Government of Western Australia
Department of Water

Water quality protection note 15
August 2013

Looking after all our water needs

Extractive industries near sensitive water resources

Purpose

Extractive industries (described as quarries in this note) provide vital, basic, raw materials for the housing and construction industry in Western Australia (WA). These materials include limestone, sand, hard rock, gravel, shale and clay. Quarries may be located on government or privately-owned land. Apart from the quarry pit, infrastructure such as offices, roads, hardstand areas, screening and crushing equipment, stores, workshops and staff amenities may be required. These facilities need to be well-designed and managed, to avoid harming the quality of nearby surface and groundwater resources.

Contamination may arise from soil erosion, waste disposal systems and loss of chemicals stored or used on-site (such as fuel and mechanical servicing fluids). Native vegetation fringing waterways and wetlands needs protection as it provides an effective barrier to contamination and supports aquatic ecology. Soil erosion and turbid run-off from disturbed soils is a threat to surface water catchments as it causes sedimentation. Water treatment processes (such as disinfection) are also disrupted by increased turbidity. Poorly controlled pit dewatering can excessively lower the natural watertable. This disrupts local water supplies and reduces the flow in nearby waterways. Discharges can also change the quality of water resources, harming aquatic plants and animals.

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 extractive activities (quarrying) near sensitive water resources
- guidance on acceptable practices used to protect the quality of water resources
- 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.

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, followed by references, note disclaimer and how to provide feedback.

Scope

This note covers quarries for the extraction of basic raw materials from the natural environment, including clay, gravel, hard rock, limestone, peat, sand and shale, as defined in the State planning policy (SPP) 2.4 – *Basic raw materials* (reference 9c). The note applies to the establishment, operation and rehabilitation of quarries and their associated facilities including mechanical plant fuelling points, material stockpiling (such as overburden), screening, site drainage, equipment storage, workshops and employee amenities located near sensitive water resources as described in Appendix A.

For quarries away from sensitive water resources, refer to Environmental management of quarries – development, operation and rehabilitation guidelines (reference 3).

Within proclaimed public drinking water source areas (PDWSAs), detailed advice on the operation and management of sand mining activities is described in our *Policy and guidelines on construction and silica sand mining in public drinking water source areas* (reference 4b).

This note does not cover iron, nickel, gold, bauxite, coal, lead, oil shale, mineral sand, silica sand, garnet sand, kaolin, bentonite, attapulgite and montmorillonite. These ores provide for mineral extraction and are managed under the *Mining Act 1978.*

Planning approvals and processes

Under WA's Town Planning Regulations 1967, an extractive industry is defined as 'an industry that involves the extraction, quarrying or removal of sand, gravel, clay, hard rock, stone or similar material from the land and includes the treatment and storage of those materials, or the manufacture of products from those materials on, or adjacent to, the land from which the materials are extracted, but does not include *industry – mining*' (see schedule 1 (2)).

The state's planning approvals and processes, licences and clearing applications that may be required for the extractive industry of basic raw materials are outlined in the Western Australian Planning Commission's *Basic raw materials applicants' manual: A step-by-step guide for establishing extractive industries in Western Australia* (reference 9a).

The procedure for planning approval to establish quarries varies depending on the land tenure. *Table 1* (overleaf) summarises the types of land tenure and approval authorities.

A checklist for site selection considerations is provided in the Western Australian Planning Commission's *Basic raw materials applicants' manual* (reference 9a). Other important state planning policies relating to the quarry planning process are shown in reference 9.

Table 1 Planning approval procedures for extractive industries according to land tenure

Land tenure	Definition	Decision-making authority
Freehold land	– privately-owned land.	Local government authority Western Australian Planning Commission
Crown land	– vacant (unallocated) crown land – reserves for public utilities, timber – pastoral and grazing leases – leases for Aboriginal communities.	Department of Mines and Petroleum in consultation with managing authorities such as: – Conservation Commission – Department of Environment Regulation – Department of Indigenous Affairs – Pastoral Lands Board – Department of Parks and Wildlife.
Reserved land	– National parks – water and nature reserves – conservation parks – state forests – commons – utility.	

