



Water quality protection note 80

April 2015

Stockyards

Purpose

In Western Australia, groundwater and surface water resources are a major water source for public, private and industrial supply. Shallow, unconfined groundwater aquifers and surface water sources are particularly vulnerable to contamination by land uses such as stockyards.

Livestock produce large quantities of liquid and solid waste. Solid wastes include fresh manure, decomposed manure (from the yard floors and in stockpiles), spilt feed and dead animal carcasses. Liquid wastes include urine, washdown and contaminated run-off from stockyards, stock transport, vehicles and surrounding areas. Both types of waste are high in degradable organic matter, nitrogen, phosphorus, microorganisms, and may contain pathogens, pesticides, antibiotics and other pharmaceutical residues. These all pose a threat to water quality through the leaching of contaminants into soil and groundwater, and run-off into surface water if not effectively contained and treated prior to release. This risk is enhanced when animals are kept in confined areas such as stockyards. The potential adverse affects on water resources include:

- introduction of harmful pathogens causing a threat to human health
- excessive release of nutrients contributing to algal blooms and death of fish and waterbirds
- suspended solids from waste products and dust
- depletion of oxygen due to the breakdown of organic matter, causing death of aquatic organisms
- release of pharmaceutical residues that could affect the natural operation of aquatic ecosystems and contaminate water resources.

Careful consideration therefore needs to be given to the design, management and operation of stockyard facilities, as well as to the disposal of wastes, to ensure the quality of the state's water resources are maintained, especially in sensitive environments (see Appendix A). The amount of contaminants from stockyards reaching water resources will depend on a number of factors including numbers of stock, rainfall frequency, liquid waste and manure containment and management, land slope, soil type and proximity to water resources. These all need to be considered when planning and operating stockyards.

The Department of Water is responsible for managing and protecting the state's water resources. It is also a lead agency for water conservation and reuse. This note offers:

- our current views on land development in drinking water source catchments
- guidance on acceptable practices used to protect the quality of Western Australian water resources
- a basis for the development of a multi-agency code or guidelines designed to balance the views of industry, government and the community, while sustaining a healthy environment.

This note is intended to inform industry operators, government officers, environmental consultants and community members on water quality protection aspects of this activity from initial design, through construction, operation and possible eventual closure.

Appendices provide additional advice relevant to this note, including:

- A. Information on sensitive water resources, note limitations and updates
- B. Relevant statutes and administering agencies
- C. Key data we need to support project assessments
- D. Typical waste and stormwater management system diagram at a stockyard; followed by references, note disclaimer and how to provide feedback.

Scope

This note applies to permanent stockyards for confining and holding livestock for a range of purposes including sale, receipt, transport, emergency feeding, husbandry, weaning, rendering, slaughtering and similar food or hide production animal facilities operating for a commercial purpose. It includes stockyards that are used both continuously and occasionally.

This note does not apply to temporary stockyards for short-term purposes in association with an existing, approved, primary land use. It is not intended to cover feedlots, zoos, wildlife parks, dairies, rural veterinary services, stables, kennels or domestic pet holding, but may offer some useful guidance on potential risks to the environment and good practice.

Advice and recommendations

Location

The suitability of a potential site to support stockyard operations needs to be assessed to avoid environmental and social issues. However, access to feed supplies, transport routes and other services required to support a stockyard and its associated operations also need to be given due consideration when selecting a site. The following recommendations describe constraints in or near sensitive areas (see Appendix A for descriptions of sensitive water resources).

Within public drinking water source areas (PDWSAs)

- 1 In priority 1 (P1) and priority 2 (P2) areas, wellhead protection zones (WHPZs) and reservoir protection zones (RPZs), the establishment or expansion of stockyards is incompatible with management objectives for the water resource. The Department of Water will oppose the development or expansion of stockyards in these areas or zones.

- 2 In priority 3 (P3) areas, stockyards are considered compatible with conditions. Conditions such as adequate buffers, no stock within WHPZs and RPZs and other best management practices, as outlined in this note, are expected to be applied to protect water resources.

Private water supply sources

These surface water bodies or groundwater wells need effective protection from physical, chemical and microbial contaminants. This should be achieved by preventing discharge of contaminated material to soils and waterways, through provision of adequate protective separation buffers.

- 3 There should be an adequate vegetated buffer measured from the external boundary of operational areas to any private water supply bores, the full supply level of surface drinking water supply points and their primary feeder streams, and aquaculture ponds (excluding tanks). Refer to Water quality protection note (WQPN) 6 *Vegetation buffers to sensitive water resources* (reference 6a).

Waterways

Waterways include all natural creeks, streams, brooks, rivers, inlets, estuaries and surface drainage systems.

- 4 Stockyards should not be established on land subject to seasonal flooding, within defined flood plains or within waterway foreshore areas. Facilities should be located above the 1 in 100 year flood level, and should not be located on land subject to seasonal inundation or waterlogging. For information on recorded flood levels, contact the Department of Water.
- 5 An adequate separation distance should be maintained between stockyards and waterways (including foreshore areas) to protect their ecological and social values and prevent degradation to water quality. Foreshore areas are determined on the basis of the waterway values, vulnerability to threats and biophysical criteria as described in our Foreshore policy 1 – *Identifying the foreshore area*. Our Water note 23 and River restoration report 16, both titled *Determining foreshore reserves*, provide supporting information on defining foreshore areas (reference 6b).
- 6 Under the right hydrological and contaminant conditions, natural vegetation buffers can improve water quality by filtering contaminated water before it enters a waterbody. Vegetation density and landform are important considerations when determining appropriate separation distances between land uses and waterways. For advice on buffer selection, see our WQPN 6 *Vegetated buffers to sensitive water resources* (reference 10c).

Proclaimed waterways management areas

Five management areas have been declared under the *Waterways Conservation Act 1976* to provide special protection to some rivers, inlets and estuaries. These areas are considered especially vulnerable to degradation. They are the Albany Waterways, Avon River, Leschenault Inlet, Peel-Harvey Estuary and Wilson Inlet management areas.

- 7 Development approval from the Department of Water is required in proclaimed waterways management areas. Proponents should contact our local regional office for location advice, management measures and provide project details for assessment (Appendix D).

