

Guideline

Environmental Protection Act 1994

Application requirements for activities with impacts to water

This guideline outlines the information to be provided to support an environmental authority application for activities with impacts to water.

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1 Introduction

This guideline focuses on the types of impacts that environmentally relevant activities (ERAs) can have on water and outlines the information to be provided to the department as part of the ERA application process.

This guideline seeks to assist both regulators and operators of an ERA with the potential to impact water to identify, quantify and evaluate the impacts to the environmental values of water and to ensure that these impacts are managed in a way that achieves a balance between the social benefits of development and maintaining the environmental values of the receiving environment.

In accordance with Chapter 4, Part 3 of the Environmental Protection Regulation 2019 (EP Regulation), applicants are advised that the department must refuse an application if the proposed ERA involves, or may involve:

- The release of water or waste to a wetland for treatment, and the authority considers that, because of the ERA:
 - The wetland will be destroyed or reduced in size; or
 - the biological integrity of the wetland may not be maintained.
- The release of waste directly to groundwater, and:
 - the waste is not being, or may not be, released entirely within a confined aquifer; or
 - the release of the waste is affecting adversely, or may affect adversely, a surface ecological system; or
 - the waste is likely to result in a deterioration in the environmental values of the receiving groundwater.
- That all or part of the transshipping activity is to be carried out in:
 - In an area within the Great Barrier Reef Marine Park¹; or
 - In an area that is within the Great Barrier Reef World Heritage Area; but not within a port area.

In this section— Great Barrier Reef Marine Park means the Great Barrier Reef Marine Park under the *Great Barrier Reef Marine Park Act 1975* (Cwlth).
- The release of water or waste to Great Barrier Reef catchment waters or other coastal waters² (GBR catchment waters), the administering authority must refuse to grant the application if the authority considers that:
 - a) The relevant activity will, or may, have a *residual impact*; and
 - b) having regard to the matters mentioned in the water quality offset policy, the residual impact will not be adequately counterbalanced by offset measures for the relevant activity.

Section 41AA of the EP Regulation defines a residual impact of a relevant activity as the presence of fine sediment, or dissolved inorganic nitrogen, in Great Barrier Reef catchment waters that—

¹ A transshipping activity to be carried out in an area within the Great Barrier Reef Marine Park includes a transshipping activity to be carried out in a relevant Great Barrier Reef Marine Park area.

² Great Barrier Reef catchment waters or other coastal waters (GBR catchment waters) has the meaning in section 41AA of the EP Regulation and means Great Barrier Reef catchment waters defined under section 112 of the *Environmental Protection Act 1994* to mean water in a river in the Great Barrier Reef catchment or water in a tributary of a river in the Great Barrier Reef catchment; and coastal waters of the State that are between the following geodesic lines:

- (i) a line running north from the point that is the most northern coastline of the State in the Great Barrier Reef catchment;
- (ii) a line running east from the point that is the most southern coastline of the State in the Great Barrier Reef catchment.

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- a) was released to the water because of the relevant activity; and
- b) remains, or is likely to remain in the water despite mitigation measures for the relevant activity.

Please refer the departments guideline '[Reef discharge standards for industrial activities ESR/2021/5627](#), to understand if the Reef discharge standards apply to your activity and what additional information you need to include in your environmental authority application to address this provision.

In general, there are three key areas to be addressed during the ERA application process:³

- Identify the environmental values of the receiving environment.
- Identify the possible impacts due to the proposed activity and all associated risks to the values.
- Identify the strategies to mitigate the identified risks to the environmental values.

This guideline identifies the information to be provided with an application and outlines how the department will use this information to make a decision on the application. Information provided will also assist the department to:

- Identify whether any impacts on receiving waters supports the management intent for those waters.
- Develop or select a condition to manage a specific risk identified with the activity.
- Determine whether the application should be refused because it is not possible to undertake the activity without causing unacceptable environmental harm. Applications may also be refused if insufficient information is available for the department to determine if environmental values will be protected.

1.1 Using this guideline

The information provided in this guideline is updated regularly by the Department of Environment, Science and Innovation (the department) and is subject to change without notice. Applicants should check the department's website for the latest copy prior to lodgement.

Sections 3–5 set out the information that applicants will need to provide to the department with their application. Section 6 sets out some useful references to help applicants develop their application material.

The information provided in this guideline is general in nature and is designed to assist applicants identify key areas of concern associated with each ERA. Further information on industry specific water impacts can be found at www.business.qld.gov.au.

Additionally, the level of detail required to support an application will depend on the type of ERA proposed and its likely impact on the receiving environment. Some activities will require additional information to be provided. In order to assist applicants to identify potential areas of concern associated with their individual applications, applicants are encouraged to participate in a pre-lodgement meeting.

Applications can now be made to the department online through Online Services. Supporting documentation that addresses each environmental value impacted by the activity can be uploaded electronically. Supporting documentation can be uploaded as a separate document for each environmental value or as one document uploaded at the end of the online application process. For more information and to register to use Online Services go to <https://www.qld.gov.au/environment/pollution/licences-permits/online-services>.

This guideline is relevant for applications for prescribed ERAs and mining ERAs. For applications relating to petroleum, geothermal or greenhouse gas storage ERAs, refer to the guideline '[Application requirements for petroleum activities](#)' (ESR/2016/2357). A person may also have additional obligations under section 440ZG of

³ s125 of the *Environmental Protection Act 1994*

the *Environmental Protection Act 1994* if the person is using, generating or is otherwise responsible for prescribed water contaminants⁴ not addressed in their EA.