Note: This table was derived from Western Australian Planning Commission and Department of Planning publications

Advice and recommendations

Location of quarries

1 Extractive industries should be an accepted land use near most sensitive water resources (Appendix A) provided the operator adheres to regulatory conditions designed to meet local planning, environmental and water source protection objectives.

Within proclaimed PDWSAs

2 Extractive industry operations are considered a compatible land use with conditions in priority 1 (P1), priority 2 (P2) and priority 3 (P3) areas in PDWSAs. These areas are shown within published drinking water source protection plans or land use and water management strategies. To locate these areas, refer to information on PDWSA given in Appendix A.

3 Proponents or decision-making authorities should refer detailed development proposals to operate or expand quarries within any PDWSA (including the data described in Appendix C) to the Department of Water for assessment and advice.

4 Quarries should not be located in:

a wellhead protection zones (WHPZs)

b vegetated buffer zones around reservoirs or their feeder streams, as described in our water quality protection note (WQPN) no. 6 (reference 4c).

This is to minimise risk to water supply infrastructure, limit impact of any petroleum hydrocarbon contamination and foster retention of natural vegetation buffers.

5 Special conditions may apply to quarries in reservoir protection zones (RPZs).

Near conservation-category wetlands and environmental protection policy lakes

6 Extractive industries should not affect the water balance or ecology of natural lakes, swamps, or wetlands with recognised conservation values or their fringing vegetation, unless approved by the Minister for the Environment and Heritage on the advice of the Environmental Protection Authority (EPA). Contact the Department of Parks and Wildlife for information about conservation wetlands and lakes.

Near natural waterways

Waterways managed by the Department of Water include all natural creeks, streams, brooks, rivers, inlets, estuaries and surface drainage systems that flow intermittently.

7 Quarries should not be established on land subject to seasonal flooding, within defined flood plains or within waterway foreshore areas.

8 An adequate separation distance should be maintained between land disturbed by any extractive industry 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 no. 1 – *Identifying the foreshore area*. Our Water note no. 23 and River restoration report no. 16, both titled *Determining foreshore reserves*, provide supporting information on defining foreshore areas (reference 4d).

9 Natural vegetation buffers improve water quality by filtering potentially contaminated water before it enters a water body. 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 4c).

10 Information on the location of sensitive water resources and waterway values is available from this department's local regional office (see <www.water.wa.gov.au>, select *Contact us*). For location information online, select *Tools and data > maps and atlases > geographic data atlas*. These interactive maps show proclaimed waterways management areas in the south-west of WA by opening the *Environment* layer.

11 For general information on waterways and guidance on best environmental management practice see <www.water.wa.gov.au> select *managing our water > managing our rivers and estuaries.*

Near the Swan-Canning Estuary

12 The Swan River Trust is responsible for the protection and management of the Swan-Canning river system. Activities and development close to the Swan, Canning, Helena or Southern rivers are likely to have an effect on the waters of the river system. Any proposals abutting the trust's development control area (DCA) should be referred to the trust for comment.

Developments distant from the trust's DCA, but near tributaries or drainage systems or likely to affect groundwater flows, should also be referred to the trust for comment and advice. For more details see online information at <www.swanrivertrust.wa.gov.au>, phone the trust on 9278 0900 or email < planning@swanrivertrust.wa.gov.au>.

Within proclaimed waterway management areas

Five management areas have been declared under the *Waterways Conservation Act (WA) 1976* to provide special protection to specific rivers, inlets and estuaries. See Appendix A for details.

13 Extractive industries require written development approval from this department in proclaimed waterway management areas. Proponents should contact our local regional office and provide project details for assessment (see Appendix D). To discuss any technical aspects, phone our Waterways management branch in Perth on 6364 6700.

Disturbance to bed or banks of waterways

14 A permit from this department under the *Rights in Water and Irrigation Act 1914* is required to undertake any works that will alter the bed or banks of a waterway within a proclaimed river, surface water management area or irrigation district. Permits, if granted, may contain conditions such as requiring stabilisation of waterway banks or restoration of waterway vegetation.