Swan River Trust management area

- 8 The Swan River Trust is responsible for the protection and management of the Swan–Canning River system to safeguard its ecological and social values under the *Swan and Canning Rivers Management Act 2006* (see Appendices A and B). Approval from the Trust is needed for any land- or water-based development within the Swan, Canning, Helena or Southern Rivers and their associated foreshore areas – the Swan River Trust development control area (DCA). Activities and development close to these areas are likely to have an effect on the waters of the river system. Development proposals within or abutting the DCA should be referred to the Trust for comment.
- 9 Developments distant from the DCA, but near river tributaries or drainage systems, that could affect waters within the area, e.g. by leachate in groundwater flow, should also be referred to the Trust for assessment and advice.

Near wetlands

- 10 Wetlands require an adequate buffer to protect them from adverse impacts (such as those associated with nutrients and pollutants) and to maintain ecological processes and functions. For more information about separation distances and adequate buffers to wetlands, contact the Department of Parks and Wildlife <www.dpaw.wa.gov.au>.

Residential buffers

- 11 Separation distances from residential areas should conform to *Guidance statement no.3 – Separation distances between industrial and sensitive land uses* (reference 8b) and any relevant local government planning schemes and policies. The buffer dimensions will depend upon the topography, prevailing wind conditions, size of the stockyard, the numbers of stock handled, the purpose for which the stock are handled, and noise, dust and odour management issues.

Other location constraints

- 12 Ideally, the land should be gently sloping (between 1 in 20 and 1 in 50) so liquid wastes can be easily managed, but erosion is avoided. Rocky, steep (slope exceeding 1 in 10) and erosion-prone land is considered unsuitable for stockyards.
- 13 A minimum vertical separation distance of 2 m from the finished stockyard surface to the maximum groundwater level is recommended for free-draining soils, to avoid waterlogging and to allow for filtration of soil contaminants and aerobic microbial action in the soil.

Development and expansion approvals

- 14 If a stockyard has the capacity to handle 10 000 or more animals per year, a works approval and licence is required from the Department of Environment Regulation, as a

prescribed premise under the Environmental Protection Regulations 1987 (reference 9a). For more information, contact the Department of Environment Regulation (Appendix B).

- 15 There are other statutory approvals that may apply to developing or expanding stockyard facilities. See Appendix B for a list of these and the applicable contact authorities.

Existing non-conforming activities

- 16 Many stockyards were approved and established before the introduction of present environmental standards and best management practices. Negotiations should be arranged with stockyard operators lacking effective environmental management systems to ensure that facilities and practices are progressively improved to minimise risk to water resources as practical and economic constraints allow.

New or expanded activities

- 17 Any proposed new stockyard or expansion of an existing stockyard that may affect sensitive water resources (Appendix A) should be referred to the Department of Water's nearest regional office for assessment and advice (see <www.water.wa.gov.au> and select *Contact us*).

Construction

Waste treatment and disposal facilities

Wastewater from stockyard pens, sheds, vehicles, laneways and other potentially contaminated areas as run-off, drainage or washdown should be collected and treated to an acceptable standard prior to reuse or disposal, to ensure that contaminants do not enter surface or groundwater.

- 18 Pre-treatment of wastewater to remove solids before entry into treatment ponds is recommended i.e. by installing a manure screen or sediment trap or manually removing manure from stockyards regularly (see *Solid waste*).
- 19 If there is no method for solids removal, the primary ponds should be designed so that there is adequate settling time for manure to be removed from the wastewater stream. If the facility handles various animal species adequate measures should be in place to remove each type of manure from the wastewater stream, as they may have different properties when in water (fresh cattle manure sinks, sheep manure tends to float). WQPN 39 *Ponds for stabilising organic matter* (reference 6a) provides information on best practice for wastewater treatment pond location, construction and operation.

Site drainage and design

Stockyards and associated on-site facilities need to be designed to manage solid and liquid waste to prevent water resource contamination. See Appendix D for a typical wastewater and stormwater management system.

- 20 Stockyards should be designed to facilitate access of machinery such as skid-steer loader, front-end loader or tractor back-blade to ensure ease of solid waste removal (including manure and spilt feed).
- 21 Water and feed troughs should be designed so there are no gaps underneath that can accumulate manure, with smooth vertical external sides for manure run-off. The yard floor should slope away from troughs. Concrete aprons should be installed around troughs to prevent bog holes being worn by cattle, which accumulate manure.
- 22 Lane and access ways should be constructed to facilitate distribution of feed, and movement of stock between yards. They should allow all-weather access, and minimise the generation of dust. Drainage from laneways used for stock movement should be treated as contaminated waste water and managed in the same way as stockyard washdown. The use of road humps and the directional slope of laneways and access ways may be useful in assisting to direct clean stormwater away from contaminated areas.
- 23 Fencing should be designed to allow for easy cleaning of yards. A 35 cm clearance from the ground level should be sufficient for easy removal of accumulated waste along the fencelines.
- 24 Uncontaminated stormwater should be kept separate from wastewater, and should be diverted away from wastewater ponds. Roofs, gutters and downpipes of dwellings, offices, machinery sheds, feed stores and stockyards should drain uncontaminated stormwater away from stockyard areas. Pipes, culverts and/or bund walls should be used for this purpose. All uncontaminated stormwater should be collected in a holding dam or tank for use in the operation (i.e. as stock water, dust suppression or washdown supply) or infiltrated into the ground at source where practical.
- 25 Stockyards should preferably be roofed (e.g. shed type structures) to prevent clean stormwater from entering the enclosure and offer the animals shelter. This will significantly reduce contaminated run-off, the volume of wastewater generated and therefore the size of the waste stabilisation ponds required. At least two sides should be left open for observation and ventilation.
- 26 Stockyards should have a non-slip hardstand floor, preferably brushed concrete, rolled limestone, compacted clay soils or if impractical, then a hard surfaced pad formed by compaction should be encouraged. This will reduce infiltration of liquid waste within uncovered stockyards, and also aid in the cleaning process for covered or shed structures.
- 27 The *Code of practice for welfare of animals at saleyards* (reference 3) states that it is undesirable for animals to be kept on concrete for long periods of time. The hardstand floor may therefore need to be covered with material such as sawdust, woodchips or straw. When removal is required, this material should be managed in the same way as manure, as it is contaminated solid waste.
- 28 If stockyards are not roofed, all contaminated run-off should be directed to the wastewater treatment system. It should be collected in a drainage channel with

sufficient cross section to handle a 15 mm rainfall event (reference 17), to prevent overflow.