1.2 What is 'water'?

For the purposes of this guideline, 'water' can include all, or any part of, a river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water in natural or artificial watercourses, bed and banks of a watercourse, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater. Many ERAs have the potential to impact on the environmental values of waters if not managed appropriately. Potential impacts may be caused by:

- Controlled/planned releases to water
 - Point source discharges of waste water or other contaminants generated by the ERA (e.g. Discharge of treated effluent from sewage treatment plants, placement of contaminants into water such as dredge spoil, disposal or fish food in sea cage aquaculture, or the intentional introduction of substances into groundwater such as by fracking to release underground gas)
 - changes to hydrology, including aquifers, stream flow rates or water availability.
- Uncontrolled/unplanned releases of water
 - Unintentional releases of contaminants (e.g. leaks through, or overflows from, waste water ponds or poorly managed fuel or oil storages, contamination by landfill leachate, generation of acid mine drainage).
- Changes to the quantity and quality of stormwater runoff from the site of the ERA.
- Indirect impacts
 - disturbance to the bed or banks of waters (e.g. by pipe or road crossings, or extraction or dredging activities)
 - turbidity due to disturbance or clearing of riparian vegetation during construction
 - changes to groundwater formation characteristics
 - changes to groundwater ecology (and surface water ecology)
 - Changes to groundwater hydrology (e.g. causing estuarine saline water intrusion into a freshwater aquifer, or lowering a water table hosting potential acid sulfate soils)
 - introducing a bio-accumulative contaminant that causes harm to terrestrial wildlife (e.g., birds) preying on aquatic fauna
 - Extracting groundwater that causes site groundwater contamination to migrate to a previously unaffected environmental receptor or that results in lowering of the water table.

Some adverse effects include harming public amenity, human uses of water such as drinking, farm supply, irrigation, stock water, cultural values, aquaculture, visual aesthetics and swimming as well as harming plants, animals and the aquatic ecosystem.

⁴ Prescribed water contaminants are listed in Schedule 10 of the EP Reg.

1.3 Queensland environmental law

Activities that are likely to cause environmental impacts are called environmentally relevant activities (ERAs). In Queensland, an environmental authority is required to conduct an ERA and will include conditions to protect the environmental values of waters from harm.

Environmental harm is any adverse effect or potentially adverse effect on an environmental value and includes environmental nuisance.

Environmental impacts to waters, associated with ERAs, are regulated by the:

- *Environmental Protection Act 1994* (EP Act).
 - The EP Act sets out the standard criteria for ERAs
- Environmental Protection Regulation 2019 (EP Regulation).
- Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP (Water)).

The intent of the EPP (Water) is to protect or enhance the environmental values of waters. The success of achieving the policy intent involves management of many activities in the catchments and may be a long-term goal for some water quality objectives, particularly, for waters that are moderately or highly disturbed and are not meeting water quality objectives.

Applications that may affect water must be assessed against the legislation including the EP Regulation, the standard criteria and the EPP (Water).

The term 'environmental value' is generally used to describe the ecological, physical, aesthetic, social and cultural values of a location or proposed site. Environmental value is defined in section 9 of the EP Act as being:

- a quality or physical characteristic of the environment that is conducive to public health, safety or amenity
- a quality or physical characteristic of the environment that is conducive to ecological health
- a quality or physical characteristic of the environment that contributes to its biological diversity and integrity, intrinsic or attributed scientific value or interest amenity, harmony and sense of community; or
- another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

Environmental values for specific waters are defined in section 6 of the EPP (Water). Please refer to EPP (Water) to determine the environmental values for the relevant waters.

Examples of adverse effects on these environmental values could include an oil spill washing onto a public beach, a sewage spill creating a hepatitis risk by contaminating oysters or acid mine drainage killing stream bank vegetation.

[Section 7](#) of the EPP (Water) prescribes the environmental values of wetlands. These environmental values relate to protection of Queensland wetlands and seek to protect the biodiversity, natural state, biological integrity and special features of the wetland including threatened flora and fauna, natural hydrology and interaction with other ecosystems. Maps of Queensland wetlands can be found on the department's [website](#).

Environmental values, established in the EPP (Water) are relevant throughout Queensland. Water quality objectives have been prescribed for thirteen basins in Queensland. These objectives broadly include:

- Aquatic ecosystem protection

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- Aquatic ecosystem protection includes four levels of protection to cater for the varying degrees of human disturbance affecting waters. These levels are high ecological value, slightly disturbed, moderately disturbed and highly disturbed waters.
- Suitability for a broad range of human uses
 - Human uses include suitability for drinking, stock water, irrigation, farm use, aquaculture, industrial use and production of aquatic foods.
- Social values
 - Social values include cultural use and primary, secondary and visual recreation use.

For each environmental value, there is a range of relevant water quality objectives designed to protect that value. These can be found on the department's [website](#). The exception is the cultural and spiritual environmental value, for which there are no published guidelines. In these cases, individual facts and circumstances need to be identified through consultations with traditional owners and other sources, such as relevant native title determinations.

GBR catchment waters have end-of-basin load water quality objectives, which are to be achieved and maintained as per s11(4) of the EPP (Water). The GBR catchment waters end-of-basin load water quality objectives establish locally relevant anthropogenic loads for each of the GBR catchments and are considered in assessment of applications in addition to relevant environmental values and associated water quality objectives. The [Great Barrier Reef End-of-Basin Load Water Quality Objectives \(PDF, 815KB\)](#) have been finalised for all [Great Barrier Reef catchments \(PDF, 1.3MB\)](#) and can be found on the department's [website](#).

The long-term goal for some Queensland waters under section 15 of EPP (Water) is to improve environmental values, particularly in disturbed ecosystems under pressure from human impacts. In determining environmental values, site-specific information is preferred. Water quality objectives are targets that have been set to protect environmental values. In water bodies not achieving water quality objectives, the intent of the EPP (Water) is to progress towards the objectives (where achievable) through a number of catchment management actions and improvements to point sources consistent with best practice environmental management. For further information on determining environmental values of waters, refer to the department's technical guideline 'Wastewater releases to Queensland waters'.