Protection of native vegetation

15 Extractive industries should not harm native vegetation (unless permitted by a clearing licence or permit). These vegetated areas provide significant benefits to the natural ecology and water quality through their ability to sustain aquatic ecosystems and filter pollutants and sediment from surface run-off. Our Water note 10 – *Protecting riparian vegetation,* and Water note 12 – *The values of riparian vegetation,* provide relevant information (reference 4d).

16 The *Environmental Protection Act 1986* (see Appendix B) provides significant penalties for anyone who clears or damages native vegetation without authorisation. For more information and submission of applications to clear native vegetation, contact Department of Environment Regulation.

17 Extractive industry pits should be placed sufficiently high in the landscape to allow for the retention of wetland and waterway vegetation.

Clearing of native vegetation under the Country Areas Water Supply Act 1947

The *Country Areas Water Supply Act 1947* (see Appendix B) establishes specific clearing controls within six PDWSAs to protect native vegetation and limit salinisation of waterways. For details see Appendix A.

18 If a quarry will be located within a designated clearing control catchment, the proponent should submit an application to this department's local regional office for a clearing permit prior to clearing any native vegetation.

Separation distances to sensitive water resources

19 Perennial natural vegetation buffers should be retained or re-established between disturbed land and water supply sources, surface drainage channels, rivers, streams, and wetlands. These buffers will lower the immediate risk of water contamination, act as contaminant filters and should allow time for effective remedial action after a chemical spill incident. Information to define appropriate separation distances is given in our WQPN 6 – *Vegetated buffers to sensitive water resources* (reference 4c).

20 Vegetated buffers normally need to be supported by other protective barriers, such as stormwater sedimentation basins and effective containment of potential contaminants. Our WQPNs no. 26 and 27 recommend appropriate management practices for containing substances that present a hazard to water resources due to their nature, mobility or concentration (reference 4c).

21 In P1 areas of PDWSAs, a minimum of 3 m of undisturbed soil or rock strata should be retained as a vertical buffer between the base of the excavated area and the maximum water table level. This buffer may be temporarily reduced to a minimum of 2 m during extraction activities, provided the operator uses effective risk management measures to prevent water resource contamination.

22 In P2 and P3 areas, a minimum of 2 m of undisturbed soil profile should be maintained as a vertical buffer between the base level of the excavated area and the maximum water table level.

Acid sulfate soils

23 A scientific assessment of areas such as coal measures and (present or former) peat swamps should be conducted to detect and avoid disturbance of soils likely to generate acids when exposed to air after dewatering. These areas are prone to the release of toxic metals likely to damage water resource values. More information is provided in *Treatment and management of soils and water in acid sulfate soil landscapes,* (reference 2b) or by contacting the Department of Environment Regulation. The Western Australian Planning Commission's *Planning bulletin 64/2009* (reference 9b) also addresses the requirements for the development of land containing acid sulfate soils to avoid any potential harm to the natural and built environment

24 Quarries near wetlands and waterways should not disturb peat land, floodways or the groundwater table, unless the development proposal has undergone an Environmental Impact Assessment and is approved by the Minister for the Environment. The Department of Water or local government agency can provide information on flood-prone land.

25 In all coastal plain and sedimentary basin areas, a qualified and experienced hydrogeologist (in consultation with this department) should determine the probable maximum water table for the site. Our *Perth groundwater atlas* (reference 4a) provides information on indicative water table depths in the Perth metropolitan region.

Quarry design, construction and management

Dewatering of pits

26 Pit dewatering can change groundwater quality, affect the natural watertable and flow regime of a water source, and impact upon natural biota. Information on best management practices on dewatering of soils is provided in our WQPN no. 13 – *Dewatering of soils* (reference 4c). A licence may be required for dewatering in proclaimed groundwater areas. Licensing information and application forms are available from our local regional offices (see <www.water.wa.gov.au> select *Contact us*).