- 29 Manure storage areas should be designed to a capacity so all manure collected can be properly contained. The location of the manure storage areas should be in accordance with the *Location* section of this note. They should have a hardstand floor area with waterproof covering (a shed type structure or impermeable lining that fully covers the storage area) to prevent contaminated run-off. In low rainfall areas (less than 400 mm per year), an impervious, contained area with controlled drainage to wastewater ponds may suffice.
- 30 Contaminated water from the washdown of stockyards, manure storage areas, vehicle areas and any other potentially contaminated areas should also be directed to the wastewater treatment system.

Operation and management

Disposal of wastes

It is an offence under the Environmental Protection (Unauthorised Discharges) Regulations 2004 to cause or allow animal waste, food waste and other scheduled items to be discharged to the environment (see Appendix B and reference 9a).

Solid waste

Solid waste includes manure, spilt feed, and screenings. Animal manure is a valuable source of plant nutrients and organic matter and can be used as an alternative to artificial fertiliser, if the application is correctly managed. It can improve soil structure, tilth and increase the water and nutrient holding ability of leached sand soils.

- 31 Where practical, manure should be collected regularly in a semi-dry state from stockyards before wash down, and contained and covered, especially if rain is anticipated and the stockyards have no roofs. This should be carried out carefully to avoid damaging the hardstand or liner, ideally by skid-steer loader, front-end loader, tractor back-blade or manually for small areas.
- 32 Manure should be stored in stockpiles or composted in designated, fully contained storage areas protected from the weather and fly strike (Appendix D).
- 33 Manure should be disposed of off-site at an approved facility or applied to land as an alternative to chemical fertilisers based on seasonal plant needs and testing of the soil nutrient content. If used as fertiliser, it should be spread evenly on the land and incorporated into erosion-prone soils, during the pasture growing season. Vegetation cover should be maintained to improve nutrient uptake and minimise leaching.
- 34 Manure should not be spread within any of the sensitive areas listed under *Location*, or directly to crops intended for human consumption. Steep slopes, paddock depressions and seasonally inundated areas should also be avoided.
- 35 The application area should be able to accommodate the nutrient loads based on vegetation growth needs, while minimising nutrient leaching below the root zone.

- 36 Manure application rates should be calculated based upon the soil type of the area and the specific plant or crop requirements after considering the results of soil testing. Department of Agriculture and Food (WA) publications (reference 4) provide more detailed information.
- 37 Sludge from wastewater treatment ponds should be periodically removed, allowed to dry within an under-drained containment structure, then stored and spread or disposed of in the same manner as manure.

Liquid waste

Liquid wastes include urine, contaminated stormwater, wash down from yards and stock transport vehicles, and contaminated run-off from stockyards and associated areas.

- 38 Low volume, high pressure water hoses should be used for wash down operations to minimise the amount of water used, which will reduce cost and the volume of liquid waste required to be managed.
- 39 Liquid waste from stockyards can be connected to reticulated sewerage where available, but only with the permission of the service provider. Otherwise, all contaminated wastewater should be directed to a wastewater treatment pond system, as outlined in the *Waste treatment and disposal facilities* section.
- 40 Treated effluent from the pond system may be reused (if its fit-for-purpose) such as for irrigation or washdown, disposed of by solar evaporation, removed off-site to a site approved by regulatory agencies or disposed to the reticulated sewerage system where available and only with permission of the service provider.
- 41 If treated wastewater is to be disposed of by on-site irrigation, this should be in accordance with *WQPN 22 Irrigation with nutrient-rich wastewater* (reference 6a).

Dead animals

- 42 The recommended method for disposing of dead animals is to a licensed rendering plant if practical, or to an approved organic waste disposal facility.
- 43 Where these facilities are unavailable, other options such as composting or vermiculture should be considered. There are guidelines available on composting and vermiculture from the Environmental Protection Authorities in New South Wales and Victoria, and the Department of Agriculture in Queensland (references 12c, 15 and 19). These can be used as a guide for undertaking composting, in conjunction with site-specific advice from relevant agencies (Appendix B).
- 44 If the alternatives described above are unavailable, on-site burial may be considered. The following points relate to burial:
- A burial pit site should be located according to the *Location* section of this note, in preferably low permeability soil (e.g. clay), with at least a 100 m buffer from the high water mark of any water supply sources and water bodies.

- There should be a minimum separation of 2 m from the maximum groundwater level.
- Carcasses should be covered with a minimum of 1 m of soil to deter scavengers.
- If more than one pit is required, these should be distributed across the property to avoid concentration of potential contaminants.
- Burial should be carried out in accordance with local government requirements, and with specific advice from regulatory agencies in sensitive environments.

45 If infectious disease has been an issue, animal carcasses may need to be burnt.

Chemical and fuel management

Pesticides, vehicle fuels, veterinary and agricultural chemicals pose a contamination risk to water resources if they are not handled and stored correctly. It is an offence under the Environmental Protection (Unauthorised Discharges) Regulations 2004 to cause or allow pesticides, petrol, diesel and other scheduled items to discharge to the environment (Appendix B and reference 9a).

46 Storage and use of any chemicals and fuels should be in accordance with WQPN 65 *Toxic and hazardous substances, storage and use* (reference 6a). Chemical storage facilities should be inspected regularly to ensure any deterioration or leakage is identified and remedied at an early stage.

47 Herbicide and pesticide use in PDWSAs should comply with the Department of Health's PSC 88 *Use of herbicides in water catchment areas* (reference 8) and our Statewide policy 2 *Pesticide use in public drinking water source areas* (reference 6b). The Department of Health should be contacted for advice on the use of pesticides where they may contact humans or enter food or water supplies.

48 Only pesticides and veterinary medicines approved by the Australian Pesticides and Veterinary Medicines Authority <www.apvma.gov.au> are allowed to be used in Australia.

Dust management

Dust can arise from stockyards through the action of animals' hooves, drying of loose manure, construction and the movement of vehicles, especially in windy conditions. Dust can cause a nuisance to neighbouring properties and residences, but also poses a threat to water resources through clogging and creating turbidity in drainage areas, waterways and wetlands. The following should be undertaken to minimise dust problems.

