



WQPN 98, May 2007

Rural Abattoirs

Purpose

Abattoirs are an important industry in Western Australia. They play a major role in Western Australia's domestic meat supply and export industry, as well as employment opportunities to many rural communities.

Abattoirs however pose the following contamination risks to water resources:

- nutrients from animal manure and process wastewater leading to eutrophication in wetlands and waterways, and toxic concentrations of nitrogen compounds;
- depletion of oxygen levels in surface waters due to the breakdown of organic matter;
- pathogens such as salmonella bacteria from any diseased stock held at the site;
- increased salinity derived from waste stabilisation pond effluent evaporation;
- increased turbidity due to solids transfer to waterways and wetlands; and
- alkalinity and surfactants derived from equipment cleaning.

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:

- the Department's current views on the location and operation of rural abattoirs;
- guidance on acceptable practices used to protect the quality of Western Australian water resources; and
- a basis for the development of a multi-agency code or guideline designed to balance the views of industry, government and the community, while sustaining a healthy environment.

This note provides a general guide on issues of environmental concern, and offers potential solutions based on professional judgement and precedent. The recommendations made do not override any statutory obligation or Government policy statement. Alternative practical environmental solutions to suit local conditions may be proposed. Regulatory agencies should not use this note's recommendations without a site-specific assessment of any project's environmental risks. Any conditions set should consider the values of the surrounding environment, the safeguards in place, and take a precautionary approach. The note shall not be used as this Department's policy position on a specific matter, unless confirmed in writing.

Scope

This note applies to commercial abattoirs situated in rural areas, which process domestic and wild harvest animals for human consumption or the pet food market and are located in areas where there are sensitive water resources. For more information on sensitive water resources, see [Appendix C](#).

The note is not intended to cover associated activities such as stockyards, by-product plants or fellmongering, but may offer some useful guidance on potential risks to water resources and good practice.

Recommendations

Sites for abattoirs

1. Abattoirs should be located on land with the following attributes:
 - a. zoned for the activity under the local government (council) town planning scheme;
 - b. access to essential services, including waste recycling and disposal services;
 - c. sufficient on-site area to provide for the safe and effective management of wastes;
 - d. sufficient area for possible future expansion of premises;
 - e. a gradient of less than ten per cent to facilitate earthworks and minimise erosion;
 - f. not flood prone or where the groundwater table is less than two metres below the surface;
 - g. retention of adequate buffers to sensitive environments such as residential areas, recreation facilities, drinking water sources and sensitive water resources;
 - h. stable soils suited to animal holding, infrastructure construction, stabilisation pond construction and wastewater disposal;
 - i. adequate internal buffers to rural dwellings, roads, waterways and wetlands;
 - j. suitable climatic conditions to allow for the effective operation of the waste management systems; and
 - k. visual and odour impacts to neighbouring communities should be considered prior to construction.

Within Public Drinking Water Source Areas

Public Drinking Water Source Area (PDWSA) is the collective name given to any catchment area declared for the management and protection of water sources used for public drinking water supplies. PDWSA includes Underground Water Pollution Control Areas, Water Reserves and Catchment Areas proclaimed under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *County Areas Water Supply Act 1947*. For details on these statutes and associated regulatory measures in PDWSA, see [Appendix B](#). The location of PDWSA is shown at www.water.wa.gov.au, select *Maps, data and atlases > Geographic Data Atlas*, then *Environment > PDWSA*.

2. The establishment or expansion of abattoir facilities is *incompatible* with the management objectives for PDWSA. This Department will oppose development or expansion of these facilities in these areas or zones.