Access roads

27 Quarry operators should use existing roads and tracks where practical. New access ways onto major roads should not be created. Roads and car parks pose a contamination risk to water resources in sensitive areas because drainage may contribute to soil erosion, transport of litter, sedimentation and transfer of contaminants (such as fuel or oil). Details on road design and construction best management practices are provided in our WQPN 44 *Roads near sensitive water resources* (reference 4c).

Security fencing

28 Quarries should have security fencing and locked gates to prevent public access outside of operating hours. All barriers should be maintained in a serviceable condition to guard against illegal waste dumping and site intruders.

Site water supply

29 A licence may be required to provide a site water supply drawn from a bore, waterway or water body under Part III of the *Rights in Water and Irrigation Act 1914*. Proponents should contact our local regional office for more information.

On-site wastewater treatment and disposal systems

Best management practice for sewage disposal is to discharge sewage to a reticulated sewerage system. However, reticulated sewerage is rarely available in rural and remote areas due to the technical and financial challenges of providing this service. Therefore, on-site wastewater treatment and disposal systems will be required.

30 Small-scale extractive industry sites may not have toilet and washroom facilities or an on-site wastewater treatment system. For these sites, a chemical toilet should be provided for staff. The toilet facility should be maintained in good working order and waste disposed of at a facility authorised under the *Health Act 1911*.

31 Some quarry operations may have toilet facilities and other staff amenities connected to an on-site wastewater treatment system. The *Government sewerage policy – Perth Metropolitan Region* (1996) and the *Draft country sewerage policy* (2003) define minimum requirements for non-sewered development. Where land cannot be connected to a reticulated sewerage system, wastewater should be treated and disposed of on-site in accordance with these policies.

32 The most common types of on-site wastewater treatment systems installed in WA are:

- conventional septic tank with leach drains or soak wells
- aerobic treatment units (ATU) or packaged wastewater treatment plants
- septic tank system incorporating amended soil in the effluent disposal field
- waste stabilisation lagoon systems (aerobic or facultative wastewater treatment ponds). Our WQPN 39 *Ponds for stabilising organic matter* provides guidance on pond systems (reference 4c).

Further information on these systems and the minimum buffer distances and lot size for all on-site wastewater treatment systems is available in our WQPN 70 *Wastewater treatment – onsite domestic systems* (reference 4c), the Department of Health's Environmental Health Branch or your local government authority.

33 An application form including all the relevant details for any proposed wastewater treatment system (including type and size) should be supplied to your local government authority for approval prior to construction and operation. Our advice should be sought for systems in PDWSAs or waterway management areas.

34 All wastewater should undergo effective treatment before release to the environment, and should comply with national water quality criteria (reference 1c or 1d).

35 Systems should be operated and maintained as recommended by the supplier to achieve optimum treatment performance. Septic tanks require regular pumping-out by licensed waste contractors. Annual checks of tank capacity should be undertaken. ATUs generally require a three-monthly maintenance service by the supplier or a contractor approved by the Department of Health.

36 The Department of Water recommends a minimum clearance of 2 m between the base of soakage systems (such as leach drains) and the highest known groundwater table near sensitive water resources for all soil types. The aim is to decrease any contaminant loadings to surface catchments or groundwater sources.

Chemical storage

37 All vehicle and plant fuelling facilities (including mobile power generators) should be placed and operated within low-permeability (less than 10^{-9} m/s) bunded compounds designed to allow effective recovery of any fuel spill without fluid loss to the environment. Our WQPN 56 *Tanks for above ground chemical storage* provides information. Mobile fuel tanks should follow the guidance given in our WQPN 58 *Tanks for temporary above-ground fuel storage* (reference 4c).

38 Any underground tank systems near sensitive water resources should have double-walled construction and be adequately protected against corrosion.

39 Bulk chemical storage (above-ground and with more than 250 L capacity) requires our written approval in any PDWSA. The storage tank facility should be guided by our WQPN 65 *Toxic and hazardous substances – storage and use* (reference 4c).

