Understanding stormwater maintenance problems

MURRAY POWELL, President of the Stormwater Industry Association of NSW, writes that there are a number of pressing stormwater maintenance issues that councils need to address.

I was recently informed by one of the leading Gross Pollutant Trap (GPT) cleaning companies that it had never cleaned the smallest model GPT from one of the leading proprietors.

I was stunned.

I also estimate there to be at least 500 operational GPTs of this size - who is cleaning them? I suggest the answer is no-one!

This article illuminates the problems with, and some of the solutions to the complex and expensive issue of stormwater maintenance.

Ownership issues

Whilst there are many issues, let's begin with ownership.

Since almost all of these smaller traps are going into private developments, or small industrial estates or car parks, they are remaining in private hands.

Pressure on the private sector to return a profit has the potential to see corners cut and often the first thing to be put aside is maintenance, particularly if there is only a perceived benefit to the environment.

Local government is responsible for stormwater management and it is best-placed to keep a register of all GPT locations, including other environmental protection works.

Once such a register is in place, it can be checked or audited on an annual basis as a minimum to ensure that maintenance is being carried out.

This is easier said than done, but definitely well worth the effort given the benefits.

Any audit should also include unit complexes, commercial areas and shopping precincts.

How full is it?

Many councils do not have the appropriate tools to inspect or monitor GPTs.

The basic tools should include long handle gatic lifters and a survey staff.

These basic tools will enable monitoring of a large range of proprietary traps. However, once the lid has been opened

Grab cleaning a CDS GPT.

and the depth to the pollution measured, how is the person monitoring the device able to tell how full it is?

A 'Data Sheet' is a tool that facilitates the task of monitoring.

The Data Sheet details the depth when empty, the depth when it should be cleaned, and, preferably, 10% gradients in between.

When the depth is measured, the operator is then able to refer to the Data Sheet to determine how full the GPT is, and how long before cleaning is required.

It is rare to find those responsible for the cleaning and maintenance of GPTs using a Data Sheet and most operators rely on guesswork, or a timed-basis, or when the device becomes non-operational.

Developer cleaning before hand-over

In subdivision and development projects, GPTs are usually installed at the same time that other stormwater infrastructure is constructed, which is quite early in the schedule of works.

This means that the GPTs are in the ground before the higher sediment loads from the building phase commences. This has the potential to overwhelm, not only GPTs, but any other stormwater quality improvement device.

Frequently, the GPT may be neglected during construction and cleaned out only the week before handover.

Even after handover, the sediment yields are still high and it does not take long before the GPTs are full of sediment and become non-operational.

Not only does this mean the device has been in bypass and is likely to be polluting the downstream waters, it also results in a larger and more expensive cleaning exercise the next time it is cleaned.

Ideally, councils should include in their Development Control Plans (DCPs) or approvals a requirement for monthly maintenance of any stormwater pollution controls during the development phase (unless the developer can demonstrate that a two monthly or quarterly time-frame is acceptable) and provide a guarantee that it will be carried out.

Whilst a developer is in charge of the site it needs to be contractually required to clean the stormwater traps.

Swales and ponds are easier to monitor and generally better maintained. However, for the out-of-sight, out-of-mind subsurface devices this is often not the case.

Insufficient budget for cleaning

Some councils in New South Wales have environmental levies and some have the 'Stormwater Charge' levied on property owners in the catchment.

Other councils fund maintenance from general revenue.

However, many councils have inadequate budgets for maintenance of GPTs and do not clean their stormwater traps adequately.

The NSW Stormwater Industry Association (SIA) was a strong advocate for a sustainable funding source for local government to manage stormwater more effectively.

The SIA lobbied the NSW Government, which saw the introduction of the Stormwater Charge, which allowed councils to levy a charge on residential and commercial properties in their local government area.

The funds raised from the levy had to be spent on outstanding stormwater works over and above the existing budget allocations already in place.

The funds are also able to cover the ongoing monitoring and maintenance costs of a council's stormwater quality improvement devices.

Many councils have taken advantage of this opportunity, which now provides them with a sustainable funding source for their maintenance.

However, some councils either have chosen not to take up the charge or, if they have, the funds are not being allocated to maintenance, but being spent on asset renewal and other works to mitigate stormwater flooding.

Whilst these other elements may have value, it is equally important to maintain the stormwater facilities and pollution control devices already in place.

This will ensure that councils are getting value out of their capital assets, and protecting the environment, which is a part of their charter.

The 'clean once a year' philosophy

Often a council's maintenance departments are not involved in the design and installation of stormwater quality devices.

This is usually seen to be the responsibility of the design engineers or environmental officers.

Consequently, the maintenance departments inherit the responsibility for the care and control of the devices with inadequate budgets and no opportunity to provide input in the concept and design phase and advise on positive maintenance strategies to make their job easier and more effective.

Increasingly, the maintenance people are asking to be involved early in the decision-making process.

Their input is to be encouraged as they are well-placed to look at the bigger picture, achieve economies of scale and offer suggestions on standardisation of the type of treatments to reduce maintenance costs.

However, there are still some maintenance departments that are focused on their current budget and actively try to discourage the installation of new devices.

Alternatively, they may be happy for the installation of poorly performing devices, which do not catch many pollutants, as they do not need to be cleaned as often.

A pit basket that is full and overdue for maintenance.

This could be called the 'Once a Year' philosophy.

That is, some maintenance managers are budgetary focused and are happy to push the cleaning out to once a year.

Often, the more devices that are installed, the less everything gets cleaned.