49 Stockyard areas should be maintained by regularly removing loose manure, using soil amendment and water sprays for dust control where necessary.

50 Internal roads, laneways and other traffic areas for stock and/or vehicles surrounding the stockyards should be watered as required (using uncontaminated water) to suppress dust.

- 51 Grass cover or other vegetation should be encouraged in areas surrounding the stockyards to minimise loose soil and therefore prevent dust generation.
- 52 Maintenance of adequate stocking densities can control dust from open yards during dry periods, as it maintains the moisture content of the yard.
- 53 Windbreaks and trees in appropriate positions based on prevailing winds should be considered to prevent dust movement especially if dust is an issue for neighbours.

Vehicle management

Vehicles are required in the operation of stockyards to transport food, chemicals, fuel and animals. Vehicle washdown and cleaning areas are normally necessary. If not managed correctly, the liquid waste from washdown areas can contaminate surface and groundwater resources. See Appendix D for a typical wastewater and stormwater management system.

- 54 Wash down of vehicles and any mechanical equipment should be undertaken as outlined in our WQPN 68 *Wash down of mechanical equipment* (reference 6a).
- 55 All contaminated wash down water should be directed to the wastewater treatment system.
- 56 Any vehicle or machinery repairs or servicing on-site should be conducted in accordance with our WQPN 28 *Mechanical servicing and workshops* (reference 6a).

Staff training and responsibilities

- 57 Employees should be well trained and reminded via signs of the risks to water resources or water supplies posed by solid and liquid waste released to the local environment.

Accidents and emergency response

Spill containment

- 58 Any potentially toxic or hazardous substance spills should drain to a sealed collection sump. These wastes should then be pumped to a sullage tank pending disposal at an approved location.
- 59 A contingency plan should be available on-site to address foreseeable emergency situations, such as accidents, fires, chemical spills and vandalism that could impact on water resources. Staff should be trained and assigned roles in conducting effective emergency response procedures. For more information, see WQPN 10 *Contaminant spills – emergency response* (reference 6a).
- 60 Absorbent materials such as sand, inert litter or atapulgite ('kitty litter') should be kept on-site to absorb any spilt chemicals. Spills should initially be cleaned up using absorbents prior to any wash down. Chemical contaminated litter should be stored in a suitable container for disposal at an approved location.

Monitoring and reporting

61 Any chemical spill or contaminated water that escapes to the environment should immediately be reported to the Department of Environment 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. Information required will include: date and time of incident, description of the escaped chemicals, quantity of chemicals, location of the spill and action taken to remedy the problem.

Activity closure

62 In the event of closure of a stockyard, the site should be restored and audited to ensure soil conditions suit the needs of the next land use.

Appendix A: Information on sensitive water resources, note limitations and updates

Sensitive water resources

Our water resources sustain ecosystems, aquatic recreation and aesthetic values as well as providing drinking, industry and irrigation supplies. Along with breathable air, uncontaminated water is essential for viable communities. Natural water resources should remain within defined quality limits to retain their ecological, social and economic values. Hence they require appropriate protection measures to minimise contamination risks.

Information on water quality parameters and processes to maintain water values are published in the Australian Government's national water quality management strategy papers. These papers are available online at <www.environment.gov.au> select *water* > *water policy and programs* > *water quality*.

The Department of Water strives to improve community awareness of catchment protection measures (for both surface water and groundwater) as part of a multi-barrier protection approach to sustain acceptable water resource quality. Human activity and many land uses pose a risk to water quality if contaminants in significant quantities are washed or leached into water resources.

Sensitive waters include estuaries, natural waterways, wetlands and groundwater. These waters support one or more of the environmental values described below.

Public drinking water sources

Overview

Public drinking water source area (PDWSA) is the collective name given to any area proclaimed to manage and protect a community drinking water source. PDWSAs include underground water pollution control areas, water reserves and catchment areas administered by the Department of Water under the provisions of the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*.

For online information on the location of PDWSAs, see our Geographic Data Atlas, available < www.water.wa.gov.au >.

Within PDWSA, priority areas are defined (priority 1 (P1), priority 2 (P2) or priority 3 (P3)) via publicly consulted drinking water source protection reports or land use and water

management strategies. Priority areas are used to guide land planning, rezoning and development approval processes. Priority areas are assigned considering the current local planning scheme zoning, land tenure, the water source's strategic value and its vulnerability to harm. Each priority area is managed using a specific risk-based strategy to provide for effective water resource protection. The Department of Water develops these documents in consultation with other government agencies, landowners, industry and the community.

P1 areas are defined to ensure human activity does not degrade a water source. These areas are declared over land where the provision of high-quality drinking water for public use is the primary beneficial land value. P1 areas typically cover land controlled by the state government or one of its agencies. These areas are managed under the principle of *risk avoidance*, so most land development and human activity is normally opposed.

P2 areas are defined to ensure there is *no increased risk of pollution* to the water source once a source protection plan has been published. These areas are declared over land where low-intensity development exists (involving rural usage such as dry land grazing or cropping). Protection of public water supply sources is a high priority in P2 areas. These areas are managed in accordance with the principle of *risk minimisation*, and so the intensity of development should be restricted (via management conditions) and activities with a low water contamination risk are normally considered acceptable.

P3 areas are defined to *manage the risk of pollution* to the water source. These areas are declared over land where public water supply sources must co-exist with other land uses such as residential, commercial and/or light industrial development. Protection of P3 areas is mainly achieved through land use management measures e.g. contamination barriers. Environmental guidance (such as these notes) or site-specific development approval conditions are used to limit the water resources contamination risk from the land use or activity. If, however, the water source becomes contaminated, then water supplied from P3 sources may need to be more intensively treated or an alternative water supply source commissioned.

Additional protection zones are defined close to the point where drinking water is extracted or stored. These zones are called wellhead protection zones (WHPZs) and reservoir protection zones (RPZs). Statutory land use constraints apply to activities within these zones surrounding sources to safeguard these waters most vulnerable to contamination.

