



Water quality protection note no. 32

February 2018

Nurseries and garden centres

Scope

This note applies to both new and established plant nurseries (propagation and retail) and garden centres located near sensitive water resources. Please refer to Water quality protection note (WQPN) no. 4: *Sensitive water resources* for further information on sensitive water resources.

This note is not intended to cover plants grown or propagated by home gardeners, but may offer some useful guidance on potential risks to the environment and good practice.

Standard information to be read in conjunction with this note can be found in WQPN no. 3: *Using water quality protection notes*.

Water quality contamination risks

Nurseries and garden centres can pose the following risks to water resources:

- Leachate and runoff from possibly contaminated areas can contaminate surface and groundwater. Leachate can result from poor practices or rainfall or excess irrigation percolating through the soil of pot plants. This water flushes out nutrients and pesticide residues within pots.
- Leachate and runoff that contains nutrients, in particular nitrogen and phosphorus, can promote algal blooms in surface-water resources.
- Other potential water contaminants from nurseries and garden centres include soil pH control chemicals, wetting agents, trace minerals and harmful microbes derived from animal manures.
- Inefficient water use may also contribute to unnecessary draws on the water table and in turn affect the water balance in waterways and wetlands.

For general information about protecting water quality, see WQPN no. 8: *Further reading*.

Recommendations

Location

Nurseries and garden centres should be established in locations where they are likely to have a minimal effect on sensitive water resources. Please refer to WQPN no. 4: *Sensitive water resources*.

Most nurseries and garden centres require a reliable source of water extracted from the environment to allow for plant irrigation during times of low rainfall. The highest risk of contaminants leaching from nurseries and garden centres into groundwater, waterways or wetlands occurs where there are permeable soils (e.g. sand or gravel) overlaying a shallow water table (less than 10 m below the surface).

Within public drinking water source areas

Nurseries (plant production), are:

- *Incompatible* in priority 1 (P1) areas.
- *Compatible with conditions* in both priority 2 (P2) and priority 3 (P3) areas. *Compatible with conditions* means the activity is compatible with water resource management objectives, providing that site-specific environmental best practice management is used (such as that recommended in this note).

Garden centres (commercial) are:

- *Incompatible* in priority 1 (P1) areas.
- *Incompatible** in priority 2 (P2) areas. *This means incompatible unless special circumstances apply. Subject to confirmation of these special circumstances, this land use may be considered to be compatible with conditions if it is directly associated with a primary land use that is compatible with conditions or acceptable with the application priority area. In these cases, we expect the operator to use best management practices to reduce water quality risks. Please refer to WQPN no. 25: *Land use compatibility tables for public drinking water source areas*.
- *Acceptable* in priority 3 (P3) areas.
- Applicable to both nurseries and garden centres, special constraints for chemical storage and use apply in wellhead protection zones (WHPZs) or reservoir protection zones (RPZs). See WQPN no. 25: *Land use compatibility tables for public drinking water source areas* for further information on WHPZs and RPZs.

For more information on public drinking water source areas, see Strategic policy: *Protecting public drinking water sources in WA* and WQPN no. 25: *Land use compatibility tables for public drinking water source areas*.

Waterways

- Adequate buffers between waterways and their foreshore areas need to be maintained. Refer to Operational policy 4.3: *Identifying and establishing waterways foreshore areas*.
- If a development is located within a Waterways Management Area declared under the *Waterways and Conservation Act 1976* then approval must be sought from this agency. These areas include Albany Waterways, Avon River, Wilson Inlet, Peel-Harvey estuaries and Leschenault Inlet. Proposals should be referred to this department's regional office.
- For any land- or water-based developments or activities near the Swan, Canning, Helena or Southern rivers, please contact the Rivers and Estuaries Division of the Department of Biodiversity, Conservation and Attractions (swanrivertrust.dpaw.wa.gov.au) for special requirements.

Wetlands

- To find out the locations of wetlands, advice on management requirements and any separation distances or special measures that may be required, contact your local government in the first instance, or the Department of Biodiversity, Conservation and Attractions (www.dbca.wa.gov.au).
- Groundwater supply bores should be placed so there is negligible impact on water levels in wetlands.