2 Making an application involving actual or potential impacts on waters

The EP Act⁵ specifies what information must be included with applications for environmental authorities. Applications will be assessed against the requirements stated in the EP Act, the EP Regulation and any relevant EPPs, such as the EPP (Water).

For environmental authority applications that have the potential to impact on waters, the application must describe how the following environmental objective and performance outcomes for the ERA will be achieved. Under Schedule 8, Part 3, Division 1 of the EP Regulation, the environmental objectives for water are:

Environmental objective

The activity will be operated in a way that protects environmental values of waters.

Performance outcome

There is no actual or potential discharge to waters of contaminants that may cause an adverse effect on an environmental value from the operation of the activity.

All of the following:

- (a) The storage and handling of contaminants will include effective means of secondary containment to prevent or minimise releases to the environment from spillage or leaks.
- (b) Contingency measures will prevent or minimise adverse effects on the environment due to unplanned releases or discharges of contaminants to water.
- (c) The activity will be managed so that stormwater contaminated by the activity that may cause an adverse effect on an environmental value will not leave the site without prior treatment.
- (d) The disturbance of any acid sulfate soil, or potential acid sulfate soil, will be managed to prevent or minimise adverse effects on environmental values.
- (e) Acid producing rock will be managed to ensure that the production and release of acidic waste is prevented or minimised, including impacts during operation and after the environmental authority has been surrendered.
- (f) Any discharge to water or a watercourse or wetland will be managed so that there will be no adverse effects due to the altering of existing flow regimes for water or a watercourse or wetland.
- (g) For a petroleum activity, the activity will be managed in a way that is consistent with the coal seam gas water management policy, including the prioritisation hierarchy for managing and using coal seam gas water and the prioritisation hierarchy for managing saline waste.
- (h) The activity will be managed so that adverse effects on environmental values are prevented or minimised.

Environmental objective

The activity will be operated in a way that protects the environmental values of wetlands.

Performance outcome

- (a) There will be no potential or actual adverse effect on a wetland as part of carrying out the activity.
- (b) The activity will be managed in a way that prevents or minimises adverse effects on wetlands.

⁵ Section 125 of the *Environmental Protection Act 1994*

Environmental objective

The activity will be operated in a way that protects the environmental values of groundwater and any associated surface ecological systems.

Performance outcome

Both of the following apply:

- (a) There will be no direct or indirect release of contaminants to groundwater from the operation of the activity.
- (b) There will be no actual or potential adverse effect on groundwater from the operation of the activity.

Or, the activity will be managed to prevent or minimise adverse effects on groundwater or any associated surface ecological systems.

Some activities involving direct releases to groundwater are prohibited by the EP Regulation.

3 Identifying environmental values of receiving waters

The first step in making an application for an ERA is to accurately identify the environmental values of the site. This information will be used to identify the risks associated with an activity and to determine whether the site is an appropriate location for the activity to be conducted. This information will also inform instances when conditions need to be imposed in order to mitigate the risk of environmental harm.

The following table outlines several suggestions to assist applicants identify the environmental values associated with their proposed site.

In addition to general information about the site and the environmental values, several key environmental priorities have been listed. If applicable to the application, these environmental priorities have regulatory assessment requirements and should be addressed in detail.

Site plan

Identify on a scaled site plan:

- Topographical contours at suitable increments, shown with respect to Australian Height Datum.
- Identify the direction(s) of surface water runoff and drainage lines that pass through, or are near, the site and any surface waters potentially impacted by the ERA (including rivers, creeks, lakes, wetland or drainage lines) that are within or adjacent to the site.
- Where wetlands have been identified on, or adjacent to, the site, further information regarding the environmental values of the area may be obtained from the wetland mapping tool on the department's [website](#).
- Any rivers in strategic environmental areas (SEAs) that could be potentially impacted by the ERA.
- Any GBR catchment waters where the ERA is proposing to discharge fine sediment or dissolved inorganic nitrogen from a point source. The department provides a free online [Reef regulatory requirements map](#) tool, where applicants can complete an online form with the Lot and Plan number of their property to receive a map via email that shows if the property is proposed to be, or is, operating in a Reef region and subject to the new Reef discharge standards. Alternatively, applicants can download the [Great Barrier Reef catchment and river basin map \(PDF, 1 MB\)](#).
- Any existing or proposed water bores or groundwater monitoring wells within or on land adjacent to the site.
- A conceptual model showing the movement (including direction and rate of flow) of groundwater in the area. This requirement is essential for activities which have a high risk of contaminating groundwater to determine appropriate locations for compliance monitoring.
- Describe the flooding potential of the site. Where information is available, indicate the extent of a 1% annual exceedance probability (1/100 yr average recurrence interval) flood, and/or probable maximum flood
- The location of waste storage, processing, treatment, and disposal locations. Include details for both raw and treated wastes and details of the relevant storage facilities. Plans must show any proposed point source discharges to waters from waste management processes onsite.
- If the environmental authority application is for a resource ERA (mining or petroleum), identify any environmentally sensitive places within or adjacent to the proposed mining tenement.

Maps of environmentally sensitive areas can also be created on the department's [website](#).

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- A description of hydrogeological features of the site which include soil and rock types (including porosity, permeability) and stratigraphy (including faulting and fracture propensity).
- Identify and describe any barriers which are overlying and underlying aquifers.

Where Schedule 1 of the EPP (Water) does not set specific environmental values or water quality objectives for waters on, or adjacent to, the site, Section 11 of EPP (Water) requires that the water quality objectives are the set of water quality guidelines that will protect all environmental values for the water. These are, in order of preference: site specific documents for the water, any Queensland water quality guidelines or any Australian water quality guidelines.

Local water quality objectives can be derived using Queensland water quality guidelines procedures for deriving regional or sub-regional guidelines for aquatic ecosystem protection.