Near natural waterways or within Waterways Management Areas

3. Facilities should not be established on land subject to seasonal flooding or within floodplains.
4. Adequate separation distances should be maintained from natural waterways to minimise the risk of degradation of water quality. These separation distances are determined on the basis of the waterway values, vulnerability and biophysical criteria (see [Foreshore Policy 1 – Identifying the foreshore area and Appendix A, Reference 7e](#) for supporting information). For advice on buffer selection, see this Department’s Water Quality Protection Note *Vegetation buffers to sensitive water resources*.
5. Five Waterways Management Areas have been declared via the *Waterways Conservation Act 1976* to provide special protection to estuaries and their associated waterways that are considered especially vulnerable to degradation. These areas are the Albany Waterways, Avon River, Leschenault Inlet, Peel–Harvey Estuary, and Wilson Inlet. If a development is located within a Waterways Management Area, prior written approval is required from the department administering the waterway. Information on waterway values and the location of these management areas can be obtained by contacting the Department of Water’s regional office (see www.water.wa.gov.au and select *Contact us*).
6. For information on the constraints for clearing of native vegetation, contact the Department of Environment and Conservation’s nearest regional office or refer to the brochure *Protecting Native Vegetation – New laws for Western Australia*, available at www.dec.wa.gov.au, select *Department of Environment > Land > Native vegetation protection > Publications*.

Within the Swan River Trust management area

7. Approval from the Minister for the Environment is required for any land or water-based development within or abutting the Swan, Canning, Helena and Southern Rivers and adjoining lands within the management area established via the *Swan River Trust Act 1988* and the *Swan and Canning Rivers Management Act 2006*. For submission details see web site www.swanrivertrust.wa.gov.au, or phone the Trust on 9278 0900.
8. Applications for development outside the management area, but likely to affect waters within the area, should be referred by regulatory authorities to the Trust for comment prior to any decision to approve the development.

Near conservation valued wetlands

The Department of Environment and Conservation aims to ensure that chemicals or contaminated waters do not enter the environment close to sensitive waters such as wetlands, see [Appendix C](#).

9. Wetlands require an adequate buffer to protect them from potential adverse impacts (eg associated with nutrients and pollutants) and to maintain ecological processes and functions within the wetland. The width of the buffer should be determined based on the values of the wetland, the threats posed by the adjacent land use and the protective management techniques used at the facility to maintain or improve wetland values. Recommended buffer distance criteria for the Swan Coastal Plain are provided in *Position Statement: Wetlands* (Water and Rivers Commission, 2001) see [Appendix A, reference 6a](#). A minimum buffer width to the wetland boundary of 50 metres is recommended.

For more information on identifying wetland buffers, see Chapter B4 of the Environmental Protection Authority's *Draft Guidance Statement No. 33 Environmental Guidance for Planning and Development*, (see [Appendix A, reference 4a](#)).

10. Details of development proposed within 500 metres of any wetland (eg lakes, sumplands, damplands and palusplain wetlands) listed as a sensitive water resource in Appendix C should be forwarded to the nearest regional office of the Department of Environment and Conservation for assessment, with supporting information addressing the environmental risks.

Regulation of abattoirs

11. Regulation of emissions and discharges from prescribed premises is undertaken by the Department of Environment and Conservation. Abattoirs are listed as a prescribed premises under schedule 1 and schedule 2 of the Environmental Protection Regulations 1987. Premises with a production or design capacity of 1,000 tonnes or more of animals (live weight) per year (Category 15) require a works approval for construction and a licence to operate under the Environmental Protection Act 1986. Premises with a production or design capacity of more than 100 but less than 1,000 tonnes of animals (live weight) per year (Category 2) require a registration to operate and must demonstrate compliance with the Environmental Protection (Abattoirs) Regulations 2001.
12. 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](#)).
13. Large scale abattoirs are required to have their licence renewed every year, while small scale abattoirs are only registered under the Environmental Protection (Abattoirs) Regulations 2001. Licensee's pay an annual fee to retain their license but are renewed/reissued every one to five years as determined by the Department of Environment and Conservation. Registered premises pay a one-off fee upon first application and once granted there is no expiry date.
14. Abattoirs that propose to expand or change any part of the abattoir (ie volume of wastewater produced, capacity of abattoir) must apply for a works approval (Environmental Protection Act, 1986, Part V, Division 3).
15. Animal processing effluents and waste carcasses are a Controlled Waste, and a licence to transport and treat such wastes is required for bulk quantities (Environmental Protection (Controlled Waste) Regulation 2004, Schedule 1: Controlled Waste, see [Appendix B](#)).
16. Planning and health aspects are dealt with by local government.