Landscape

- Nurseries and garden centres should not be located on land subject to seasonal flooding. They should also be located at least 2 m above the maximum groundwater table. To find out flood areas within Western Australia, email flood@dwer.wa.gov.au.
- Nurseries and garden centres should be located on gently sloping ground where gradients are between 1:10 and 1:200. Slopes of more than 1:10 are likely to produce excessive runoff and erosion problems. Runoff can increase the potential for contaminant transport.

Development and expansion approvals

- Nursery operators intending to take water (i.e. from surface water or bores) for irrigation should contact this department's local regional office to determine if your development is located in an area proclaimed under the *Rights in Water and Irrigation Act 1914*. In these proclaimed areas a licence from this department is required. For more information, please visit www.dwer.wa.gov.au.
- Please refer to WQPN no. 14: *Statutory approvals* for a list of approvals that you may need to obtain before commencing your development or activity, and which agency is responsible for them.
- If your development or activity is located in or near a sensitive water resource, you may need to submit it to the Department of Water and Environmental Regulation for advice. Please refer to WQPN no. 4: *Sensitive water resources*.
- Operators should demonstrate that under a range of operating conditions, on-site materials and processes do not pose a significant risk to the local environment. Please refer WQPN no. 18: *Information the Department of Water and Environmental Regulation requires to assess a proposed development or activity*.
- Nursery development proposals should include descriptions of practices to minimise nutrient leaching, such as soil moisture controlled irrigation and leaching barriers. When selecting a potting media, consider the type of irrigation system planned or in use, so that the permeability of the potting media is compatible with the irrigation methods.
- Proposals should describe and show via diagrams the methods of containment and reuse or recycling of wastewater. Otherwise, trays should be placed under pots to retain nutrient-rich leachate for later plant uptake.
- This department recognises that many activities were approved and established before the introduction of current industry environmental best practice. The department

encourages the operators of existing premises to implement best management practices that minimise the risk to water resources.

Operation and management

Nursery and garden centre stock

- Nurseries and garden centres should not stock plants that are declared under the *Agriculture and Related Resources Act 1976*, as they are considered environmental weeds. For a current list of declared plants see the Department of Primary Industries and Regional Development's website at www.dpird.wa.gov.au.
- This department supports the propagation and sale of native plants as these require fewer water and chemical resources for survival once established, grow in harmony with the local environment and help support native animals.

Toxic and hazardous substances

- Pesticides, fertilisers, manures and soil amendment materials should be stored on impermeable surfaces that are weatherproof and exclude stormwater runoff from other areas.
- Bulk liquid chemical, pesticides, fertilisers and any fuel storage and use should follow this department's water quality protection notes, WQPN no. 65: *Toxic and hazardous substances* and WQPN no. 56: *Tanks for elevated ground chemical storage*.

Irrigation

Nursery operators should use an efficient irrigation system that minimises runoff. The following practices are recommended:

- Water according to the plant development requirements, seasonal evaporation losses, variations in plant water needs and the water-holding capacity of the potting media.
- Plants with similar water requirements should be grouped in common stations and watered at the appropriate frequency for the seasonal plant uptake and evapotranspiration rates (termed hydro-zoning).
- Water wastage and chemical leaching should be minimised by limiting the space between plant containers as this maximises the water delivery to pots.
- Where practical, reduce the amount of leachate produced. Sub-irrigation (bottom watering) and drip irrigation is preferable to overhead sprinkler systems. Consider applying water as a series of timed pulses, as this slows the infiltration rate.
- Operators should determine the water application rates and operating pressures for each sprinkler type to ensure that the irrigation system delivers a uniform application of water. This will ensure minimum wastage. Sprinkler systems should be selected and maintained to deliver a uniform coverage of water, regardless of wind effects.
- If fixed overhead sprinklers are used, operators should ensure that the uniformity of water application is high (more than 85 per cent) and the mean application rate is less than 15 mm per hour for porous potting soils.

- Drip irrigation systems in composted beds can be used to reduce leachate and nutrient export.