40 The installation of underground chemical storage tank (UST) systems are prohibited in P1 and P2 areas of underground water pollution control areas (UWPCAs). By-laws allow UST to be installed with conditions in P3 areas provided they are outside WHPZs and achieve the recommended separation buffers to waterways.

41 Elevated chemical storage tank systems are prohibited in WHPZs. Elevated chemical tank systems (including fuels) within UWPCA should have a maximum capacity of 5000 L, unless a detailed risk assessment demonstrates the acceptability of a larger capacity tank.

Pesticide use and storage

Pesticides may be used for controlling weeds surrounding the pits. Some pesticides remain mobile and toxic in the environment, and sometimes their carrier solvents do not degrade or are toxic, and have the potential to be transported into surface water and groundwater.

42 The use, application, storage, mixing and disposal of pesticides within PDWSA should conform to our State-wide policy 2 – *Pesticide use in public drinking water source areas* (reference 4b) and adhere to the supplier's label and safety instructions.

Licences and storage of explosives

43 Licences are required for the possession and storage of explosives in WA in accordance with the Dangerous Goods Safety (Explosives) Regulations 2007 (Appendix B).

44 The *Dangerous goods safety guidance note X03/08* (reference 3b) provides guidance on the storage of explosives. Further information should be obtained from the Department of Mines and Petroleum (DMP).

Stormwater and surface water management

45 All stormwater run-off from disturbed land should be contained on-site initially to achieve effective removal of sediment and turbidity.
Over-land stormwater flows from outside the quarry area should be diverted via bypass drains or earthen bunds around disturbed surfaces and any stockpiles.

46 Any surface water flowing from disturbed areas should pass through effective settling pits to minimise turbidity. The pits should be designed and maintained to provide storage for a minimum of two hours' run-off resulting from a 10-year average return interval storm event, when calculated using the current version of the Engineers Australia publication *Australian rainfall and runoff* (reference 6). The settling pits should be operated with a surface scum trapping system which prevents discharge of any floating matter.

47 Guidance on stormwater system design, management, treatment and disposal is given in our *Stormwater management manual for Western Australia* (reference 4e) and WQPN 52 – *Stormwater management at industrial sites* (reference 4c).

48 Stormwater run-off during high-rainfall events should be minimised by using vegetated or armoured drainage paths and buffers. Dense surface vegetation buffers trap sediments and remove a portion of nutrients that may otherwise discharge into waterways or water bodies.

Stockpiled materials

49 All stockpiled materials (including topsoil overburden) awaiting transport or held for rehabilitation should be located upstream in the catchment of turbidity control facilities.

Waste management

Extractive industry operations are likely to generate waste from employee amenities, mechanical servicing and wash down of mechanical equipment.

50 In P1 and P2 areas of PDWSAs, routine servicing and wash down of operating equipment is unacceptable. Running repairs should only be conducted if effective containment measures are in place to prevent fuel, lubricants, coolant and hydraulic fluid losses to the environment.

51 In P3 areas of PDWSAs, routine equipment servicing and wash down are accepted provided they occur outside the recommended buffers to surface water resources and the operator demonstrates effective procedures for the capture and transport of liquid wastes to an authorised disposal site.

52 The management and disposal of wastes from on-site employee amenities should meet the requirements of the *Health Act 1911* and the local government authority. The

wastewater system (septic tanks or other approved treatment and effluent disposal units) should be installed on site in accordance with the Health regulations and guidelines (see recommendations under heading *On-site wastewater treatment and disposal systems*).

Staff training and responsibilities

53 Employees should be trained, assigned specific environmental management roles, and reminded via signs or symbols of the contamination risks to water resources posed by chemicals released to the local environment.

Accidents and emergency response

54 An environmental response program should be in place for accidental chemical spills. The program should include adequate warning and communications systems, support equipment, designated employee responsibility and training of response personnel. The Department of Environment Regulation should be advised immediately of any significant chemical spills (phone: 1300 784 782) and the Water Corporation should be advised of any spill in a PDWSA (phone 13 13 75 with the details and proposed corrective actions).

