



## Water quality protection note no. 17

February 2018

# Floriculture activities near sensitive water resources

## Scope

Floriculture includes all commercially grown flowering and ornamental plants in greenhouse based pots, trays, troughs and contained beds, or in field settings. This note applies to new and established operations growing plants near sensitive water resources (See this department's Water quality protection note (WQPN) no. 4: *Sensitive water resources* for a definition).

This note does not cover the growing or authorised harvest of native flowers that rely on rainfall and nutrients sourced from the natural environment, or the cultivation of specific exotics such as proteas, that require negligible artificial inputs of water, nutrients or other chemicals once established.

This note aims to limit the risk of water resource contamination from floricultural activities. This department's WQPN no. 32: *Nurseries and garden centres* complements the information in this note.

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

Floricultural activities, especially those conducted intensively without any physical barrier to chemicals leaching into the environment, can pose a risk to water resources. Concerns include over-watering, excessive or poorly timed use of fertilisers or pesticides, inappropriate storage of chemicals and disposal of wastes that can leach contaminants.

Nutrients from fertilisers can cause eutrophication of surface water bodies, which can kill aquatic life. Nutrients can also infiltrate into groundwater, making it unsafe to drink.

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

## Recommendations

### Location

The following recommendations describe areas to avoid or appropriate buffers to be maintained near sensitive water resources (see WQPN no. 4: *Sensitive water resources* for definitions of sensitive water resources).

#### *Within public drinking water source areas*

For 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*.

- Floriculture is *incompatible* within priority 1 (P1) areas.
- In priority 2 (P2) areas:
  - intensive, non-contained floriculture, i.e. involving irrigation and/ or regular additional inputs of chemicals (including fertiliser) to soils connected to the environment, is *incompatible*
  - extensive, non-irrigated floriculture that requires negligible irrigation or chemical inputs (including fertiliser) is *compatible with conditions*
  - fully contained plant growing, such as hydroponic cultivation, with no on-site chemical discharge is *compatible with conditions*

This department may approve these forms of floriculture with best management practices in P2 areas, provided the risks are effectively managed.

- In priority 3 (P3) areas:
  - intensive floriculture is *compatible with conditions* i.e. may be approved subject to use of best management practices that demonstrate the activity is conducted with negligible contamination risk to local water resources
  - extensive floriculture is *acceptable*.
- The separation distance should be at least 100 m from non-contained floriculture (where *compatible with conditions* or *acceptable*) to drinking water source bores or the full supply level of surface water storage reservoirs and their feeder streams.

#### *Groundwater*

- A minimum vertical separation distance of 2 m to the maximum groundwater table (end of wet season for free draining soils), should be maintained to avoid water logging and allow for soil contaminant filtration and aerobic microbial action.

#### *Waterways*

- Floriculture should not take place on land subject to flooding unless measures are in place to prevent soil erosion or loss of agricultural chemicals. To find out flood areas within Western Australia, email [flood@dwer.wa.gov.au](mailto:flood@dwer.wa.gov.au).

- 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](http://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](http://www.dbca.wa.gov.au)).

### *Landscape*

- Floriculture should be sited on gently sloping ground where gradients are between 1:10 and 1:200. Slopes greater than 1:10 can produce excessive runoff, with the potential for soil erosion problems. Excessive runoff and boggy areas may foster the movement of contaminants into surface waters.

## **Development and expansion approvals**

- Water taken from the environment, such as from bores, wells or surface waters, and used for commercial land development in most areas of the State, requires a licence from this department under the provisions of the *Rights in Water and Irrigation Act 1914*. The location of proclaimed groundwater areas are shown on this department's website [www.dwer.wa.gov.au](http://www.dwer.wa.gov.au), or any of this department's regional offices can provide advice on licensing areas.
- 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.
- Where facilities are proposed to be constructed or upgraded near sensitive water resources, proponents should supply a development proposal to this department. Please refer WQPN no. 18: *Information the Department of Water and Environmental Regulation requires to assess a proposed development or activity*.

## **Construction**

- The system should be developed and constructed by a competent and experienced irrigation system designer to achieve even soil wetting and, where practical, incorporate controls using soil moisture probes.
- Anti-fog plastic coverings on greenhouses and ground level plastic coverings should be used. Benefits include climate control that helps prevent disease, especially in

greenhouses. For additional information see the Department of Primary Industries and Regional Development's farm notes available at [www.dpird.wa.gov.au](http://www.dpird.wa.gov.au).

## Operation and management

### *Irrigation systems*

- Water application around the plants should be controlled to match the plant needs, preferably using trickle irrigation or low level micro sprinklers. Water should be applied at a rate matched to soil moisture and seasonal evapotranspiration loss.
- Sufficient water should be applied to wet the topsoil profile, while preventing drainage below the plant's root zone. The operator should have a thorough understanding of the irrigation system's capabilities and the plant's water needs, as excess watering can leach fertilisers into the groundwater or run-off into surface waterbodies. This both wastes resources and harms the environment.
- Overhead watering is not recommended as it is wasteful and water splash on the soil may damage flowers, cause spotting on petals and foster disease such as mildew, Botrytis or Alternaria. Irrigation should cease whenever rainfall provides adequate soil moisture.