Fertiliser application

- Nursery operators should have a thorough understanding of the nutrient needs of each plant species and appropriate fertiliser application rates during the plant growth cycle. Most formulated fertilisers contain both nitrogen (N) and phosphorus (P), which makes it important to understand the composition of the fertilisers. Blending of fertilisers or use of plant-specific formulations can ensure that the correct balance of nutrients is applied.
- Nursery operators should minimise nutrient losses by only applying fertiliser amounts required by the plant at various stages of its development cycle and adopting measures to reduce leaching. This is particularly the case for nitrogen (N) and potassium (K) as they are readily leached from the soil due to their high solubility and low retention rate.
- Where practical, nursery operators should use controlled release fertiliser (CRF), which provide a consistent rate of nutrient release. These give the operator a choice of types depending on nutrient release characteristics. Operators should not use pellets with a damaged coating as this may produce an initial flush of nutrients. They should also be aware that nutrient release from CRF increases with temperature. CRF should be applied at the supplier's recommended rate (grams or litres per square metre), and matched to the plant nutrient uptake needs for its growth stage.
- Fertigation (which is the addition of water-soluble fertilisers to the irrigation system) can be beneficial if well timed to suit crop needs. Fertigation is not considered appropriate for sprinkler systems with a low coefficient of uniformity (uneven water spread).
- Animal waste fertilisers that require biological breakdown should be considered as they provide a steady release of nutrients. Stabilised animal manures may also be used, however protective measures should be used to avoid attracting nuisance insects and transferring disease.
- The use of soluble, inorganic fertilisers should be selective, as the nutrients in these fertilisers are very susceptible to leaching. If water-soluble fertilisers are used, small and frequent applications are recommended to minimise nutrient loss. The application should be based on actual plant needs as opposed to a fixed time schedule.
- Application rates can be adjusted by measuring the nutrient levels in extracted water or via leaf tissue analysis.

Pesticide application

- In public drinking water source areas, the use of pesticides (i.e. insecticides, herbicides, or fungicides) should follow best management guidance as specified in the Department of Health's *PSC 88: Use of herbicides in water catchment areas*.
- Contact the Department of Health for advice on the use of pesticides where they may contact people, food or water supplies. Contact details available at www.health.wa.gov.au.
- Nurseries and garden centres should evaluate the type of pest species on the property, their densities and their life cycles before a decision is taken on what method of pest

control is needed. Where practical, physical and biological methods of pest control are preferable to the use of chemical pesticides.

- Nursery operators should consider incorporating pest exclusion methods such as controlled drainage, insect-proof housing for susceptible plants, inspection and quarantining of infected stock. If pesticide use is needed, spot application is preferred to blanket spraying. Pesticide application should follow the supplier's recommendations on timing and rates.
- Mixing of pesticides should be on weatherproof, impermeable surfaces that exclude or contain runoff.
- Operators should ensure that employees are trained and equipped to deal with emergencies such as chemical spills.
- Pesticide use, storage, handling and disposal should be conducted in accordance with the Health (Pesticides) Regulations 2011.

Waste management and disposal

Green and solid wastes

- Reject soil, discarded green waste, sediment from silt traps and spilt media should be contained in a purpose-built, weatherproof storage container, skip or on an impermeable sheltered surface. This ensures that liquids can be collected and stored pending reuse or disposal. Solid waste should not be washed down the drain. It should be disposed of regularly at an authorised disposal facility, e.g. landfill or recycling facility.
- Used plastic plant pots can be taken to a pot recycler or via a similar commercial venture. Recyclers can supply cages to nurseries and garden centres for the collection of used pots. The cage will be collected regularly, the pots shredded and disinfected, and new plastic pots and rakes made.