Construction

Animal holding and lairage

17. Yards and stables should contain sand or sawdust overlying a hardstand surface with a permeability of 10^{-9} metres per second or less. They should also be constructed to prevent intrusion of external surface runoff. Runoff from yards and stables should be directed to the on-site wastewater treatment system.

18. Yards and stables should be located away from waterlogged soil and natural drainage lines, and at least 100 metres from waterways and wetlands.
19. Manure should be stockpiled in a hardstand surface with a permeability of 10^{-9} metres per second or less and dried before spreading on the land as part of a Nutrient and Irrigation Management Plan (NIMP). It should be managed to prevent fly strike and odours developing and to prevent seepage of the liquid phase into the soil and groundwater.
20. Sludge that is removed from the treatment ponds should be allowed to dry and then spread as for manure. Drying should be on a hardstand surface with a permeability of 10^{-9} metres per second or less. It is best to dry it out in summer months to quickly develop a sealing crust and prevent odour emissions, with controls to prevent fly-strike.
21. Manure should be stored in a container or area that is protected from rainfall and surface runoff, be located on high ground and at least 100 metres away waterways, wetlands and natural drainage lines.
22. Manure should not be applied closer than 100 metres to waterways and wetlands.

Stock transport washdown

23. Washdown of vehicles should be undertaken as outlined in the Water Quality Protection Note *Washdown of mechanical equipment* (see [Appendix A, reference 7c](#)).
24. All contaminated water should be directed to the wastewater treatment system.

Abattoir facilities

25. The volume of waste should be minimised by the use of small diameter, high-pressure hoses for washdown operations.
26. Trigger operated 'shut-off' valves on the hoses should be used to assist in reducing the amount of water used.
27. Gross solid wastes should be removed prior to hosing down processing areas as this helps to reduce the suspended matter that can overload the primary treatment system. The use of traps on drains can also assist.
28. Screens should be used to separate paunch solids (an animal's stomach content of partly digested vegetation) from entrained and conveying wastewaters. From here the wastewater can be discharged to the secondary treatment system and the left-over solids can be stored with other solid wastes from the abattoir and managed as described in the Solid Waste Management section.
29. Clean stormwater should be kept separate from the contaminated areas and directed to the stormwater drainage system. Stormwater should also be allowed to infiltrate on site where practical.
30. All process areas should have concrete floors graded to washdown drains.

Water supplies

31. Under the *Rights in Water and Irrigation (RIWI) Act 1914*, a licence is required in most areas in order to access surface or groundwater to provide the water supply for the premises use. To apply for a licence, a detailed plan with specifications should be submitted to this Department's nearest regional office. Fines from \$2,500 to \$10,000 are applicable if the licensee does not comply with the licence conditions.
32. For some rural areas, a licence is not required to obtain water. Water sources can include scheme water, dams and recycled water from other operations.

Fuel and chemical storage

33. Tanks should be located on hard stand areas with associated perimeter bunding. This reduces the leakage risk into surrounding waterways, wetlands, storm drains, ponds or soils. For more information see this Department's Water Quality Protection Notes: *Toxic and hazardous chemicals – storage and use* and *Tanks for above ground chemical storage* (see [Appendix A, reference 7c](#)).

Site operation

Solid waste management

Sources of solid waste in abattoirs include animal holding areas, slaughterhouse and processing areas, waste treatment plant, unwanted hide or skin pieces, and unwanted carcasses and carcass parts (for more information see: www.epa.nsw.gov.au/mao/abattoirs.htm#solid).