WHPZs are assigned around water production wells based on hydrological factors. Statutory land use restrictions apply within these zones as groundwater moves rapidly towards wells due to aquifer depressurisation by pumping. Any contaminants leaching from the ground surface in a WHPZ could rapidly migrate into scheme water supplies (before effective remedial action can occur). In sedimentary basins, WHPZs are usually circular, with a radius of 500 m in P1 areas and 300 m in P2 and P3 areas. These zones do not extend outside PDWSA boundaries.

RPZs are defined over and around public water supply storage or pipe-head reservoirs. Statutory access and land use restrictions apply in RPZs. The aim is to restrict the likelihood of contaminants being deposited or washing into water sources in any run-off. RPZs are normally within state-controlled areas encompassing land up to 2 km measured outward from the reservoir top water-level and include the inundated area when the reservoir is full.

For additional explanatory information on PDWSAs, see our Water quality protection note (WQPN) 25 *Land use compatibility in public drinking water source areas*, WQPN 36 *Protecting public drinking water source areas*, WQPN 75 *Proclaimed public drinking water source areas*, WQPN 76 *Land use planning in PDWSA* and WQPN 77 *Risk assessment in PDWSA*. These notes are available online at <www.water.wa.gov.au>.

Established activities within PDWSAs

Many land use activities were approved and established before publication of a source protection plan or land use and water management strategy.

Activity operators should ensure that modern environmental facilities and practices are progressively implemented and maintained so that the water resource contamination risk is minimised (within practicable and economic constraints).

New or expanded activities in PDWSAs

Any development proposals that could affect a drinking water source should be referred to this department's local regional office with detailed supporting information for an assessment and written response.

The development proposal may be:

- approved (with or without conditions)
- delayed pending receipt of additional information before a decision is made; or
- opposed due to a statutory or policy conflict or inadequate protective measures provided to safeguard the water source.

To assist the assessment, operators should demonstrate that under all operating conditions the facilities and processes used on-site do not pose a significant water contamination risk.

Buffers to water supply sources

Native vegetation buffers should be used to separate compatible land use areas from the sources of drinking water including the full supply margins of reservoirs, their primary feeder streams and/or production bores. Advice on suitable buffer forms and dimensions is provided in our WQPN 6 *Vegetated buffers to sensitive water resources*.

Within clearing control catchments

Controls on vegetation clearing for salinity management in country areas are provided under part IIA of the *Country Areas Water Supply Act 1947*.

These controls apply in the Wellington Dam, Harris River Dam, Mundaring Weir and Denmark River catchment areas and the Kent River and Warren River water reserves.

Details of clearing controls may be obtained from our regional offices, see online information at <www.water.wa.gov.au>, select *Contact us*.

Private water supply sources

Private water sources vulnerable to contamination include:

- drinking water sources for people or domesticated animals

- commercial or industrial water supply sources (requiring specific qualities that support activities such as aquaculture, cooling, food and mineral processing or crop irrigation)
- urban or municipal irrigation sources (where water quality may affect vegetation performance or people's health and wellbeing).

Underground ecosystems

Important underground ecological functions that may be at risk of contamination include groundwater- and cave-dwelling animals and microorganisms (generally located within soils that have open pore spaces such as sand, gravel and limestone).

Waterway ecological and social values

Waterways that have high social and conservation significance are described in the Western Australian Environmental Protection Authority (EPA) Guidance statement 33 *Environmental guidance for planning and development*, section B5.2.2. This statement is available online at <www.epa.wa.gov.au> select *policies and guidelines > environmental assessment guidelines > guidance statements*.

The Department of Water manages natural waterways under Section 9 of the *Water Agencies (Powers) Act 1984* and the *Rights in Water and Irrigation Act 1914*. For online information, see <www.water.wa.gov.au> and select *managing water*. Apart from aquatic ecosystems and water sources, waterways provide social values including aesthetic appeal, drainage pathways and recreational opportunities for watercraft use, fishing, tourism, swimming and related aquatic activities. Engineered drains and constructed water features are normally not assigned ecological values because their primary function and operational factors outweigh their ecological value.

This department also administers the *Waterways Conservation Act 1976* which defines Western Australian waterways subject to specific regulatory controls. Currently proclaimed waterways include the Avon River, Peel-Harvey Inlet, Leschenault Inlet, Wilson Inlet and Albany waterways management areas.

Within the Swan-Canning Estuary catchment

The Swan River Trust is responsible for the protection and management of the Swan-Canning River system. The Trust safeguards ecological and social values under the *Swan and Canning Rivers Management Act 2006*. Written approval is needed for any land- or water-based development within the Swan, Canning, Helena or Southern Rivers and their associated foreshore areas within the Swan River Trust development control area (DCA). Human activity and development close to these areas are likely to have an effect on the waters of the river system. Development proposals within or abutting the DCA should be referred to the Trust for assessment.

Developments outside the DCA, but near river tributaries or drainage systems should also be referred to the Trust for assessment and advice. This is because water quality within the area may be affected by chemicals leached into groundwater flow. For detailed information, see online advice at <www.swanrivertrust.wa.gov.au>, phone 9278 0900 or email: planning@swanrivertrust.wa.gov.au .

Wetland ecology

Many important wetlands have been given conservation status under the Ramsar convention (described online at <www.ramsar.org>), Japan and Australia migratory bird agreement (JAMBA), China and Australia migratory bird agreement (CAMBA), and Republic of Korea and Australia migratory bird agreement (ROKAMBA).

Wetlands are also protected under various national and Western Australian government policies. Conservation wetland data to guide land planning and development activities is provided via the following publications:

- *Directory of important wetlands in Australia* defines wetlands scheduled by the Australian Government. It is available online at <www.environment.gov.au> select *water > water topics > wetlands*.
- Wetlands with defined high conservation significance are described in the EPA (WA) guidance statement 33 *Environmental guidance for planning and development* (section B4.2.2). This statement is available online at <www.epa.wa.gov.au> select *policies and guidelines > environmental assessment guidelines > guidance statements*.

The Department of Parks and Wildlife is the custodian of the state wetland datasets, and is responsible for maintaining and updating relevant information. These datasets are available by contacting the department (<www.dpaw.wa.gov.au>).

Wetlands datasets identified for conservation value or for resource enhancement include:

- *Geomorphic wetlands of the Swan Coastal Plain*
- *South coast significant wetlands*
- *Geomorphic wetlands Augusta to Walpole* (this dataset awaits detailed evaluation).