Surface water

Identify environmental values of potentially affected surface waters:

- Provide details of the background quality of surface water, specifically in relation to contaminants of concern and water quality or environmental indicators relevant to the proposed ERA.
- Identify the environmental values of surface waters on or adjacent to the site, and water quality and environmental objectives to protect or enhance these values and any other value indirectly affected.
- Identify the environmental values of surface waters on or adjacent to the site and any relevant Great Barrier Reef end-of-basin load water quality objectives.

Groundwater

Identify the environmental values of potentially affected groundwater:

- The location and depth to groundwater (including perched aquifers or water tables) and the depth to water level/potentiometric surface on the site.
- Details of any groundwater bores in the vicinity of the proposal and the uses of extracted water.
- Details of the background quality of groundwater, specifically for common anions and cations to characterise the water and for other qualities that may be affected by the proposed ERA e.g. hydraulic conductivity, transmissivity and flow rate. This is only required for activities which pose a material or significant risk of impacting on the quality of groundwater through direct or indirect releases or alteration of hydrology.
- If available and relevant, the results of any testing to confirm aquifer properties.
- Where there are underground ecosystems or groundwater dependant ecosystems associated with the groundwater and the proposed activity presents a real risk to these ecosystems, details of those ecosystems and their interactions with the groundwater will be required.

The level of groundwater information required to be provided will depend on the likelihood and degree of impacts from releases to groundwater. For activities unlikely to impact on groundwater (e.g. an impervious layer between the activity and groundwater or areas where depth to groundwater or the surrounding geology may reduce the risk of impacts on groundwater), applicants may briefly address the required information within their application.

For an ERA posing a higher risk to groundwater (due to the type of ERA proposed or sensitivity of the groundwater environment) more detailed information will be required as mentioned above.

When collecting reference data for background information, seasonal influences should be taken into account. The latest version of the Australian and New Zealand guidelines for fresh and marine water quality (ANZECC water quality guidelines) provides the methodology to collect such reference data. Applicants should also refer to the department's [water sampling manual](#) and [National Environmental Protection \(Assessment of Site Contamination\) Measure 1999](#) when charactering groundwater.

3.1 How information on environmental values will be used by the department

This information will be used to establish the contextual details, including the environmental values of the site and the surrounding area.

When assessing an individual application in the context of protecting Queensland waters, the department must consider the environmental values and the management intent for those waters (e.g. high ecological value, slightly disturbed, moderately disturbed or highly disturbed waters). Any applicable water quality guidelines and best practice environmental management for achieving the management hierarchy for surface or groundwater in section 14 of EPP (Water) will also be considered. If the contaminants of concern are prescribed water contaminants under [Schedule 10](#) of the EP Regulation, the duty under s. 440ZG of the EP Act will also be considered.

This information will be considered when determining whether the ERA and its components can be operated on the site in a way that minimises the impacts to environmental values. Also, if the application is approved, this information will be used to inform the conditions placed upon the environmental authority.

4 Possible impacts to identified environmental values

Once the environmental values of the site have been identified, applicants must identify the potential impacts which are likely to arise from the proposed activity.

In addition to providing details of any discharges or releases, the EP Act⁶ requires applicants to provide a description of the relative risks and likely magnitude of impacts on the identified environmental values.

The following table includes a number of key areas which, if applicable, should be addressed by an applicant in the application documentation.

Discharges and releases

The department's technical guideline 'Wastewater releases to Queensland waters' should be referred to when preparing an application to discharge contaminants to waters. The following information is the minimum that must be provided:

- Identify the location, depth and configuration of all potential discharge points, including:
 - A plan illustrating the location of each potential discharge point, including discharge to a stormwater system, waterway, channel and drain and trade waste dimensions and construction materials of discharge structures.
- Details of the contaminants and waste water to be released including:
 - Description of all waste avoidance and waste minimisation measures adopted to minimise release and adverse qualities of the release
 - Identification of potential contaminants and expected concentrations and/or daily and annual loads (including range)
 - Identification of the physical state of contaminants e.g. Solid, liquid, gas, etc.
 - Identification of whether any contaminants are persistent, toxic, or bio-accumulative
 - Description of the source(s) of contaminants
 - Types, design and level of treatment to be adopted
 - The quantity of the proposed release (average, minimum and maximum daily discharge volume, and maximum hourly release/discharge rate)
 - Whether the release will be continuous or intermittent
 - For a release of toxicants, the initial dilution provided by the discharge structure and the size of the mixing zone, noting that mixing zones are not applicable to managing bio-accumulative toxicants
 - Details of any variation in quantity or quality of discharge released during wet weather events

Note that much of the above information is also relevant to releases to waters other than waste water, for example, uneaten food and caged cultured organism excreta for a sea cage aquaculture activity.

Unplanned and uncontrolled releases

The following information must be provided for unplanned/uncontrolled releases.

⁶ s125 of the *Environmental Protection Act 1994*

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- Identify activities that could lead to direct or indirect impacts and unplanned/uncontrolled release of contaminants to waters, such as, spills and leaks or stream bed and/or bank disturbance and describe the magnitude of the disturbance.
- Identify the location, depth and configuration (if relevant) of the areas where the unplanned/uncontrolled release could be discharged to waters, including:
 - A plan illustrating the location of each potential release point, including release to a stormwater system, waterway, channel or drain.
- Identify infrastructure (including containment devices) with the potential to release unplanned/uncontrolled contaminants to waters. For example, stormwater or waste water flows in excess of stated design hydraulic capacity of the infrastructure such as the wet weather bypass at a sewage treatment plant.
- Identify the potential contaminant type and quantities that could be released from infrastructure identified in dot point above.