Wastewater

- Surfaces that are used to store, decant or apply chemicals, and vehicle access paths in regular use, should be sealed and effectively impervious. Pooling of storm or irrigation water should be avoided. Roadways and paths within and adjacent to production facilities should be properly drained and sealed using bitumen or concrete.
- Gravel, rolled limestone or forestry by-products over plastic film should be used for walking paths and under benches. These areas should be well drained (e.g. on a slope using a coarse stone aggregate 10 to 25 mm in diameter, and laid more than 75 mm deep). See Appendix A for a conceptual layout depicting a typical leachate recovery system.
- Where the nursery is located on low permeability soils (less than 10 mm soakage per day) or near to sensitive water resources, nursery operations should contain any contaminated waters to ensure that there is no discernible impact on the environment.
- Wastewater may include stormwater runoff from roofs and car parks, plant growing area leachate, and runoff from the nursery production areas. Nursery operators should manage clean stormwater separately to potentially contaminated water. Clean stormwater may be used for irrigation or discharged to soakage or drain systems and this

uncontaminated stormwater should be managed as recommended in our *Stormwater management manual for Western Australia*. Available at www.dwer.wa.gov.au.

- The volume and quality of wastewater runoff from operational areas should be monitored. This wastewater may contain harmful microbes, pesticides, salts, significant levels of nutrients and trace elements. Discharge or reuse of wastewater needs careful management. Water treatment by settling, filtration, biological or chemical treatment may be needed prior to discharge.
- Wastewater recycling or reuse should first be considered for the disposal of production wastewater. These waters can be drained into a lined storage-pond system and disposed of by controlled on-site irrigation. The water may be treated and applied to land in accordance with this department's note WQPN no. 22: *Irrigation with nutrient-rich wastewater*. If the wastewater is recycled for use on nursery stock, it may require filtration and disinfection. Care needs to be taken to ensure that salt levels do not build up to the extent that they harm salt-sensitive plants.
- If reuse or recycling is not a practical option, wastewater should be discharged to soak pits, however this wastewater must not contain significant concentrations of nutrients or persistent toxic substances. Soak pits should be designed to foster aerobic, (presence of air) biological breakdown of residual contaminants. Wastewater incompatible with the local environment may be disposed of by solar evaporation in a pond with a low permeability liner. Such liners may consist of a plastic membrane at least 0.5 mm thick, conforming to this department's WQPN no. 26: *Liners for containing pollutants, using synthetic membranes* or a low permeability soil liner described in WQPN no. 27 *Liners for containing pollutants, using engineered soils*.
- The washing of equipment and machinery should occur on an impervious pad, such as reinforced concrete with a perimeter bund wall or kerbing. Clean stormwater intrusion onto the impervious pad should be minimised. This can be done by constructing a roof over the area or reducing the size of the pad to the smallest practical surface area. The pad should slope toward a collector gully. Wastewater collected from the pad should drain to a sediment trap where soil and other heavy contaminants are removed. The trap should provide a minimum holding capacity of one hour under peak-flow conditions for effective settling of solids.
- The settled soil material in the sediment trap should be periodically removed and reused, or disposed of at an authorised landfill site. The extent of practical and cost-effective wastewater treatment will depend on the disposal method, the type of contaminants (e.g. nutrients, microbes, salts) and the risks to the local environment.
- Operational wastewater (treated or otherwise):
 - Should not be discharged by drains or pipes into waterways or wetlands.
 - Should not be discharged into stormwater pipes or drains connected to off-site facilities unless prior written approval is obtained from the owner or operator of the drain (normally the local government, or the Water Corporation for main drains). Any disposal of wastewater to the environment should comply with the *Australian and New Zealand guidelines for fresh and marine water quality 2000*. Within PDWSA it should comply with the *Australian drinking water guidelines 2011*.

- Released indirectly into a waterway or drain, unless it has been tested as compatible with the receiving environment and first passes through a vegetated filter zone, designed and maintained to appropriate standards. Operators should consult this department's *Stormwater management manual* for Western Australia for best management practices for the treatment of wastewater before discharge.
- Pits, pathways, paved areas and drains should be regularly inspected and maintained so that wastes are contained as designed.

Accidents and emergency response

- Any spills should be immediately cleaned up, with the solids disposed of appropriately in sealed containers for disposal offsite, and the residue should drain to a sealed collection sump, not into the environment.
- Any chemical spill or contaminated water that escapes containment should immediately be reported to the Department of Water and Environmental Regulation Pollution Watch Hotline, phone 1300 784 782. If the spill is within a PDWSA, the Water Corporation should also be advised immediately, phone 13 13 75.
- A contingency plan should be available to address emergency situations such as accidents, fires, chemical spills and vandalism that could impact on water resources. See WQPN no. 10: *Contaminant spills – emergency response* for more information.