Wetlands that are highly disturbed by land use, or have been landscaped to provide a social amenity or drainage control function in urban settings, may not be assigned conservation values unless they are actively managed to maintain these values.

Note limitations

Many Western Australian aquifers, waterways and wetlands await detailed scientific evaluation, present data on their quality is sparse and their values remain unclassified. Unless demonstrated otherwise, any natural waters that are slightly disturbed by human activity are considered to have sensitive environmental values. Community support for these water values, the setting of practical management objectives, provision of sustainable protection services and effective implementation are vital to protecting or restoring water resources for both current needs and those of future generations.

This note provides a general guide on environmental issues, and offers solutions based on data searches, professional judgement and precedents. Recommendations made in this note do not override any statutory obligation or government policy statement. Alternative practical environmental solutions suited to local conditions may be considered. This note's recommendations shall not be used as this department's policy position on a specific matter, unless confirmed in writing. In addition, regulatory agencies should not use this note's recommendations in place of site-specific development conditions based on a project's assessed environmental risks. Any regulatory conditions should consider local environmental values, the safeguards in place and take a precautionary approach.

Where a conflict arises between this note's recommendations and any activity that may affect a sensitive water resource, this note may be used to assist stakeholder negotiations. The negotiated outcome should not result in a greater water quality contamination risk than would apply if the recommended protection measures were used.

Water quality protection note updates

This note will be updated as new information is received, industry/activity standards change and resources permit. The currently approved version is available online at <www.water.wa.gov.au> select *publications* > *find a publication* > *series browse* > *water quality protection notes*.

Appendix B: Statutory approvals relevant to this note include:

What's regulated?	Western Australian statutes	Regulatory office
Regulation of prescribed premises that could pollute (stockyards with a holding capacity of \geq 10 000 animals per year)	<i>Environmental Protection Act 1986</i> – Part V Environmental regulation Environmental Protection Regulations 1987 Environmental Protection (Abattoirs) Regulations 2001 Environmental Protection (Unauthorised Discharges) Regulations 2004	Department of Environment Regulation < www.der.wa.gov.au >
Land and waters that have been contaminated by human activity	<i>Contaminated Sites Act 2003</i> and associated regulations 2006	
Management of human wastes Community health issues	<i>Health Act 1911</i>	Department of Health < www.health.wa.gov.au > Local government
Transport, storage and handling of fuels, solvents, explosive and other dangerous goods	<i>Dangerous Goods Safety Act 2004</i> Dangerous goods safety regulations 2007	Department of Mines and Petroleum – Resources Safety Division < www.dmp.wa.gov.au >
Licence to take water or disturb waterways Permit to alter bed or banks of waterways	<i>Rights in Water and Irrigation Act 1914</i>	Department of Water regional office < www.water.wa.gov.au >
Discharge of waters to managed waterways	<i>Waterways Conservation Act 1976</i>	
Developments in proclaimed PDWSAs	<i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i> <i>Country Areas Water Supply Act 1947</i>	
Native vegetation clearing	<i>Country Areas Water Supply Act 1947</i> Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Department of Water < www.water.wa.gov.au > Department of Environment Regulation < www.der.wa.gov.au >

What's regulated?	Western Australian statutes	Regulatory office
Pastoral leases	<i>Land Administration Act 1997</i>	Pastoral Lands Board of Western Australia (c/- Department of Lands) < www.lands.wa.gov.au >
Emergency response planning	<i>Fire and Emergency Services Authority of WA Act 1998</i>	Department of Fire and Emergency Services < www.dfes.wa.gov.au >
Statutory policies covering wetlands, drinking water catchments and estuaries	<i>Environmental Protection Act 1986</i> , – Part III Environmental protection policies	Minister for the Environment advised by the Environmental Protection Authority < www.epa.wa.gov.au >
Impact of significant development proposals on the values and ecology of land or natural waters	<i>Environmental Protection Act, 1986</i> – Part IV Environmental impact assessment	
Discharges into the Swan-Canning Estuary	<i>Swan and Canning Rivers Management Act 2006</i>	Swan River Trust < www.swanrivertrust.wa.gov.au >
Discharge to sewer (industrial waste permit) or to main drain	<i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i> <i>Country Towns Sewerage Act 1948</i>	Water Corporation < www.watercorporation.com.au > Designated water services provider
Subdivision of land Land zoning and development approval	<i>Planning and Development Act 2005</i>	Western Australian Planning Commission Department of Planning < www.planning.wa.gov.au > Local government

Statutes are available online from the *State Law Publisher* at <www.slp.wa.gov.au>.

