



Nursery & Garden Industry
Queensland

Maintaining Drainage Systems

Drainage systems in nurseries are required to carry highly variable water flows on a daily basis, but drainage maintenance can often be a forgotten activity, until a sudden storm event occurs. A regular maintenance programme need not be expensive, but can result in more effective collection of drainage water for recycling, and minimise infrastructure damage caused by uncontrolled water flows. If you hope to reap the economic and environmental benefits of your drainage system, regular maintenance is essential.



The main objective of a drainage system is to move water away as quickly as possible without causing damage to nursery infrastructure and growing stock, and without reducing water quality. A blocked or dammed drain can cause more frequent overbank flooding and unexpected erosion, leading to increased sedimentation downstream of the drainage system. Similarly, a lack of maintenance can result in sediment and litter traps being filled, and consequently being unable to perform their functions efficiently. If these structures are already full they cannot control water flows effectively and flooding can result.

An effective maintenance programme starts with making regular inspections annually and after storm events, and responding to identified issues. Records of activities undertaken can help to highlight areas requiring more intensive maintenance. Mapping of

the drainage system is a good place to start with any maintenance plan.

Appropriate intervals for drainage maintenance are dependant on the structures that need to be maintained, with previous history being used as a guide to future maintenance requirements. Annual maintenance activities should be done before the wet season. Some components require daily attention, e.g. cleaning drains in the growing media storage, whereas others may be weekly, monthly or annual activities.

The following are some areas that need to be addressed in a drainage maintenance plan.

- *Removal of accumulated sediment and trash,*
- *Repairing minor problems, e.g. damage from vegetation,*
- *Herbicide and weed control activities,*
- *Removing major obstructions,*
- *Identifying and making structural changes,*
- *Grass mowing,*
- *Flushing of systems,*
- *Disposal of wastes, e.g. sediment from silt traps.*

Drainage system maintenance starts before the drainage system itself, by preventing blockages through keeping sediment and litter out of the system.

- *Check and clean trash traps regularly.*
- *Maintain stockpiled material. Growing media and other materials are a potential source of sediment and litter. Consider:*
 - *locating stockpiles away from drainage systems and waterways,*
 - *covering stockpiles,*
 - *minimising the number and size of stockpiles,*
 - *building the stockpile with a slope no greater than 2:1 (horizontal to vertical)*

- providing suitably enclosed storage areas for stockpiled material such as growing media, or enclose the growing media stockpile with silt fences or a drainage system that will collect contaminated runoff, or do both

For **subsurface drainage systems**, regularly make sure outlet drains are not blocked, and the drains themselves have not built up sediment. If pipes are broken or crushed, replace them. If trees are growing nearby consider the potential for them to grow roots around and into drainage infrastructure and cause blockages. Where practical, remove any vegetation that causes blockages of drainage systems through root intrusion or from leaves.

Regularly inspect the drains and outlets of **surface drainage systems** after each heavy rain, and remove silt deposits and other obstructions. If surface drains are grassed keep them mown and control woody weeds using herbicides. Unsealed drains are a poor option for controlling drainage water due to their susceptibility to erosion, which will affect the structure of the drain and contribute to downstream siltation. These deficiencies in unsealed drains increase maintenance and repair requirements not only for the drains themselves, but also other sections of the drainage system.

Filter strips, swales and filter drains require regular grass cutting/weed control, litter removal, inlet and outlet cleaning and removal of accumulated silt. Remedial actions on these structures may be required to repair edges, erosion controls and erosion damage, and realign riprap (rock placed to reduce erosion). When assessing maintenance requirements identify erosion, silt accumulation, waterlogging and vegetation health and scarify or dethatch to improve plant health if necessary.

Constructed wetlands require harvesting of the plant tops at least annually. The wetlands should be harvested in late summer before the phosphorous in the plant tops is transferred to the root system for winter storage. Removal of the plant tops

removes phosphorous from the system, allowing the regrowth to absorb and store more phosphorous.

Constructed wetlands must continue to provide the design residence time for the water, make sure the water reaches all parts of the wetland, maintain a healthy environment for the micro-organisms, and promote vigorous growth of the vegetation. To achieve these aims maintenance activities should concentrate on ensuring depth control and inlet/outlet structures are functioning correctly, valves and monitoring devices are cleaned and maintained, and embankments and structures are not damaged. Sediment accumulation should be monitored to identify when it needs to be removed. Monitoring of flow rates will help keep the wetland healthy and reduce damage to the structure.