Common activities that may cause unplanned and uncontrolled releases and thus need to be avoided are:

- Leakage, seepage or overflows from waste water treatment or storage lagoons
- Leakage, seepage or overflows from erosion and sediment control infrastructure.
- Leachate from waste disposal cells
- Regulated structures (dams or levees)
- Acid sulfate soils
- Acid, metalliferous and saline drainage
- Saline and sodic drainage
- Seepage or overflow from tailings dams or waste rock dumps
- Pipelines carrying environmentally harmful substances
- Storage of oils, fuels and other chemicals
- Land disposal of waste water or other contaminants

Common sources of contaminants include:

- Seepage through the floor or walls of waste water/contaminant treatment or storage lagoons.
- Overflow of treatment/storage lagoons or ponds during prolonged or significant wet weather events.
- Stormwater not being diverted around disturbed areas.
- Leakage from fuel or chemical storage facilities.
- Leakage from well drilling operations and well simulation.
- Disturbance of highly dispersive sodic soils and improper management resulting in saline discharges, turbidity and erosion.
- Disturbance of contaminated land or groundwater resulting in contaminated soil, groundwater or stormwater discharges.
- Ruptures in pipelines used to transfer wastes.

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- Impacts on groundwater from unsustainable or poorly managed irrigation of waste water to land.
- Disturbance of acid sulfate soils. (see [Guidance materials for acid sulfate soils | Environment, land and water | Queensland Government \(www.qld.gov.au\)](#))
- Acid rock drainage. Refer to the 'Global acid rock drainage guide' (GARD Guide) produced by the International Network for Acid Prevention and the Commonwealth Government Leading Practice Guidebook Managing Acid and Metalliferous Drainage
- Structures which are dams or levees constructed as part of environmentally relevant activities.

Water infrastructure

Provide detail on the location and storage capacity of water infrastructure on the site which may include regulated structures, tailings dams, waste rock dams, water storage dams, sediment ponds, wastewater storage ponds, levees, heap leach pads and any other water management infrastructure.

All structures which are dams or levees associated with the operation of an ERA must have their hazard category assessed based on the potential environmental harm that would result from failure event scenarios, as per the 'Manual for assessing consequence categories and hydraulic performance of dams'. This will determine whether they are regulated structures. The design for a regulated structure must be determined by a suitably qualified and experienced person with relevant professional experience.

Groundwater

Where groundwater interacts with surface waters, it is necessary to identify whether the impacts on groundwater quality or elevation, will compromise any identified environmental values and water quality objectives for those waters, or adversely affect a surface ecological system (i.e. through surface-groundwater interactions), or impact on other surface environmental values e.g. agriculture, terrestrial ecosystems. In order to obtain approval for a direct release of contaminants to groundwater, the department must be satisfied that there are no other viable alternatives, and the release is to a confined aquifer and will not deteriorate the environmental values of the receiving groundwater. Where the groundwater hosts an underground aquatic ecosystem, the ANZECC water quality guidelines recommends that that the highest level of protection should be provided to these ecosystems.

Where the applicant proposes an impact to groundwater, monitoring is likely to be required prior to the commencement of the proposed ERA in order to collect sufficient baseline information, as well as at regular intervals during the life of the ERA, including during establishment and any rehabilitation and site closure, to determine if there are any adverse impacts to groundwater as a result of the operation. Once completed, the department will review the results of any groundwater monitoring and determine whether any additional baseline monitoring, or any ongoing monitoring, will be required.

Where there is an indirect release or potential release of contaminants to groundwater, applicants must provide the following information:

- The geological stability of the relevant site for the ERA.
- The location, quality and use, or potential use, of the receiving groundwater.
- The permeability of the earth under the place where the ERA is carried out.
- The presence of containment devices at the relevant site for the ERA and their effectiveness in preventing or minimising the release of the waste.
- The distance separating the receiving groundwater from any containment device.

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- The potential for fluctuations in the level of the receiving groundwater.
- The way in which materials, including contaminants, will be removed from the containment system.
- Whether or not materials, including contaminants, will be removed from the containment devices and if so, the effectiveness of the methods that will be used for the removal.

The department will use the above information to determine whether the risk and likely magnitude of the impacts are acceptable based on the environmental values.

Based upon the relative risk of the activity, the department must also decide whether to impose specific conditions about the following matters:

- The design, construction, function, protection and maintenance of containment devices.
- Maintaining a particular distance between the receiving groundwater and the point of contact between each containment device and the underlying earth.
- Removing materials from the containment device.
- Monitoring the groundwater and or vadose zone to check the effectiveness of the management measures.
- For activities such as irrigation, monitoring the soil to ensure that a build-up of contaminants that may affect environmental values of groundwaters is avoided.

Wetlands

Applicants must describe how the existing environmental values of any wetlands on, or adjacent to, the site will be maintained, or enhanced. Consideration will be given to biodiversity, the natural state, biological integrity, any special features such as threatened flora and fauna, the natural hydrology and interactions with other ecosystems. If a wetland has been allowed to degrade, prior to the applicant making an environmental authority application, (for example through inappropriate land use like cattle grazing), the applicant may be required to restore the wetland.

The department provides wetland mapping to identify significant wetlands. However, it is noted that some man-made drains have previously been mapped as referable wetlands. In these circumstances any pre-existing environmental values are likely to have been lost and the applicant is not expected to restore them. Applicants are encouraged to undertake a site evaluation to confirm the accuracy of any mapping.

Key documents that may assist applicants and assessing officers when evaluating impacts to wetland are:

- The 'Strategy for the conservation and management of Queensland's wetlands'
- State planning policy
- Map of referable wetlands
- Coastal wetlands are protected under the *Coastal Protection and Management Act 1995*. Under this Act, the 'Queensland coastal plan' establishes policies so as to minimise further loss or degradation of coastal wetlands

The 'Queensland wetland buffer planning guidelines' has been developed to assist with the design of a wetland buffer that will maintain wetland environmental values and protect wetlands from current and future threats from adjacent land uses. Appendix F of the 'Queensland wetland buffer guidelines' provides a large list of references that can be used to guide decisions about buffer distances to protect particular environmental values of a wetland. However, care should be taken to ensure that any references used are analysed in

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relation to the wetland being investigated, as each site will be unique in terms of location, wetland environmental values and other characteristics.