Appendix C: Information needed for development assessments

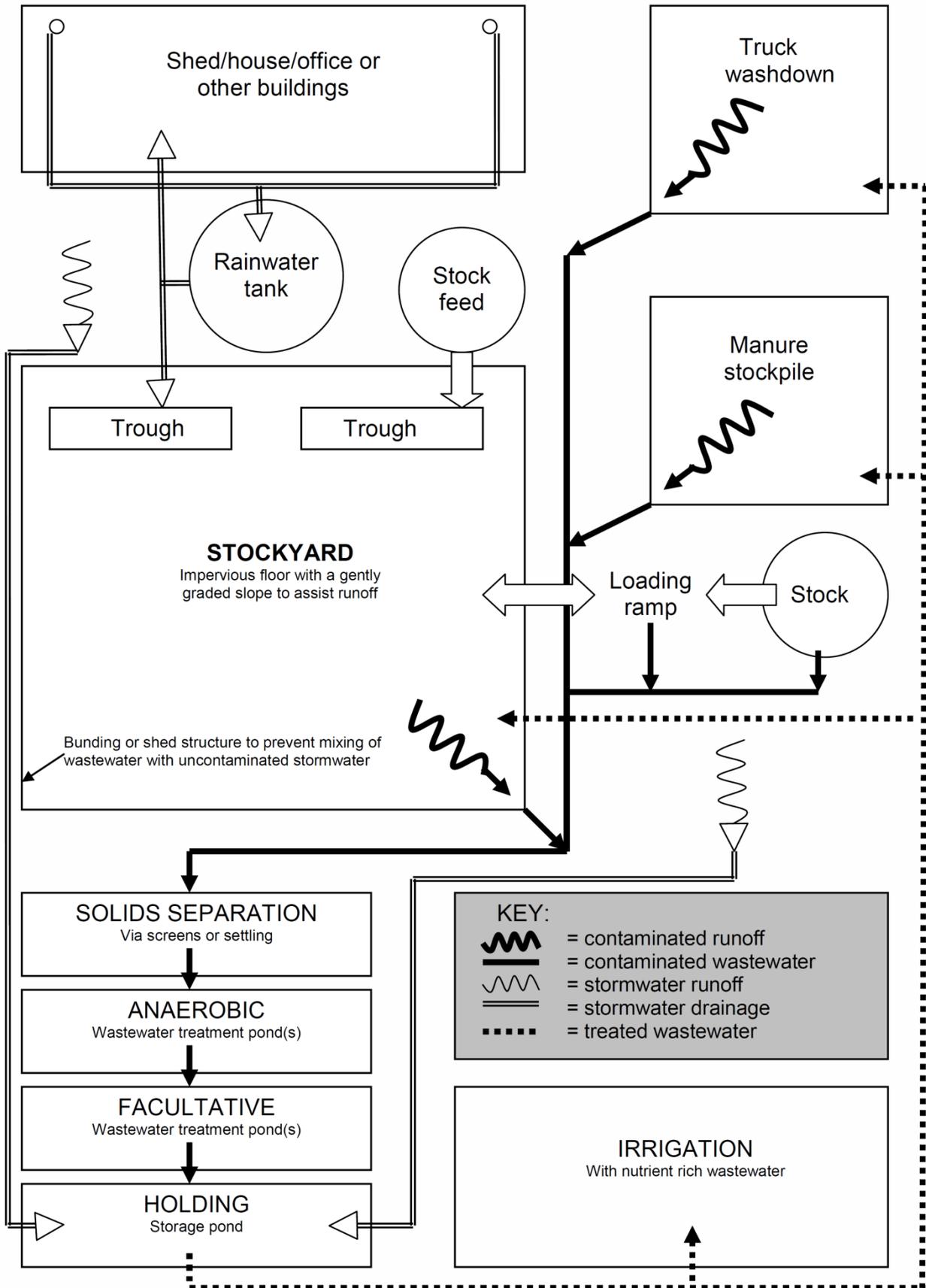
Where facilities near sensitive waters are to be constructed or upgraded, the following data should be supplied with the development proposal:

- 1 Site owner/operating tenant's name and contact details.
- 2 A site plan showing the location of the project facilities relative to tenements, leases, lots and roads. The plan should show the topography, remnant vegetation cover, existing and proposed development areas and on-site water features and sources.
- 3 Details of site investigation of soil strata, depth to water table (if applicable) and data on the location, extent, hydrology, quality and dependencies on local water resources (including any seasonal variations) that could be affected by site operations or facilities.
- 4 The present local government land use zoning (where applicable). Current land use description, any site contamination history and its remediation.

- 5 Full description and scale of the activities planned for the project site, (site amenities, crops, animals, earthworks and chemical applications), construction and operating workforce and planned project operational life.
- 6 Describe intended commissioning date, operating times and any expansion options.
- 7 Details of any proposed vegetation clearing, environmental buffers, site earthworks and services including water supply, sewage and drainage.
- 8 Description of all materials/chemicals to be stored or handled on-site in commercial quantities, including a water use budget.
- 9 Description of the types, quantities and quality of solid and liquid waste (if applicable) that will be generated or disposed from the facility.
- 10 Environmental management plan describing planned material containment, waste management (treatment and disposal); and nutrient and irrigation management plan.
- 11 Details of any environmental modelling conducted to demonstrate the effects of the project on local water resources.
- 12 Planned operational and equipment maintenance procedures.
- 13 Details of any contingency measures proposed to minimise the impacts of spills and safely dispose of contaminated waters that may result from storms, fire, flood or equipment malfunction or vandalism. Information should include workforce training, site monitoring and emergency response facilities.
- 14 Any project contractual agreements or regulatory approvals received.

For significant projects, development proponents should engage the services of a qualified and experienced consultant to professionally prepare their development proposal. This should ensure that government agencies can efficiently assess and respond to the proposal without delays caused by inadequate or poorly defined information.

Appendix D: Typical waste and stormwater management system diagram at a stockyard



References and further reading

National guidelines and standards

- 1 Australian Government, national water quality management strategy papers available online at <www.environment.gov.au> select *water* > *water policy and programs* > *water quality*:
 - a Paper 2 – *Policies and principles*, 1994
 - b Paper 3 – *Implementation guidelines*, 1998
 - c Paper 4 – *Australian and New Zealand guidelines for fresh and marine water quality*, 2000
 - d Paper 6 – *Australian drinking water guidelines*, 2011
 - e Paper 7 – *Australian guidelines for water quality monitoring and reporting*, 2000
 - f Paper 9 – *Rural land uses and water quality – a community resource*, 2000
 - g Paper 21 – *Australian guidelines for water recycling: Managing health and Environmental risks (phase1)*, 2006To obtain printed copies of the papers, refer to <www.awa.asn.au>, request by email at <bookshop@awa.asn.au> or obtain them from a library.
- 2 Primary Industries Standing Committee, 1997. *National guidelines for beef cattle feedlots in Australia (2nd ed.) – SCARM Report no. 47*, CSIRO publishing, available <www.publish.csiro.au/pid/114.htm>.
- 3 Standing Committee on Agriculture, Animal Health Committee, 2002. *Model code of practice for the welfare of animals – Animals at saleyards – SCARM report no. 31*, CSIRO publishing, available <www.publish.csiro.au/pid/367.htm>.