34. Disposal of abattoir waste is the responsibility of the abattoir operator and should be managed under conditions of licence or site-specific management plan.
35. Solid waste should be held in a weatherproof skip before consignment to a rendering works, transfer to a digester or composted for stabilisation prior to land application. Waste disposal may be conducted through methods such as application to land to meet plant nutrient needs, rendering then sale of fertiliser and bone meal, on-site treatment of the solid waste to produce pelletised soil additives/animal feedstock or if other options are not viable, disposal to an authorised landfill site. Application of solid waste to land should only occur if the waste material has been composted. Composting over 1,000 tonnes of material per year requires a works approval and licence from the Department of Environment and Conservation.
36. An assessment of the nature and quality of the waste should be conducted to minimise its production and determine whether to recycle or convert it to other useful products.
37. Solid waste should be kept separate from wastewater streams via the use of bucket traps and skips. This decreases the volumetric and organic load on the wastewater treatment stream.
38. Non-organic solid waste such as packaging and hair nets should be kept away from the wastewater streams to prevent blockages and resulting equipment malfunctions.
39. Paunch material should be kept dry, stabilised and disposed of by reuse or landfill.
40. Blood greatly increases the putrescible organic load, measured as Biochemical Oxygen Demand (BOD) on waste treatment systems. It should be regarded as a saleable commodity

that is dried and marketed as a fertiliser (blood and bone). Some key strategies to help manage blood while reducing BOD are listed as follows:

- directly recover as much blood as practical (at least 95% without washdown) to prevent the blood entering the water system and process separately;
- place a trigger operated nozzle on washdown hoses to decrease water use;
- pass waste through a screen to collect solid material and dispose of separately;
- collect the solid waste in a dry state rather than flush into the wastewater stream;
- all scraps should be collected in bucket traps and disposed correctly rather than letting it wash down the drains; and
- waste from cuttings and trimmings should be placed in a save-all or digester.

Liquid waste treatment

Liquid waste includes blood, urine, other body fluids, animal faeces, contaminated stormwater, washdown from yards and stock transport vehicles, and contaminated runoff from washdown areas within the abattoir.

41. The most common method used for treatment of wastewater is through a two-stage system via gravity flow from the plant to the treatment facilities. The primary stage deals with the removal of floating and settling solids, while the secondary stage uses biological treatment to stabilise and reduce residual organic matter. By using a combination of the two treatment stages, the final effluents should normally be at acceptable contaminant concentrations for irrigation.
42. Primary treatment methods include fixed run down or rotating screens, save-alls and filtration.
43. Secondary treatment methods include the use of anaerobic (methane forming bacteria) and aerobic (aeration) ponds in series. A typical treatment configuration is one to two anaerobic ponds followed by an aerobic or facultative ponds, then a polishing/irrigation storage pond.
44. All ponds require elevated embankments and drains to divert the stormwater runoff, prevent pond flooding and embankment erosion prevented. Clean stormwater should not be allowed to pass into any waste stabilisation ponds.
45. See this Department's Water Quality Protection Note *Ponds for the stabilisation of organic waste* (see [Appendix A, reference 7c](#)) for best management information on the location, construction and operation of wastewater treatment ponds.
46. For best management practice information for lining of ponds, see this Department's Water Quality Protection Notes *Liners for containing pollutants, using engineered soils* and *Liners for containing pollutants, using synthetic membranes* (see [Appendix A, reference 7c](#)).
47. Desludging of ponds is occasionally required to maintain settled solids at acceptable levels while preventing the sludge layer disrupting the pond stabilisation process. Desludging may be required after five to 10 years depending on accrual rates. Regular desludging according to accumulation rate in the pond system will lessen the risk of partly treated wastewater overflowing into the surrounding environment should extreme rainfall events occur. Extracted biosolids can then be solar dried and used as manure.
48. Treatment of the abattoir effluent should stabilise degradable organic matter, remove fat, grease, gross and suspended solids and ensure that nitrogen, phosphorus and salt concentrations are managed to ensure preservation of vegetation and water values in the surrounding environment.

