Summary Sheet

Gross Pollutant Traps 9

Gross Pollutant Traps (GPTs) are devices that remove solids conveyed by stormwater.

All forms of development and land use generate gross pollutants, which are a threat to wildlife and aquatic habitats, can look unpleasant, smell and attract vermin.

There are a variety of GPTs suitable for use in urban catchments that remove litter and debris greater than 5 millimetres and coarse sediments before they enter the receiving waters.

Application and Scale

The typical application scale for GPTs is the neighbourhood or catchment-wide scale:

- A neighbourhood system would involve smaller traps in side inlet pits, and pit systems that filter runoff from a small number of blocks; and
- Catchment-wide systems are those that include racks and booms across rivers and major stormwater flow corridors.

GPTs can operate in isolation to protect immediate downstream receiving waters or as part of a more comprehensive treatment system to prevent overload of downstream infrastructure.

What is Water Sensitive Urban Design?

Water Sensitive Urban Design (WSUD) is an approach to urban planning and design that integrates the management of the total water cycle into the urban development process. It includes:

- Integrated management of groundwater, surface runoff (including stormwater), drinking water and wastewater to protect water related environmental, recreational and cultural values;
- Storage, treatment and beneficial use of runoff;
- Treatment and reuse of wastewater;
- Using vegetation for treatment purposes, water efficient landscaping and enhancing biodiversity; and
- Utilising water saving measures within and outside domestic, commercial, industrial and institutional premises to minimise requirements for drinking and non-drinking water supplies.

There are many different WSUD measures which together form a 'tool kit' from which individual measures can be selected to form a specific response suiting the characteristics of each development (or redevelopment).

Those measures are described in detail in the WSUD Technical Manual, which can be found online at www.planning.sa.gov.au/go/wsud

Gross pollutant traps are one such measure.

Design Considerations

The key design considerations for the selection of GPTs include:

- A high flow bypass system. This diverts flows higher than the maximum design treatment flow for the GPT over or around a diversion weir. The high flow bypass prevents (i) damage to the trap during floods, (ii) flooding of the surrounding areas being caused by the trap and (iii) excessive scour of the collected pollutants;
- The pollutant storage method. This could be in the form of a wet sump, a basket, net or storage behind screens that are free draining. The pollutant storage method needs to prevent re-suspension of the captured contaminants and the development of anoxic conditions which causes the release of bio-available forms of the pollutants;
- The location of the GPT in the catchment. It is important to understand the pollutant profile of the catchment in order to size the GPT. The pollutant profile is determined by the catchment area, land use and upstream stormwater management infrastructure; and
- Access for inspection and maintenance. A GPT should be located where maintenance and inspection can be carried out using standard maintenance equipment. Adequate access and hardstand areas for maintenance plant (vacuum loader, crane, tippers etc) from the street to the device should be provided.

Most current designs of GPTs are proprietary products. The following are the broad categories of GPTs available:

- Drainage entrance treatments (e.g. grate entrance systems, side entry pit traps and channel net). These are generally used when receiving environments are close to the catchment or the catchment is small and impractical for a large 'end-of-line' system. The pollutants are captured at the entry point to the stormwater system and are stored suspended above the pit. They allow high pollutant areas to be targeted and reduce downstream blockages. Maintaining these systems requires visits to numerous locations;
- Direct screening devices (e.g. litter collection baskets, release nets, trash racks and diversion weirs). These use flow passing perpendicular to the screening surface to trap pollutants. They are installed in drainage lines above or below ground (with catchments of 5 to 200 hectares). Above ground systems are highly visible while underground systems are more likely to generate anoxic conditions. Cleaning of the screen is a substantial task but important for maximum efficiency at the start of the next storm;

- Non-clogging screens (e.g. circular or downward inclined screen). Few GPTs have this technology which maintains flows at a tangent to the screen face and minimises blockages. Non-clogging screens maintain flow for the duration of a storm event, treating more runoff than direct screening devices;
- Floating traps (e.g. flexible floating booms and floating debris traps). These are typically installed in the lower reaches of waterways with low velocities to remove highly buoyant and visible pollutants (typically 10% of the pollutant load). Pollutants are deflected into a retention chamber which generally has limited holding capacity. High velocities and floods can wash out the pollutants and damage the traps; and
- Sediment traps (e.g. ponds, circular settling tanks and hydrodynamic separators). There are a range of designs available all creating favourable flow conditions for sedimentation of coarse sediments (greater than 0.125 millimetres). The area required for the device is the primary differentiator. Maintenance is performed using vacuum equipment or by an excavator.