References

Further reading is available in WQPN no. 8: *Further reading*.

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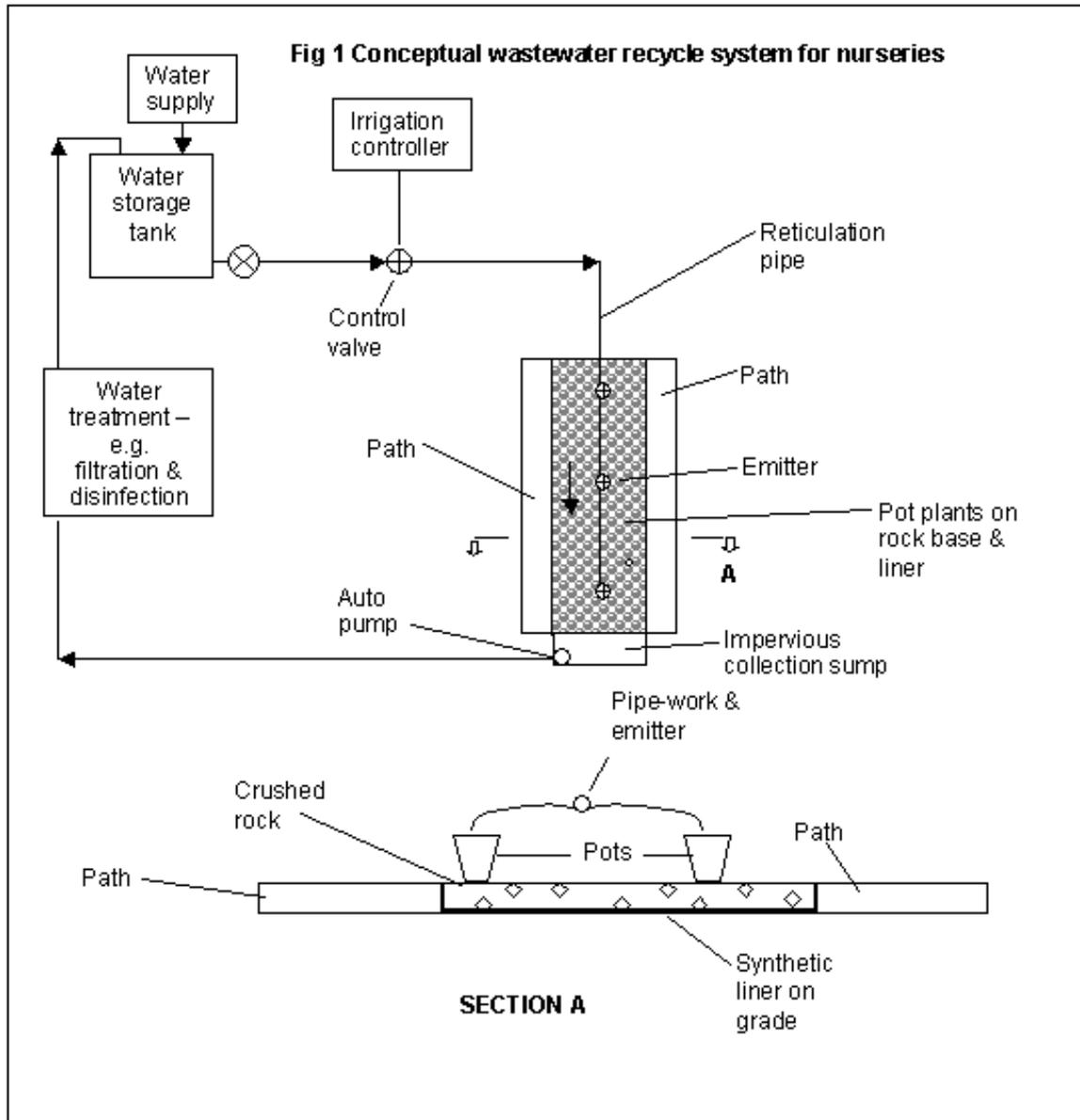
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Appendix A

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