49. No discernable seepage or pond overflow during treatment should occur in order to prevent groundwater contamination.

Liquid waste disposal

50. Treated effluent should normally be disposed of via irrigation of pasture, woodland or crops, be reused for flushing water within the abattoir or infiltrated into the ground. Disposal into surface waters is undesirable as any treatment malfunction may result in pollution of downstream water resources.

51. The area of the land required for treated effluent irrigation depends on the volume and constituents of the treated wastewater, soil type, climactic factors and soil nutrient status.

52. There should be no irrigation in times of rainfall as this could lead to contaminated stormwater leaching or runoff. The land should not be used for grazing for 48 hours after irrigation.

53. For best management practice information see this Department's Water Quality Protection Note *Irrigation with nutrient-rich wastewater* (see [Appendix A, reference 7c](#)).

54. Regular monitoring and auditing processes should occur frequently to assist maintenance of effluent parameters (ie pH, BOD, suspended solids, nitrogen, and phosphorus) within acceptable environmental limits.

55. Site visits and inspections should be conducted regularly to confirm that site operations and maintenance of waste controls are within licensing limits.

Nutrient and Irrigation Management Plans (NIMPs)

Nutrient and Irrigation Management Plans (NIMPs) are detailed prescriptions for the establishment and growing of crops, gardens, trees or turf. NIMPs demonstrate that inputs such as water and fertiliser are well matched to the plant growth cycle resulting in minimal contaminant leaching into the surrounding environment. For further information on NIMPs, see the Water Quality Protection Note *Nutrient and irrigation management plans* (see [Appendix A, reference 7c](#)).

56. A NIMP should be prepared so that applied inputs match the seasonal uptake for plants, while minimising water and nutrient leaching through the soil.

57. Consistent monitoring and auditing of the irrigation plan should be arranged so that any adverse irrigation impacts can be addressed. Plant health and soil condition should be monitored along with water quality.

58. Licensing conditions should ensure that abattoirs do not irrigate during rainfall periods or during plant dormancy periods. Ideally the irrigation system should be activated by tensiometers measuring a soil moisture deficit.

59. For best irrigation practice see this Department's Water Quality Protection Note *Irrigation with nutrient-rich wastewater* (see [Appendix A, reference 7c](#)).

Stormwater management

60. Uncontaminated stormwater should be kept separate from wastewater and should be diverted away from wastewater ponds. If there are stormwater drains leaving the site, there should be an emergency gate system that can be activated should a spill or pond overflow occur. In areas

of unreliable rainfall, stormwater should be stored in tanks or holding dams and used for abattoir operations (washdown supply or stock water) or infiltrated into the ground at source where practical. The Water Quality Protection Note *Stormwater management at industrial sites* (see [Appendix A, reference 7c](#)) and the *Stormwater management manual* (see Appendix A, reference 7d) provides guidance information on management and protection for stormwater.

Contingency plans

61. A contingency plan should be prepared to address any foreseeable emergency situation that may arise. It is better to have a plan in place to address the problem should it occur. The plan should address the following issues:

- a stormwater emergency gate activation system close to the abattoir to divert contaminated stormwater away from the off-site drainage system;
- a management system to treat any contaminated stormwater efficiently;
- access to an off-site rendering plant (if practical) if the on-site solid waste management system fails;
- a back up plan for wastewater treatment plant malfunctions and breakdowns;
- sufficient storage capacity should be designed into the treatment system to ensure that there are no discharges of untreated or partly treated water into the environment;
- protective bunding for major flood events;
- management options for contaminated water that may enter the system from a chemical spill; and
- there should be minimal net export of nutrients into any water sources.

More information

We welcome your views on this note. Feedback provided on this topic is held on this Department's file No. **WT0919**.

This note will be updated periodically as new information is received or industry/activity standards change. Updates are placed on the Department's internet site www.water.wa.gov.au, select *Water Quality > Publications > Water Quality Protection Notes*.

To comment on this note or for more information, please contact the Water Source Protection Branch in Perth, phone (08) 6364 7600 (business hours), fax 6364 6516 or use *Contact us* at the Department's Internet site, citing the note topic and version.