### *Fertiliser use*

- Flowerbeds should be well drained. Careful nutrient management is needed to limit leaching. If organic matter is used, such as well-digested compost, it should be incorporated into the topsoil bed (normally 30 cm maximum depth) to achieve an even spread of nutrients and obtain the maximum benefit with the least amount of waste. Soil nutrient concentrations (nitrogen, phosphorous and potassium) in the bed should be regularly monitored, and fertilisers added when necessary.
- Floriculture managers can minimise cost and nutrient loss by testing the soil prior to planting and managing the soil pH, essential humus (containing carbon to sustain useful soil micro-organisms), salinity and variable nutrient and trace element requirements of plants during their growth cycle.
- Fertigation (the controlled application of soluble fertiliser in irrigation water) is recommended. However if this is not practical, regular application of small amounts of fertiliser should occur to suit the growth stage of the plants. Computer based programs, or plant leaf tests could be used to determine the appropriate amount of fertiliser required. Operators should produce nutrient and irrigation management plans for their premises. Further information is provided in this department's *WQPN no. 33: Nutrient and irrigation management plans*.
- Australian and South African native plant growing may require as little as 10 per cent of the nutrient input of many northern hemisphere plants. Ideally the nutrient blend is matched to the plant species. Low phosphate formulations should be used where soil testing indicates an adequate phosphorous concentration in the top-soil, especially where nearby surface waters are vulnerable to algal blooms.
- Water requirements for native plants are generally significantly less than exotics. Some intensive floriculturists rotate cropping between exotic and native plants to rest the land.

We recommend adoption of practices that sustain the fertility of the land, without the risk of substantial soil damage due to over-cultivation, nutrient leaching, wildfire, drought or severe storm events. For regulatory purposes, any occasional flower growing near sensitive water resources involving application of irrigated water and chemicals will be regarded as intensive floriculture.

### *Pesticide use*

- 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*.
- Any pesticide applications should conform to the Department of Health's publication *Using pesticides safely*. The manufacturer or supplier application recommendations should always be followed. Within sensitive environments, further limitations on the pesticide type and dosage, withholding periods, formulation and storage may be required. These should be defined during the approval stage for any development proposal.
- Contact the Department of Health for advice on the use of pesticides where they may contact people, food or water supplies. Contact details are available at [www.health.wa.gov.au](http://www.health.wa.gov.au).
- Where practical, the use of a combination of good land use practice, natural predators and chemicals that are target-species specific (commonly called integrated pest management) should be used for insect control, rather than broad spectrum pesticide use.

### *Solid waste*

- Any wastes including packaging, washed chemical drums and bags that cannot be reused or recycled in the operation should be stored correctly and disposed of off-site at an approved facility.
- Inert waste material, such as clean soil or rock, should be reused or disposed of at an approved inert landfill facility.

### *Wastewater*

- Liquid waste and leachate from floriculture activities may contain high levels of nutrients, pesticides and other chemicals derived from the following sources:
  - process area wash down and contaminated stormwater runoff from bulk storage areas
  - disinfectants such as mild bleach solution used on knives, shears and harvesting equipment
  - glycerine solution or a silica gel that may be used as drying agents for preserved flowers
  - dyes used to colour dried flowers
  - floral preservative used to enhance the flower's vase life while in storage.

- Flower preservative solutions normally contain carbohydrate, usually in the form of sucrose, plus a bactericide, fungicide, and a wetting agent. These latter chemicals prevent organisms developing in the vase water and blocking the cut stems, and improve water uptake. Some long-used floral preservatives may also contain heavy metals, however there are now alternative low toxicity preservatives available.
- Any liquid waste that cannot be reused or recycled should be collected and stored in an impermeable container or solar evaporation pond. The waste residue should then be transported offsite for safe disposal at a local government approved waste facility, remote from any sensitive environment.

### *Stormwater*

- Stormwater from roofs and clean paved areas should be directed away from potentially contaminated areas.
- Stormwater that may be contaminated should be treated and reused in the operations if appropriate.
- Uncontaminated stormwater should be managed as recommended in our *Stormwater management manual for Western Australia*, available at [www.dwer.wa.gov.au](http://www.dwer.wa.gov.au).

### *Toxic and hazardous substances*

- Any materials containing nutrients or other soluble chemicals, e.g. potting mixes, fertilisers, fungicides and insecticides, should be stored, formulated and transferred to application equipment on an impermeable surface in a secure, weather proof area such as a shed with a reinforced concrete floor.
- Storage of bulk chemicals (including fertiliser and pesticides) and any fuel should follow the practices recommended in this department's WQPN no. 65: *Toxic and hazardous substances*. A material safety data sheet should also be available onsite for all chemicals stored or in use.

### *Mechanical servicing*

- Mechanical servicing of tractors, cultivators etc. should be managed as recommended in this department's WQPN no. 28: *Mechanical servicing and workshops*. Any liquid waste should be disposed of at a local government approved facility.

### *Accidents and emergency response*

- Any fuel or chemical spill or leak that escapes containment should immediately be reported to the department's Pollution Watch Hotline (1300 784 782) and if in a PDWSA, the Water Corporation (13 13 75).
- Within or near any sensitive environment, floriculture operators should have an emergency response plan covering foreseeable emergencies such as disease control and chemical spills. Staff should be trained and assigned roles in following the plan. 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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