Great Barrier Reef catchment waters

Applicants should describe if the relevant activity will, or may have a residual impact to water quality in the Great Barrier Reef catchment waters from dissolved inorganic nitrogen or fine sediment. Applicants should refer to the departments guideline '[Reef discharge standards for industrial activities](#)' (ESR/2021/5627) for more information on what to provide in an application to address section 41AA of the EP Regulation.

The department provides an [online mapping tool](#) to help applicants identify if the point source discharge is located within one of the six Reef regions in the Great Barrier Reef catchment—Cape York, Wet Tropics, Burdekin, Mackay Whitsunday, Fitzroy and Burnett Mary.

Ecology and hydrology of receiving waters

Describe, preferably through the use of water quality or groundwater level monitoring or modelling where applicable, how the proposed ERA will impact on:

- Aquatic ecology of waters e.g. whether in-stream clearance and earthworks will cause impacts to biological integrity.
- Hydrology of receiving waters e.g. impacts from discharges or take of surface water and groundwater, preferably through modelling.
- Any significant alteration to flow patterns in receiving surface waters.

Risk assessment

Risk assessments are undertaken to determine the significance of a risk and to assist applicants and the assessing officers to decide whether it is acceptable for an ERA, or action, to proceed given the mitigation measures proposed. A risk assessment helps determine the level of environmental risk by quantifying the probability of an event happening, as well as its severity and consequences. A risk assessment may be qualitative or quantitative and can consider environmental, economic, social and other impacts. Risk assessments should not adopt assumptions that conflict with protection of water quality and environmental values of waters or compliance with s. 440ZG of the Act e.g. concluding contaminating waters in a green zone is acceptable because persons are not allowed to take the seafood for consumption.

It is reasonable to take a tiered approach to the risk assessment process. An initial low resource desktop risk assessment conducted conservatively on all identified hazards, will allow some decisions to be made on the acceptable management of some lower risk hazards. It will also identify complex hazards or those with severe consequences. These will require a greater level of investigation to demonstrate how any proposed control methods will reduce the environmental risk of any potential release, to an acceptable level.

Additional work may involve:

- Investigative field work that includes environmental monitoring (surface and groundwater etc.).
- Materials testing of potential clay sources.
- Reviewing meteorological, geological and environmental data.
- Using conceptual modelling of, and performance modelling of, potential containment systems and for discharge sources etc.

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Hazards

Assess the hazards of any potential contaminants by:

- Reviewing available published literature for toxicity information on chemicals including consideration of mixture toxicity, persistence, mobility and bioaccumulation potential for any potential contaminants.
- Identifying the fate of each contaminant. Include any information on the hydrological and biological impacts e.g. bioaccumulation and/or biomagnification potential of contaminants, effects on acid sulfate soils, standing water levels, surface expression of groundwater.
- Identifying potential human and environmental receptors of any release, noting that protection of potential future use of waters is required under the National Water Quality Management Strategy.

For mining ERAs, consider the impact of seepage from tailings dams and waste rock dumps, stormwater runoff from tailings dam and waste rock dumps, dewatering of pits and void impacts.

Mixing zones

For planned/controlled release to water, describe the impact to any initial mixing zone(s) and include:

- The results of the baseline water quality monitoring in the area of the proposed mixing zone.
- For waters that are identified to be of high ecological value waters in the EPP (Water), provide predictive modelling results that demonstrate no or negligible change to the ecological attributes beyond the mixing zone. Refer to Volume 2 Section 2.2.2 & Appendix 1 of the ANZECC water quality guidelines for information on the management of mixing zones including when they must not be used.

Discharges to groundwater

If the applicant proposes a direct discharge of contaminants to groundwater, the application must demonstrate that the release:

- Is to a confined aquifer.
- Will not adversely affect a surface ecological system (e.g. through surface–groundwater interactions).
- Will not deteriorate the environmental values of the receiving groundwater.

If the application cannot demonstrate that the direct discharge of contaminants is able to meet the criteria stated above, then the department is required by law⁷ to refuse the application.

Groundwater impact assessment

For activities that pose a high risk of impacting groundwater, a full groundwater impact assessment must be conducted including appropriate modelling to demonstrate that the ERA will not cause adverse impacts on groundwater resources.

A groundwater impact assessment must include:

- Detailed assessment of current groundwater resources including geological and geochemical characteristics.
- Hydrogeological assessment of groundwater resources including groundwater flow characteristics, storativity, hydraulic conductivity and permeability in zones to be impacted by the proposed activities.

⁷ Section 41 of the EP Regulation

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- Details on how seepage detection between deep and shallow groundwater will be considered and managed.
- Connectivity with surface water resources.
- Impact on groundwater quality as a result of the proposed ERA.
- Impact on groundwater flow regimes and drawdown.
- Impact on existing users and future potential uses.
- Numeric groundwater modelling of groundwater resources and expected impacts of the proposed ERA.

If the ERA is for mining or significant extraction activities, it will also need to include details of the following impacts:

- Groundwater lowering/reduction in hydraulic head (from new voids e.g. caves/karst systems).
- Cones of depression and associated impacts.
- Potential contaminants generated and the impacts on the identified environmental values. Potential sources for ground water contaminants include:
 - Waste rock dumps and tailings disposed underground/in pit
 - Workshops
 - Seepage from tailings dam, waste rock dumps, heap leach, process ponds or the direction of pits toward any relevant catchment or town water supply

Activities that pose a high risk of impacting groundwater include, but are not limited to, waste disposal, mining, in-situ hydrocarbon processing (e.g. underground gasification), extraction and/or dredging into/below the groundwater table.