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



Department of Water
Government of Western Australia

www.water.wa.gov.au
Telephone: (08) 6364 7600
Facsimile: (08) 6364 7601
Level 4, The Atrium
168 St Georges Terrace Perth
Western Australia 6000

Appendices

Appendix A References and further reading

1. Australian Government – National Water Quality Management Strategy
 - a. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, 2000;
 - b. *Australian Guidelines for Water Quality Monitoring and Reporting*, 2000;
see web page www.deh.gov.au/water/quality/nwqms/index.html
 - c. *Australian Drinking Water Guidelines*, 2004;
see web page www.nhmrc.gov.au/publications/synopses/eh19syn.htm
 - d. *Policies and Principles*, 1994;
 - e. *Implementation guidelines*, 1998;
 - f. *Rural land uses and water quality- a community resource*, 2000;
see www.awa.asn.au, email bookshop@awa.asn.au, or request from a library service.
2. Natural Resource Management Ministerial Council (Australia):
Minimum construction requirements for water bores in Australia, September 2003,
see web page www.iah.org.au/pdfs/mcrwba.pdf
3. Australian Department of Agriculture, Fisheries and Forestry
Risk assessment of abattoir effluent should BSE be found in cattle in Australia, June 2001;
see www.daff.gov.au/corporate_docs/publications/pdf/animalplanthealth/bse_effluent.pdf
4. Environmental Protection Authority (WA)
 - a. Guidance Statements
 - Guidance statement No 3 *Industrial-residential buffer guidelines*;
 - Draft Guidance Statement No. 33 *Environmental Guidance for Planning and Development*, June 2005;
see Internet site www.epa.wa.gov.au, select *Guidance statements*;
 - b. Report and Recommendations
 - Report and Recommendations *Narrikup export abattoir, Benale Pty Ltd*,
see internet site www.epa.wa.gov.au, select *Reports and Recommendations*.
5. Department of Agriculture and Food (WA)
Farm Note: Manure management on small properties, July 2005
See www.agric.wa.gov.au/pls/portal30/docs/folder/ikmp/lwe/land/fert/f02198.pdf
6. Department of Environment and Conservation (WA)
 - a. Wetlands policy and guidelines
 - *Position statement: Wetlands*, WRC 2001;
see web page www.dec.wa.gov.au, select *Department of Environment and Conservation > Water > Wetlands > Publications > Policy > Wetlands Position Statement*.

b. Waste management

- *Guidelines for acceptance of solid waste to landfill*, 2001;
- *Landfill Waste Classification and Waste Definitions*, as amended;
- *Western Australian Waste Reduction and Recycling Policy*, 1997;

see web page www.dec.wa.gov.au/wastemanagement, select *Publications > Guidelines*.

c. Contaminated sites

Contaminated site guidance series

see web page www.dec.wa.gov.au/contaminatedsites

d. Environmental Code of Practice

Abattoirs 1996

Not available as electronic copy, request from a library service.

6. Department of Health (WA)

Safe use of household chemicals

see web page www.population.health.wa.gov.au/Environmental/index.cfm, search *Household Chemicals* or *Pesticide*.

7. Department of Water (WA)

a. Water source protection policies

Pesticide Use in Public Drinking Water Source Areas 2000;

see web page www.water.wa.gov.au, select *Policy*

b. Guidelines

Guidelines for the Environmental Management of Beef Cattle Feedlots in Western Australia

see web page www.water.wa.gov.au, select *Water Quality > Publications > Water Quality Protection Guidelines*

c. Water Quality Protection Notes

- *Animal industry wastewater ponds*;
- *Contaminant spills – emergency response*;
- *Irrigation with nutrient-rich wastewater*;
- *Liners for containing pollutants, using engineered soils*;
- *Liners for containing pollutants, using synthetic membranes*;
- *Land use compatibility in Public Drinking Water Source Areas*;
- *Nutrient and irrigation management plans*;
- *Ponds for stabilising organic matter*;
- *Stockyards*;
- *Tanks for above ground chemical storage*;
- *Toxic and hazardous substances – storage and use*; and
- *Washdown of mechanical equipment*

see web page www.water.wa.gov.au, select *Water Quality > Publications > Water Quality Protection Notes*.