55 A fuel management plan that meets the requirements of the DMP should be put in place to address the following:

- details of fuel transport and refuelling facilities
- spill prevention at on-site fuel transfer and storage areas
- contingency plan for dealing with fuel spillage
- monitoring program for assessing any fuels lost to the environment.

Site closure and rehabilitation

56 The operator should arrange a rehabilitation plan, update it as needed and ensure it is fully implemented at pit closure. Where quarry operations are undertaken over a long period (e.g. hard rock quarries), progressive rehabilitation should be initiated prior to pit closure.

The rehabilitation plan should include measures to prevent adverse environmental impacts such as dust, erosion, silt deposition and turbidity in local waters, a recontoured land surface and revegetation of disturbed soil suited to the next land use. The rehabilitation plan should satisfy relevant government regulatory agencies.

57 In addition to standard details required by other regulatory agencies, the rehabilitation plan should include:

a details of proposed post-closure rehabilitated land use

b a plan detailing the finished land surface profile

c detailed information on the types, sources and quantities of materials to be used for backfilling

d an assessment of the potential groundwater contamination threats posed by the materials used for backfilling, including leach test analysis for any imported materials used on-site that may pose a threat to water quality (reference 8)

e proposals for any fertiliser and pesticide application at the site

f methods of site remediation and clean-up after the end of extractive operations.

58 Upon closure of mined-out pits in P1 areas of PDWSAs, the land surface should be restored to achieve a final 3 m soil buffer above the maximum water table level, and then be revegetated with native vegetation.

59 The site should be rehabilitated to a condition that ensures the retention of the local water resource values. A qualified and experienced environmental consultant should prepare the plan for the operator and submit it to us for approval. Additional information is provided in our WQPN 84 *Revegetation of disturbed land* (reference 4c).

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 have to remain within defined quality limits to retain their ecological, social and economic values. Hence they require appropriate protection measures to minimise contamination.

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

A public drinking water source area (PDWSA) is the collective name given to any area proclaimed to manage and protect a community drinking water source. PDWSA 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 a PDWSA, see < www.water.wa.gov.au > select *tools and data* > *maps and atlases* > *geographic data atlas*, then open *environment* > *public drinking water source areas.*

Within PDWSA, priority areas (P1, P2 and P3) are defined via publicly consulted drinking water source protection plans 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. This department 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 the 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* and 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 (such as low intensity rural use). 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 is restricted (with management conditions) and activities with a low water contamination risk are 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 achieved through land use management measures provided via environmental guidance (e.g. these protection notes) or via site-specific development approval conditions 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 treated more intensively or an alternative water 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 waters most vulnerable to contamination.

WHPZs are assigned within the perimeter of water production wells based on hydrological factors. Statutory land use restrictions apply in these zones as groundwater moves rapidly towards wells due to aquifer depressurisation by pumping. Any contaminants leaching from the ground surface in WHPZs 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 metres in P1 areas and 300 metres in P2 and P3 areas. These zones do not extend outside PDWSA boundaries.

RPZs are defined over and around public water supply dams 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 runoff. RPZs within state-controlled land cover an area up to two kilometres 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,* note 76 *Land use planning in PDWSA* and WQPN 77 *Risk assessment in*

PDWSA. These notes are available online at <www.water.wa.gov.au> select *publications > find a publication > series browse.*

Established activities within PDWSAs

Many land use activities were approved and established before publication of a source protection plan or land use strategy. The operators of these activities should ensure that modern environmental facilities and practices are progressively implemented so the water resource's contamination risk is minimised (within practical 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 regional office with detailed supporting information for assessment and a written response.

The development proposal may be approved (with or without conditions); additional information may be sought before a decision is made; or the proposal 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 materials 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 full supply level of reservoirs their primary feeder streams and/or production bores used as a source of drinking water. 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 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

Those 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 or 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 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.*

This department also manages waterways throughout Western Australia 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 function and operational factors outweigh their ecological value.

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

Swan River Trust management area

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.* 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.