Government of Western Australia documents

- 4 Department of Agriculture and Food publications available online at <www.agric.wa.gov.au> select *Publications*:
 - a Farmnotes
 - *Livestock on Small Landholdings* – 3/2003 (reviewed 2005)
 - *Manure Management on small properties* – 21/98
 - *Water quality for farm domestic and livestock use* – 43/2004.
 - b Dairynotes
 - *Security of Effluent Storage Ponds* – 4/99
 - c Other
 - DairyCatch program – *Effluent best management practices*.
- 5 The previous Department of Environment publications:
 - a *Environmental Protection Act 1986, Part V* Category 55 licence, Great Southern Cattle Yard Licence no. 7407/6 (22 February 2005), Department of Environment Regulation <www.der.wa.gov.au>
 - b Geomorphic Wetlands dataset, now available Department of Parks and Wildlife <www.dpaw.wa.gov.au>

- c *Wetlands position statement 2001*, now available Department of Parks and Wildlife <www.dpaw.wa.gov.au>.
- 6 Department of Water publications, available online at <www.water.wa.gov.au> select *publications* > *find a publication* > *series browse*
- a Water quality protection notes (WQPNs), select *water quality protection notes*
- WQPN 6 *Vegetated buffers to sensitive water resources*
 - WQPN 10 *Contaminant spills – emergency response*
 - WQPN 22 *Irrigation with nutrient-rich wastewater*
 - WQPN 25 *Land use compatibility in public drinking water source areas*
 - WQPN 28 *Mechanical servicing and workshops*
 - WQPN 35 *Pastoral activities within rangelands*
 - WQPN 36 *Protection of public drinking water source areas – an overview*
 - WQPN 39 *Ponds for stabilising organic matter*
 - WQPN 65 *Toxic and hazardous substances, storage and use*
 - WQPN 68 *Wash down of mechanical equipment.*
- b Other:
- Foreshore policy 1 – *Identifying the foreshore area*
 - River restoration report 16 – *Determining foreshore reserves*
 - Statewide policy 2 – *Pesticide use in public drinking water source areas 2000*
 - Water quality protection guidelines, select *water quality protection guidelines*, Guideline 13 *Environmental guidelines for horse activities, 2002*
 - Water notes (WN) and river restoration reports, select *water notes* or *River restoration reports*
 - o WN 06 *Livestock management: Construction of livestock crossings*
 - o WN 07 *Livestock management: Watering points and pumps*
 - o WN 18 *Livestock management: Fence location and grazing control*
 - o WN 23 *Determining foreshore reserves*
- 7 Department of Environment & Department of Agriculture 2002. *Guidelines for the Environmental Management of Beef Cattle Feedlots in Western Australia – Bulletin 4550*, Government of Western Australia, Perth, available <www.water.wa.gov.au> select *Publications* > *Guidelines* > *Water quality protection guidelines*.
- 8 Department of Health publication, available online at <www.health.wa.gov.au> select *public health* > *water*, then search *PSC 88*
Public service circular 88 – Use of herbicides in water catchment areas
- 9 Environmental Protection Authority
- Guidance Statements available online at <www.epa.wa.gov.au> select *guidance statements (GS)*
- a GS 3 – Separation distances between industrial and sensitive land uses (June 2005)
- b GS 33 – Environmental guidance for planning and development (May 2008).

Other sources

- 10 Bathurst Council, 21 July 2005, *Media Release – Bathurst Council moves on \$11M Saleyards plan*, sourced 2/8/2005 from <http://bathurst.local-e.nsw.gov.au/news/pages/14074.html>.
- 11 Denyer R, 2005, *Ordinary Meeting of Bathurst Regional Council Item – Development Application 2005/0742 – Upgrade of water and waste management system at Bathurst Saleyards*. Bathurst Regional Council, New South Wales, sourced 12/8/2005 from John.Clague@bathurst.nsw.gov.au.
- 12 Department of Primary Industries and Fisheries (Queensland) documents available online at <www.dpi.qld.gov.au > search <topic >
 - a. *Beef cattle feedlots site selection (updated September 2003)*
 - b. *Beef cattle yards (reviewed 18 February 2004)*
 - c. *Composting organic waste (updated April 2005)*
 - d. *Feedlot waste management design concepts to aid cleaning (updated September 2003)*
 - e. *Feedlot Waste Management manure removal and stockpiling (updated September 2003)*.
- 13 Department of Primary Industries, Water and Environment (Tasmania) documents available online at <www.environment.tas.gov.au /search <title> *Wastewater management guidelines for intensive animal husbandry activities*.
- 14 Environmental Protection Authority – New South Wales 2002, *Abattoirs* www.epa.nsw.gov.au/mao/abattoirs.htm
- 15 Environmental Protection Authority Victoria, 1996, *Environmental Guidelines for Composting and Other Organic Recycling Facilities*, available online at <http://epanote2.epa.vic.gov.au/EPA/publications.nsf/PubDocsLU/508?OpenDocument>
- 16 Geolyse Pty Ltd. 2005, *Bathurst stock selling centre upgrade – Water and waste management*, management report prepared for Maunsell Australia Pty Ltd, and the Bathurst regional council, (NSW) <www.bathurst.nsw.gov.au>
- 17 Engineers Australia *Australian Rainfall and Run-off* , publication available for purchase at <www.engineersmedia.com.au > search *EA books*.
- 18 Maroochy Shire Council 2000, *Planning Scheme Code 3.2 – Code for Development and Use of Intensive Animal Industries and Aquaculture* Queensland publication available online at http://ww.maroochy.qld.gov.au/site/volume_4/03_rural_development/03_2.html
- 19 Recycled organics unit 2002, *Best practice guideline to managing on-site vermiculture technologies*, University of New South Wales Sydney, available <http://www.resource.nsw.gov.au/data/Vermiculture%20BPG.pdf>.

Disclaimer

This document has been published by the Department of Water. Any representation, statement, opinion or advice expressed or implied in this publication is made in good faith and on the basis that the Department of Water and its employees are not liable for any damage or loss whatsoever which may occur as a result of action taken or not taken, as the case may be in respect of any representation, statement, opinion or advice referred to herein. Professional advice should be obtained before applying the information contained in this document to particular circumstances.

Feedback

We welcome your thoughts on this note. Feedback will help us prepare future versions. To comment on this note or seek any clarification, please contact our water source protection planning branch (details below), citing the note topic and version.

Manager, Water Source Protection Planning

Department of Water

168 St Georges Terrace PO Box K822

Perth Western Australia 6000 Perth Western Australia 6842

Telephone +61 8 6364 7600 Facsimile +61 8 6364 7601

Email waterquality@water.wa.gov.au National relay service 133 677

To locate our regional offices online, see <www.water.wa.gov.au>, then select *Contact us*.

This publication is available online at <www.water.wa.gov.au> select *Publications* > *find a publication* > *series browse* > *water quality protection notes*. For those with special needs it can be made available in alternative formats such as audio, large print, or Braille.

April 14-KB-(21179)