d. Stormwater

Stormwater Management Manual for Western Australia;

see web page www.water.wa.gov.au, select *Water management > Publications > Stormwater Publications > Stormwater Management Manual*.

e. Waterways policy and guidelines

- *Foreshore Policy 1 – Identifying the Foreshore Area*, WRC 2002;
- *Water Note 10 – Protecting riparian vegetation*;
- *Water Note 11 – Identifying the riparian zone*; and
- *Water Note 23 – Determining foreshore reserves*;

see web page www.water.wa.gov.au, select *Policies or Water quality > Publications > Water Notes*.

8. Government of Western Australia – State Law Publisher

Rights in Water and Irrigation Act 1914

see www.slp.wa.gov.au > *Acts and Regulations > A to Z Browse > R*

9. Environmental Protection Authority (New South Wales)

Abattoirs August 2002. See www.epa.nsw.gov.au/mao/abattoirs.htm

10. Environmental Protection Authority (Queensland)

Meat processing industry: The way forward through eco-efficiency, August 2002.

See www.epa.qld.gov.au > search *publications*

11. Environmental Protection Authority (South Australia)

a. *Wastewater and evaporation lagoon construction*, March 2004; see www.epa.sa.gov.au/pdfs/guide_lagoon.pdf

b. *Animal processing works*, September 2003; see www.environment.sa.gov.au/epa/pdfs/guide_animal.pdf

12. Macfarlane, D & McPhail, N (no date), *Solid Waste Disposal*, published in *Abattoir Waste Water & Odour Management*, CSIRO & The University of Queensland, Hans Quality Print, Queensland.

Appendix B Statutory requirements and approvals relevant to this note include:

What's regulated	Statute	Regulatory office
Land zoning and development approval	<i>Planning and Development Act 2005</i>	Western Australian Planning Commission
		Department for Planning and Infrastructure
Subdivision of land		Local Government (Council)
Impact of significant development proposals on the values and ecology of land or natural waters	<i>Environmental Protection Act 1986, Part III: Environmental Protection Policies:</i>	Minister for the Environment advised by the Environmental Protection Authority
Regulation of prescribed premises that could pollute and controlled discharges	<i>Environmental Protection Act 1986, Part V: Environmental Regulation</i> Environmental Protection Regulations, 1987 Environmental Protection (Abattoirs) Regulations, 2001 Environmental Protection (Controlled Waste) Regulations, 2004 Environmental Protection (Unauthorised Discharges) Regulations 2004	Department of Environment and Conservation – regional office
Licence to take surface water, groundwater or disturb proclaimed waterways	<i>Rights in Water and Irrigation Act 1914</i>	Department of Water – regional office
Approval to discharge waters into managed waterways	<i>Waterways Conservation Act 1976</i>	
Storage of fuels, solvent, explosive and dangerous goods	<i>Explosive and Dangerous Goods Act 1961</i> and associated Regulations	Department of Consumer and Employment Protection
Management of human wastes Community health issues	<i>Health Act 1911</i>	Local Government
		Department of Health
Emergency response planning	<i>Fire and Emergency Services Authority of WA Act 1998</i>	Fire and Emergency Services Authority
Discharge to sewer (industrial waste permit) or to a main drain	<i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i>	Water Corporation
	<i>Country Towns Sewerage Act 1948</i>	Designated water services provider

Note: Copies of relevant statutes are available from the State Law Publisher at Internet site www.slp.wa.gov.au.

Appendix C Sensitive water resources

Clean water resources used for drinking, sustaining aquatic and terrestrial ecology, industry and aesthetic values, along with breathable air, rank as the most fundamental and important needs for viable communities. These water resources should remain within specific quality limits, and therefore require stringent and conservative protection measures. Guidance on water quality parameters necessary to maintain water values are published in the Australian Government's *National Water Quality Management Strategy Guidelines* (see web page www.deh.gov.au/water/quality/nwqms/index.html).