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. For detailed information, see online advice at <www.swanrivertrust.wa.gov.au>, phone +61(8) 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 Australian and Western Australian government policies. Conservation wetland data to guide land planning and development activities is provided via the following publications:

- Scheduled wetlands are defined by the Australian Government in the *Directory of important wetlands in Australia,* 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.*

Contact the Department of Parks and Wildlife for information about wetlands datasets.

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 the values of the local environment, the safeguards in place and take a precautionary approach.

Where a conflict arises between this note'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 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 requirements and approvals include-

What's regulated?	Western Australian statutes	Regulatory body/ agency
Material screening above 5000 tonnes/ year is regulated	*Environmental Protection Act 1986* – Part V Environmental Regulation	Department of Environment Regulation www.der.wa.gov.au
Land clearing controls	Environmental Protection (Clearing of native vegetation) Regulations 2004	
Application for mining tenements Transport, storage and handling of fuels, solvents, explosive and dangerous goods	*Mining Act 1978* *Dangerous Goods Safety Act 2004,* and associated regulations 2007	Department of Mines and Petroleum - Mineral titles division - Resources safety division www.dmp.wa.gov.au
Treatment and disposal of site amenities wastewater	*Health Act 1911*	Department of Health www.health.wa.gov.au Local government authority
Licence to take surface water and groundwater	*Rights in Water and Irrigation Act 1914*	Department of Water – regional office www.water.wa.gov.au
Licence to discharge waters into managed waterways	*Waterways Conservation Act 1976*	
Extractive industry sites in proclaimed public drinking water source areas	*Metropolitan Water Supply, Sewerage and Drainage Act 1909* *Country Areas Water Supply Act 1947*	
Impact on the values and ecology of land, air or natural waters	*Environmental Protection Act 1986 - Part III Environmental Protection Policy;* *- Part IV Environmental Impact Assessment*	Minister for the Environment advised by the Environmental Protection Authority www.epa.wa.gov.au
Potential impacts on the Swan-Canning estuary system	*Swan River and Canning Rivers Management Act 2006*	Swan River Trust www.swanrivertrust.wa.gov.au
Extractive industry licence Development approval	*Local Government Act 1995* *Planning and Development Act 2005;* and Town Planning Regulations 1967	Western Australian Planning Commission Department of Planning www.planning.wa.gov.au Local government authority

Relevant statutes are available from the State Law Publisher at <www.slp.wa.gov.au>.

Appendix C: Data needed to assist 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 and/or 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, any remnant vegetation cover, existing and proposed development areas and onsite 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 facilities or operations.

4 The present local government planning scheme 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, (including any site amenities, infrastructure, crops, earthworks and chemical applications), operating workforce and planned project operational life.

6 Describe the planned commissioning date, operating hours and any expansion options.

7 Details of any proposed vegetation clearing, environmental buffers, site earthworks and services, including water supply, sewerage and drainage provisions.

8 Description of all materials and 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 at or disposed from the facility.

10 Description of planned material containment, waste management (treatment and disposal) and water recycling; with an environmental management plan and nutrient and irrigation management plan (where applicable).

11 Details of any environmental modelling conducted or planned monitoring system 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 chemical spills and safely dispose of contaminated waters that may result from storms, fire, flood, 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, proponents should engage the services of a qualified and experienced consultant to professionally prepare their development proposal.

This will ensure that government agencies can efficiently assess and respond to the proposal without delays caused by inadequate or poorly defined information.

References and further reading

1 Australian Government – National water quality management strategy papers, online at < www.environment.gov.au > select *water > policy and guidelines > 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.

2 The previous Department of Environment and Conservation (WA) publications:

   a *Position statement wetlands*, WRC 2001; available www.dpaw.wa.gov.au.

   b *Treatment and management of soils and water in acid sulfate soil landscapes, Acid sulfate soils guideline series* (draft January 2009); available www.der.wa.gov.au.

3 Department of Mines and Petroleum (WA) publications, see <www.dmp.wa.gov.au> select *Contact us:*

   a *Environmental management of quarries: development, operation and rehabilitation guidelines*, Department of Mines, March 1991 (available as printed version only)

   b *Dangerous goods safety guidance note X03/08,* December 2008; select *resource safety > dangerous goods > guidance materials > guidance notes > storage of explosives*.

