore clogging within the filter mesh.



Plate 31 Slightly clogged filter bag, indicated by the brown stain on in the centre of the bag



Plate 32 A clean used filter bag

3.5.2 Damaged Filters

Damaged filters can often be repaired, provided the damage is small. Small tears in the fabric may occur do to several reasons, however the overall strength & structure of the nylon fabric typically prevents small tears becoming much large. Although the bag is unlikely to tear further care must be used when clean torn bags as not to spill the collected material into the pit.

Small tears may repaired by either sewing the tear back together, with additional fabric to increase the strength of the stitching, or by sewing a patch of the filter material onto the filter bag. The filter bags may need to be replaced if large tears are present, as the filter bag is no longer able to function as intended.

IES is able to repair bags or replace bags which have been damaged during maintenance. Please contact IES Sydney office on 02 9907 1401 for details or a quote.

3.6 Disposal of Material

All gully pit wastes from the site are to be taken off site and disposed of at a transfer station or similar approved disposal site. Stormwater Sediments can contain Lead, Copper, Zinc, Mercury, hydrocarbons and PCBs, which are harmful to both humans and the receiving environment. Appropriate sampling and laboratory analysis may be required to classify the material as suitable for reuse, or disposal under appropriate local guidelines.

4 Emergency Procedures

4.1 Spill Procedures

In the event of a spill discharging into any gully pit all sediment is to be extracted and the filter bags are to be removed and replaced with rejuvenated filter bags. Normal operation procedures apply to additional cleaning as a result of spills.

4.2 Blockages

In the unlikely event of surface flooding around a gully pit fitted with an Enviropod the following steps should be carried out:

Check Enviropod over flow bypass. The Enviropod filter has been designed with an overflow mechanism built into the filter box. If surface flooding still exists check the overflow slots underneath the rubber seal. If debris is lodged in the overflow slots these can be easily cleared by hand or steel rod.

If overflow is clear and surface flooding still exists remove Enviropod and check outlet pipe for blockages.

Removal of the Enviropod may be difficult if the filter is clogged and the Enviropod is holding water. If the filter is clogged, brush the side walls of the filter with a yard broom or similar. This will dislodge particles trapped at the interface allowing contained water to flow through the filter.

If the outlet pipe is blocked, it is likely that a gully sucker truck will be required to unblock it. Debris should be removed from the Enviropod with the gully sucker truck before removal of the Enviropod filter.

If a gully sucker truck is not available and the Enviropod needs to be removed by hand, follow the steps below:

- Remove excess debris by hand or brush the side of the filter.
- Lift and place filter ring through the filter box and into cage.
- Remove Filter box.
- Lift cage containing filter bag and ring out of the pit.
- Unblock outlet pipe.

Appendix A
Service Receipt Example

Enviropod Service Receipt

Site:

Contractor:

Location:

Year:

Job Number:

Receipt Number:

Week Serviced:

Service Frequency:

Enviropods on Site:

Enviropods Cleaned:

Bags Checked:

Frames and Seals Checked:

Overflows Checked

Tonnage:

If Damaged, Action:

If Damaged, Action:

If Blocked, Cleaned:

Comments

This service has been performed in accordance with Enviropod Management Plan (EMP) for above site. Please file this receipt with EMP and keep on site for compliance inspections.

Signature:

Position:

Appendix B
Maintenance Form Example

Client:

ENVIROPOD Sites

Date:

NOTE: See maps for detailed location.

[illegible]