Strategic environmental areas

Identify if the ERA impacts on the environmental attributes of a strategic environmental area (SEA) under the *Regional Planning Interests Act 2014* (RPI Act) as described on the [Department of Housing, Local Government, Planning and Public Works \(DHLGPPW\)](#) website. SEAs are located in the channel country, Cape York, Gulf rivers, North Queensland, Hinchinbrook Island and Fraser Island, as described on the [DHLGPPW website](#). If impacts are from a resource or regulated activity, a Regional Interests Development Approval (RIDA) may be required from DSDILGP.

However, note that DESI assessment officers normally provide technical advice to the administering authority during the RIDA assessment process where widespread and irreversible impacts to relevant environmental attributes are being proposed.

4.1 How information on risks to environmental values will be used by the department

The department will use the information provided to:

- Determine the environmental risks associated with the activity.
- Set the outcomes that the applicant must achieve in relation to impacts on waters.
- Establish whether the applicant has provided sufficient information to demonstrate that the risk and likely magnitude of impacts of the contaminants on the receiving environment will not adversely affect

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environmental values, other water users or properties. If the environmental values, other users and / or properties are affected and the proposed management techniques will not adequately address these issues, the application may be refused.

- Identify whether any ecological and hydrological changes, such as those caused by increased or decreased quantities of discharge to a watercourse, or changes to standing groundwater levels; will impact upon the environmental values of those waters. This will inform whether the application can be approved.
- Set necessary or desirable conditions to clarify the environmental outcomes required and measures to achieve and maintain them.

4.2 Proposed management practices

Once the magnitude and risk of each impact to the environmental values is known, applicants must identify avoidance, mitigation, monitoring, reporting and offset strategies, where appropriate, to address the risks.

These strategies can include physical works, processes or treatments. Similarly, they could include management or monitoring practices. In many cases, adequate environmental management will require both physical works as well as management practices.

When identifying avoidance, mitigation, monitoring, reporting and offset strategies the applicant should clearly detail how the works or practices will link back to and address the previously identified risk.

The following table provides general information to assist all applicants in identifying the type of information required to support the selected avoidance, mitigation, monitoring, reporting and offset strategies. Additionally, this table provides information on a number of key areas which, if applicable, will require the applicant to provide additional information on the proposed environmental management practices to be used.

Management hierarchy

Describe how the release of waste water or contaminants to waters (including contaminated stormwater) will be dealt with in accordance with the management hierarchy for surface or groundwater.

The management hierarchy for surface and groundwater in section 14 of the EPP Water (in order of preference) is:

Step 1—**firstly – reduce the production of waste water or contaminants by reducing the use of water**; evaluate water conservation measures to reduce the use of water and the production of waste water or contaminants. The applicant must describe the steps which have been taken to avoid contaminating stormwater and creating waste water.

Step 2—**secondly – prevent waste and implement appropriate waste prevention measures**; evaluate waste prevention options and implement appropriate waste prevention measures. Applicants must describe the steps taken to evaluate the treatment and re-use options of waste water (including contaminated stormwater) which have been investigated and implemented where appropriate.

Step 3—**thirdly – evaluate treatment and recycling options and implement appropriate treatment and recycling**; if waste prevention does not, or is not likely to, eliminate the release of waste water or contaminants to waters, evaluate treatment and recycling options and implement appropriate treatment and recycling.

Step 4—**fourthly – evaluate the following options for waste water or contaminants in the order in which they are listed**; if treatment and recycling does not, or is not likely to, eliminate the release of waste water or contaminants to waters, evaluate the following options:

- appropriate treatment and release to a waste facility or sewer;
- appropriate treatment and release to land;
- appropriate treatment and release to surface waters or groundwaters.

appropriate treatment, of waste water or contaminants, means—

- for release to a sewerage service provider's waste facility or sewer—treatment that meets the service provider's requirements for the release to the waste facility or sewer; or
- for release to land—treatment that ensures the release to land is ecologically sustainable; or
- for release to surface waters or groundwaters— treatment that ensures, or the taking of other steps to ensure, that the release—
 - will not affect the environmental values for the waters; or
 - is offset by undertaking an activity to counterbalance the impacts of releasing waste water or contaminants to waters, other than an offset to which the *Environmental Offsets Act 2014* applies.

sewerage service provider see the *Water Supply (Safety and Reliability) Act 2008*, Schedule 3.

waste facility means a facility for the recycling, reprocessing, treatment, storage, incineration, conversion to energy or disposal of waste.

waste prevention means the adoption of practices or processes that avoid generating waste or reduce the quantity of waste requiring subsequent treatment, recycling, or disposal.

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Step 4 could include treating or recycling water so that it is fit to replace on-site use of raw water. Examples could be process water, cleaning, dust suppression, product washing and irrigation. Another option is treating or recycling water so that it is fit for worthwhile offsite use e.g. stock water, irrigation water.

All options for reduction, prevention, treatment or recycling must be evaluated and shown to be impractical before any release to surface or groundwater will be considered by the department.

The preference is for the implementation of long-term beneficial re-use programs. Higher order use of reclaimed water is encouraged. Higher order uses include replacement of potable water in industrial applications. Additionally, investigation of re-use opportunities should be ongoing and implemented where appropriate. Rigid re-use targets may not be obtainable over time, particularly when a third party is involved.

If mitigation is required to reduce the risk of their impact, applicants are encouraged to consider management strategies, where relevant, for the following activities:

- The site water balance and ability of a site to manage clean/dirty water to reduce spill risk of contaminated water. This should not be limited to hazardous dams spill risk requirements, but should include operational systems to separate water quality and if required, release the highest quality water during high flow events.
- The potential impact of contaminant transport.
- Sewage treatment infrastructure and any associated impact of effluent disposal (e.g. surface or groundwater impact).
- The generation of leachate and management of waste water.
- Sediment and erosion controls.
- Monitoring regimes proposed to detect impacts from any potential contaminant sources.
- The effectiveness of waste water, stormwater and contaminated groundwater treatment.
- Encapsulating or isolating leachable waste or contaminants to minimise their interaction with water.