The Department of Water strives to improve community awareness of catchment protection measures for both surface water and groundwater aquifers as part of a multi-barrier protection approach to maintain the quality of water resources and their values.

To be considered sensitive, water resources must support one or more of the environmental values described below. Human activity or land use poses a risk to water quality if contaminants could be washed or leached into sensitive water resources in discernible quantities. These water resources include shallow groundwater accessed by water supply wells, waterways, wetlands and estuaries. Community support for these values, setting of practical management objectives and implementation of sustainable protection strategies are seen as key elements in protecting and restoring the values of these water resources.

Sensitive water resource values include:

- a. Public Drinking Water Source Areas (ie Water Reserves, Catchment Areas or Underground Water Pollution Control Areas) proclaimed or assigned under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*, the *Country Areas Water Supply Act 1947* or the *Health Act 1911*.
- b. Private drinking water supply sources, including the following uses:
 - human or stock consumption;
 - commercial or industrial water supplies (with specific qualities that support the activities, eg aquaculture, cooling, food or mineral processing or crop irrigation); and
 - garden or municipal water supplies (which can affect people's health or wellbeing).
- c. Groundwater aquifers that sustain important ecological functions, eg cave ecology.
- d. Waterways (excluding engineered drains or constructed features) with ecological and / or social values such as aesthetic appeal, boating, fishing, tourism and swimming, including:
 - waterways of High Conservation Significance as described in the Environmental Protection Authority's Draft Guidance Statement 33 *Environmental Guidance for Planning and Development* (Section B5.2.2) see www.epa.wa.gov.au, select EIA > *Guidance statements*;
 - waterways managed under the *Waterways Conservation Act 1976*, ie the Avon, Peel-Harvey, Leschenault, Wilson Inlet and Albany Waterways Management Areas; and
 - waterways managed under the *Swan and Canning Rivers Management Act, 2006*.

Note: many waterways in the State are yet to be scientifically evaluated and their value classified. Any such waterways that are substantially undisturbed by human activity should be considered to have high conservation value, unless proven otherwise.

- e. Wetlands possessing recognised or probable conservation values (generally excluding those highly disturbed, unless subject to active management to restore specified environmental values), and including:
- RAMSAR wetlands (see internet site www.ramsar.org);
 - Wetlands of High Conservation Significance as described in the Environmental Protection Authority's Draft Guidance Statement 33 *Environmental Guidance for Planning and Development* (Section B4.2.2), see www.epa.wa.gov.au, select EIA > *Guidance statements*;
 - Wetlands described by Department of the Environment and Heritage (Australia) in *A Directory of important wetlands in Australia*, (see web page www.deh.gov.au/water/wetlands/databases.html, or the Department of Environment and Conservation web page www.naturebase.net/content/View/813/861/;
 - Conservation and Resource Enhancement category wetlands identified in the *Geomorphic Wetlands of the Swan Coastal Plain* dataset, all wetlands identified in the *South Coast Significant Wetlands* dataset and high value wetlands identified in the *Geomorphic Wetlands Augusta to Walpole* dataset.

Note: many wetlands in the State are yet to be scientifically evaluated and classified. Any such wetlands that are generally undisturbed by human activity should be considered to have high conservation value, unless proven otherwise. To date, the Augusta to Walpole wetland dataset to date has not been subject to a detailed evaluation process.

The Department of Conservation and Environment is the custodian of wetland datasets and is responsible for maintaining and updating the information within them. The datasets can be viewed or downloaded from the Internet site www.dec.wa.gov.au, select *Department of Environment > Tools, systems and data > Geographic Data Atlas > Inland waters > Wetlands*. Guidance on viewing the wetlands is provided on the same website at *Water > Wetlands > Data > Wetland mapping > How to view wetland mapping* or phone the Department on 6364 6500.

Appendix D - Typical schematic layout of a rural abattoir