These managers simply accept a CPI increase in their cleaning budget each year, rather than pushing for a percentage increase commensurate with the percentage increase in devices needing to be maintained.

Those maintenance managers who are actively involved in the sizing and selection of new devices early in the concept and design phase are rare, but they are "out there" and should receive all the encouragement they can get.

They plan ahead with their budgets, and they care about the environmental performance of their traps, as well as allocating appropriate levels of funding to maintain them.

So how full is my wetland?

There are literally hundreds of wetlands that have been installed since the 1970s.

Some of these are working well and some...let's just say...are not.

One of the major reasons behind poorly performing wetlands is that they were either not pretreated by a GPT, or the pretreatment type/size/design was poor, and most pollution ended up in the wetland anyway.

Once in there it physically fills the wetland, reduces water residence time and breaks down to produce low dissolved oxygen conditions, low pH, and nutrient cycling, etc.

Therefore, the first step with most of these wetlands is to review the effectiveness of the GPT upstream, and then plan to clean the wetland once the pretreatment problems are addressed.

However, even that does not eliminate the need to maintain and clean a wetland.

Periodically, most wetlands will need some of the vegetation removed or "trimming", so that it continues to work aesthetically and hydraulically.

Wetlands will periodically need to have the accumulated silts and other pollutants removed.

However, given that these are spread out over a wide wetland bottom, how do maintenance managers know when cleaning is required?

The answer is to treat the monitoring in a similar manner to a GPT.

There needs to be a given location that is used for the annual monitoring, say 50 metres from a tree on the bank.

Use a rope and a "tinny" (small portable boat) to get out into the wetland, to enable all the monitoring to take place in the same location.

A wooden pole will be required, with a flat piece of wood on the base, to determine the depth.

The wood on the end should be say 500 mm x 500 mm to prevent a survey staff from pushing too far through the "fluffy/silty" layer that can occur on the bottom.

Next, mark the pole in "texta" at the water level, including the date.

This procedure provides a record of the rate at which it is filling.

One pole will have four sides, so it can be used for four wetlands.

A decision will have to be made by the environmental or wetland specialists on

the frequency and depth at which the wetland will need cleaning.

The frequency could be every five, 10 or 20 years.

An empty GPT is not necessarily a clean GPT

Depending on the type of device, material may get caught in the screen, or behind the screen of a GPT.

Material may also be caught up in some of the finer "media" type filters.

Most GPTs with screens need to have their screens cleaned, especially if they are a direct screening device and use a regular mesh style screen.

The force of water will push grass clippings, small sticks and organics into the openings of the screen.

If the GPT is simply sucked empty from the surface, but the vertical screens are not attended to, the device has been "emptied", but not "cleaned".

A device that has been cleaned correctly generally needs to either have its screens brushed or jetted clean.

However, often that is still not enough.

Devices that store pollution within the screening area can have sediments "ooze" through the screen, which then accumulate on the outside.

These continually build up, decreasing the treatable flow-rate and efficiency of the trap.

It is important to be able to physically access this area to clean it, or to be able to access and work inside the screening area, to remove all the screens and clean behind them.

As a minimum this should be carried out annually.

Depending on the type of GPT, some do not need the screens cleaned, while others do.

For some devices, cleaning of screens is an easy task. However, for others it is very expensive and complicated.

It is the responsibility of maintenance managers to know the difference between the cleaning and emptying requirements of their GPTs, to keep them working as they were designed to do.

The people best-placed to advise on the ease of cleaning the different types of GPTs are the cleaning contractors.

They will tell you the facts that are not in the glossy brochures.

Understanding pollution loads

This problem is not as bad as it once was because councils are getting more experience with the devices and are learning just how much pollution the effective ones can catch.

Experience shows that the "good" devices can commonly capture over 1 tonne per hectare per year, on polluted catchments.

As a rough rule of thumb, 1 cubic metre will be approximately 1 tonne.

It may be heavier if dominated by sediment, or lighter if dominated by leaves, but that's about the average.

Older urban catchments can be expected to deliver 0.5 to 1.0 te/ha/yr.

Industrial areas can get up to 1.5 te/ha/yr.

The newer subdivisions with source controls and better Water Sensitive Urban Design (WSUD) will have much lower loads within the stormwater system.

When planning, or approving pollution traps, councils need to base the sizing on not just flow-rate, but performance and life-cycle costs.

Additionally, within the life-cycle costs, maintenance is likely to be the larger, and therefore a more important, figure. Therefore, the frequency and cost of that maintenance is very important.

To get a three month cleaning frequency you cannot simply install a small inexpensive device that becomes full in a month and then bypasses the pollution for the next two months.

Understanding pollution loads is critical when sizing and approving traps.

Basket cleaning of a CDS GPT.

Future national guidelines

The NSW Department of Environment, Climate Change and Water (DECCW) has been working on 'Guidelines for Maintenance of Stormwater Treatment Measures' for several years now.

It has recently been handed over to the IPWEA to package up and take to the market. These guidelines should be released shortly.

These guidelines are very comprehensive and provide practical information on monitoring and maintenance of every type of stormwater treatment solution.

It will become the standard reference that all councils will use in stormwater maintenance.

Conclusion

We can stuff up stormwater maintenance for many reasons, and most are listed here. It is up to the designers, approval engineers and maintenance managers to sit down and agree on what needs to be done and how it can be funded.

Whilst a little simplistic, there are three steps to follow:

1. Understanding your treatment measures.
2. Communication (between the council stormwater managers), and
3. Budgeting to do the job correctly.

By following these steps we can minimise long-term costs and maximise the protection of our environment.