Inspect and maintain **ancillary structures** such as inlets, outlets, storages, silt traps, floating trash traps, flow control devices, headwalls, low flow channels, and overland flood routes, as these have vital functions in guiding and reducing flows in the system.



Gravel growing beds are an integral part of many nursery production systems, and the maintenance of the gravel to keep it freely draining will improve plant health, as well as making the drainage system more efficient. Constructing beds to Best Management Practice with an impervious layer under the gravel will reduce the movement of soil into the growing bed. Maintenance of weedmat

coverings to stop the accumulation of growing media and plant debris in the gravel will increase the life of the gravel bed before major replacement or upgrade of the growing surface is required.

Maintain **erosion and sediment control measures** through regular inspection and maintenance of all erosion and sediment control structure to ensure they function efficiently.

Roadways can form an integral part of a drainage system, or contribute to and add to the pressure on the drainage system. Roads and their associated drains can help control the flow of water across a nursery site, but can also concentrate flows. Sediment from unsealed roads can block drains, and where erosion occurs may require regular maintenance. Sealed roads are less prone to these problems, and in some cases can form an integral part of a nursery drainage system, but regular maintenance is still required to ensure water flows are not diverted into areas where they can cause damage.

A simple drainage maintenance plan will have the following elements:

Inspection

- Inspect the system to identify the maintenance activities required. The drainage system is visually inspected regularly for blockages, leaks and operating faults. Inspections, particularly during storms, will show whether devices are operating effectively.
- Where a device proves inadequate, it should be quickly redesigned to make it effective.
- Identify Occupational Health and Safety (OHS) hazards during inspection, maintenance and day to day activities.
- Where necessary wear appropriate Personal Protective Equipment (PPE).

Conduct maintenance activities:

- Prioritise maintenance activities.
- Service mechanical equipment as recommended by the manufacturer, e.g. sump pumps.
- Replace components that have failed.
- Carry out systematic cleaning of the system.

- Remove silt and weed growth from channels, drains, sumps and crossings.
- Flush the drainage system and inspect to ensure unobstructed water flow occurs through channels and from outlets.

Recording

- Record and report maintenance activities.
- Blockages or leakage is recorded by type and location of the section of the system affected.
- Damaged or faulty equipment is recorded and reported.
- All routine maintenance activities are recorded and reported.

A summary of monitoring and maintenance activities for drainage systems is provided in the Table 1.

For more information on maintaining drainage systems refer to "Managing Water in Plant Nurseries".

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Table 1: Drainage systems maintenance requirements

Drainage System Component	Regular Maintenance	Occasional Maintenance	Remedial Maintenance	Monitoring
Growing beds	Weedmat covering protects gravel - keep weedmat in good condition and clean regularly.	Repair re-instate weedmat.	Repair re-instate weedmat, replace clogged gravel, repair damaged drainage pipes.	Annual inspections for poorly drained areas.
Pipes	Removal of silt and debris - monthly.	Check for damage.	Erosion around pipes.	Monthly inspections.
Sealed Open drains	Removal of silt and debris - monthly, trimming of grass adjacent to structure.	Check for damage.	Erosion around drains.	Monthly inspections.
Grassed open drains	Regular grass cutting, removal of litter, cleaning of inlet and outlet areas.	Accumulated silt removal.	Repair to damaged structures, repair erosion, repair rip rap, repair inlets and outlets, removal of high silt levels from single events.	Particularly after storm events for erosion, silt build-up, vegetation health, waterlogging and other damage.
Silt and trash traps	Remove debris and silt.			Weekly or within 2 hours of a storm.
Collection and storage structures	Remove debris and silt.			
Unsealed roadways	Removal of silt and debris - monthly, trimming of grass adjacent to roads.	Reforming of road profile.		
Sealed roadways	Removal of silt and debris - monthly, trimming of grass adjacent to roads.			
Constructed wetlands	Regular vegetation removal, litter removal, inlet and outlet cleaning.	Clearing unwanted vegetation, removal of silt.	Repair of erosion, replace gravel if clogged.	Flow rates, silt accumulation, vegetation growth.