4 Department of Water (WA) publications available online at <www.water.wa.gov.au>:

   a *Perth groundwater atlas,* select *tools and data > maps and atlases*

   b Policy documents, select *publications > find a publication > series browse > state-wide policy:*

      – *Policy and guidelines on construction and silica sand mining in public drinking water source areas, 1999*

      – Foreshore policy no. 1 – *Identifying the foreshore area, (WRC) 2002*

      – State-wide policy no. 2 – *Pesticide use in public drinking water source areas, 2000*.

   c Water quality protection notes (WQPN), select *publications > find a publication > series browse > water quality protection notes:*

      – WQPN 06 *Vegetated buffers to sensitive water resources*

      – WQPN 11 *Contamination investigations near sensitive water resources*

      – WQPN 13 *Dewatering of soils at construction sites*

      – WQPN 25 *Land use compatibility within public drinking water source areas*

      – WQPN 26 *Liners for containing pollutants, using synthetic membranes*

      – WQPN *27 Liners for containing pollutants, using engineered soils*

      – WQPN 39 *Ponds for stabilising organic matter*

      – WQPN 44 *Roads near sensitive water resources*

      – WQPN 52 *Stormwater management at industrial sites*

- WQPN 56 *Tanks for above ground chemical storage*
- WQPN 58 *Tanks for temporary above ground fuel storage*
- WQPN 65 *Toxic and hazardous substances - storage and use*
- WQPN 70 *Wastewater treatment – onsite domestic systems*
- WQPN 84 *Revegetation of disturbed land.*

d Waterways guidelines, select *publications* > *find a publication* > *series browse* > *river restoration manual* or *water notes:*

- River restoration report 16 *Determining foreshore reserves*, 2001
- Water note 10 *Protecting riparian vegetation*
- Water note 11 *Identifying the riparian zone*
- Water note 12 *The values of riparian vegetation*
- Water note 23 *Determining foreshore reserves.*

e Stormwater guidelines; select *managing our water* > s*tormwater and drainage* >*:*

- *Stormwater management manual for Western Australia*
- *Better urban water management, 2008.*

5 Office of the Environmental Protection Authority (WA) publications available online at <www.epa.wa.gov.au> select *Policies*, *position statements* or *guidance statements:*

a Environmental protection policies:

- *South-west agricultural wetlands*
- *Swan coastal plain lakes.*

b Position statements:

- *Environmental offsets 2006.*

c Guidance statements:

- 3 *Separation distances between industrial and sensitive land uses*
- 33 *Environmental guidance for planning and development.*

6 Engineers Australia publication can be purchased at <www.engaust.com.au/bookshop/eabookspub.html>

Australian rainfall and runoff, a guide to flood estimation.

7 Natural Resource Management Ministerial Council (Australia) publication available online at <www.iah.org.au/pdfs/mcrwba.pdf>

Minimum construction requirements for water bores in Australia, September 2003.

8 Standards Australia publication available for purchase at <www.saiglobal.com> select *publications*

a AS 4439 *Wastes, sediments and contaminated soils*

b AS 5667 *Water quality – sampling.*

9 Western Australian Planning Commission publications available online at <www.planning.wa.gov.au>:

a *Basic raw materials applicants' manual: A step-by-step guide for establishing extractive industries in Western Australia,* February 2009.

b *Planning bulletin 64/2009.*

c State planning policies (SPP):
- *SPP 2.2 Gnangara groundwater protection policy*
- *SPP 2.3 Jandakot groundwater protection policy*
- *SPP 2.4 Basic raw materials*
- *SPP 2.7 Public drinking water source policy*
- *SPP 2.8 Bushland policy for the Perth metropolitan region (draft)*
- *SPP 2.9 Water resources*
- *SPP 4.1 Draft state industrial buffer policy.*

Disclaimer

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 branch (details below), citing the note topic and version.

Manager, Water Source Protection
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*.

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