Maintenance Considerations

GPTs require a considerable amount of maintenance to ensure they continue to operate at the design level of performance. A maintenance plan and associated inspection forms should be developed as part of the design process.

Typical maintenance considerations for GPTs include:

- The frequency of emptying to prevent odours, minimise the chance of anoxic conditions developing and the remobilisation of pollutants;
- The disposal method for the captured gross pollutants. Disposal costs depend on whether the collected material is retained in wet or free-draining conditions. Handling of wet material is more expensive and requires sealed handling vehicles;
- The need to monitor the system capture performance and the composition of contaminants; and
- The occupational health and safety requirements such as training for confined space and the handling of potentially hazardous wastes captured.

Design Process

The key steps in the design process include:

- Identify any physical site constraints (e.g. topography, soils, geology, overhead restrictions and services). On sites with steep grades, GPTs may not operate effectively, while on mild slopes head losses can cause local flooding;
- Identify any social factors such as impacts on recreational facilities, odour problems, visual impacts, vermin and safety concerns;
- Establish design objectives and targets (e.g. capture size and type of pollutant);
- Consult with the council and other relevant authorities to ensure the GPT does not cause flooding of existing structures and to determine if any approvals are required;

- Identify land and asset ownership to ensure that maintenance and management responsibilities are clearly understood;
- Determine the size of the pollutant storage required by calculating the catchment gross pollutant load and specify the desired maintenance frequency (typically between four to12 times a year);
- Determine the design flow rate (the maximum flow rate at which the GPT will operate effectively). Typically a GPT will treat a minimum of the 1 in 3 month ARI flow event and accommodate the bypass of the design 1 in 100 year ARI;
- Consider the design tools available to determine the effect of the GPT on the catchment water quality and the potential to achieve the design objectives;
- Determine what the maintenance requirements are (i.e. space, hardstand areas and equipment needed, frequency and waste disposal);
- Select a GPT design, supplier and construction contractor; and
- Determine what temporary protective measures will be needed to protect the GPT components from damage during construction and what sediment and erosion control measures are needed.

Legislative Requirements and Approvals

A thorough investigation of required permits and approvals should be undertaken as part of the conceptual design. A proposed system needs to meet the requirements of the following legislation:

- *Development Act 1993*
- *Environment Protection Act 1993*
- *Public and Environmental Health Act 1987*
- *Natural Resources Management Act 2004*

Further Information

While there is a large range of useful resources and further information available on gross pollutant traps, in the first instance it is suggested that people read Chapter 9 of the *Water Sensitive Urban Design in Greater Adelaide Technical Manual*. Further information is available at www.planning.sa.gov.au/go/wsud

Other Summary Sheets

Other Water Sensitive Urban Design Summary Sheets for the Greater Adelaide Region are available in this series. To download the summary sheets, visit www.planning.sa.gov.au/go/wsud

No. 1-3	Introduction to Water Sensitive Urban Design	No. 10	Bioretention Systems
No. 4	Demand Reduction	No. 11	Swales and Buffer Strips
No. 5	Rainwater Tanks	No. 12	Sedimentation Basins
No. 6	Rain Gardens, Green Roofs and Infiltration Systems	No. 13	Constructed Wetlands
No. 7	Pervious Pavements	No. 14	Wastewater Management
No. 8	Urban Water Harvesting and Reuse	No. 15	Modelling Process and Tools
No. 9	**Gross Pollutant Traps**	No. 16	Siphonic Roofwater Systems