Mining ERA applications must also address:

- Whether the applicant has considered and incorporated requirements stated in the 'Manual for assessing consequence categories and the hydraulic performance of dams'.
- Whether liners and basement preparations for any dam/facility will be installed.
- How capillary rise in tailings storage facilities will be managed (operationally and post closure e.g. capillary breaks).
- Installation of appropriate leak detection systems.
- The structural geology below any dams and the geotechnical/seepage implications.
- Fracturing and springs and potential to cause increase into structures/lift liners.
- The design storage allowance and design standard being adopted.
- The use of heap leach pads and carbon in pulp/leach treatments, and how highly contaminated waters will be managed (i.e. cyanide/acid leach issues).
- The management of pregnant/barren ponds and risk of cascading water quality from these facilities impacting mildly contaminated dams.
- The capping and closure design proposed.

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- Co-disposal options and risks.
- Geochemical characterisation.
- Restriction of access for cattle/wildlife to contaminated waters in structures.
- Placement of spillway locations.

The release of waste water or contaminants to waters must be dealt with in accordance with the management hierarchy for surface or groundwater.

Where a residual waste water or a contaminant release to waters remains, the release must be located, timed and managed to ensure it complies with the management intent for waters prescribed under section 15 of the EPP (Water) and protects other prescribed environmental values (see EP Act s. 9).

If release to land or water is unavoidable, documentation demonstrating that the local council will not accept the waste in its sewerage system must be provided.

Unavoidable discharges

For activities where a release to water is unavoidable:

- Provide contingency plans for sustainable waste water disposal without third party re-use.
- Describe the design of the water release system and the management systems proposed to be implemented to reduce the impact on the environmental values.

Unplanned or uncontrolled releases

Provide details of management measures installed to minimise the likelihood of, and manage, an unplanned/uncontrolled release, such as through contingency plans for spills, leaks, overflows etc.

Storage

Describe how any storage of fuel, waste, chemicals or other products that may contaminate water will be contained and managed (during handling, storage, and in the event of an incident). Include details of spill kits, containments systems and contingency plans. **Note that stormwater first flush systems do not constitute containment systems for liquid contaminants.**

Minimise potential hazards

Describe how the proposed infrastructure design and methods of release will minimise the potential hazards and risks of the ERA, particularly in relation to the potential impacts of failure caused by mass release from structural failure or contaminant release from overflows.

The following guidelines may assist applicants in identifying and managing site based hazards.

- AS 1940:2004 Storage and handling of flammable and combustible liquids
- Manual for assessing consequence categories and hydraulic performance of dams
- Structures which are dams or levees constructed as part of environmentally relevant activities

Proposed limits

For activities where a release to water is unavoidable after implementation of avoidance and minimisation measures, applicants must provide a full description of the residual sources and contaminants that remain, proposed limits (concentrations and loads) for the discharge including indicators, monitoring points, outfall

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design and monitoring frequency. This may also include an associated proposed receiving environment monitoring program.

Based upon the information provided, the department may set conditions which stipulate limits including (concentrations and loads), permitted circumstances and locations, the timing of any end-of pipe releases and associated monitoring and reporting requirements.

Stormwater management

Outline how stormwater will be managed. Information to be provided should include:

- Identify the discharge point(s) to the receiving environment, including release to a stormwater system, including any waterway, channel or drain.
- A description of the catchment area for each stormwater release discharge point, and the use of these areas.
- Details of any structures and systems used to minimise or prevent the contamination of stormwater in accordance with the general environmental duty, Section 440ZG of the EP Act (prescribed water contaminants) and the water quality objectives.
- A description of storage or systems available to capture and/or treat contaminated stormwater before release or reuse.
- Erosion and sediment controls which address:
 - The minimisation of topsoil being disturbed at any one time by staging development
 - The diversion of upstream runoff from disturbed areas
 - The re-vegetation or mulching of disturbed areas
 - The installation and maintenance of control measures such as sediment and erosion control devices (e.g. silt fences, settling basins, energy dissipaters and vegetated buffers) and storage lagoons.
- A description of:
 - How clean stormwater which runs on to, or falls directly on the site will be directed away from areas where it may become contaminated (e.g. waste water ponds, composting pads, disturbed soils).
 - How any stormwater which does become contaminated from the ERA, will be captured and reused or tested and/or treated before release, to ensure that it does not contain contaminants in concentrations that may cause environmental harm when released.
 - Sediment and erosion controls that will be in place and the storage that is available to enable capture of sediment-laden stormwater in most storm events.
 - The waste water treatment and/or storage lagoons including information on storage lining, distance above groundwater, flood immunity, freeboard and design capacity.

Applicants are strongly encouraged to use strategies which ensure:

- Clean stormwater which runs onto or falls directly on the site will be directed away from areas where it may become contaminated (e.g. waste water ponds, composting pads, disturbed soils).

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- Stormwater which does become contaminated from the ERA (e.g. falls within a bunded and unroofed fuel storage facility) will be captured and reused or tested and/or treated before release to ensure that it does not contain contaminants in concentrations that may cause environmental harm when released.
- Where land disturbance is planned, the soils have been characterised for potential problems such as sodicity, prior land contamination, dispersiveness and acid sulfate potential, and management measures developed to avoid causing environmental harm.
- Sediment and erosion controls are in place and adequate storage is available to enable capture of sediment-laden stormwater in most storm events.
- Waste water treatment and/or storage lagoons are appropriately lined, have adequate separation from the groundwater table, and have adequate freeboard and design capacity to prevent overtopping during expected design rainfall events.

The following guidelines may assist the applicant in planning and determining the adequacy of their proposed stormwater controls:

- Urban Stormwater Quality Planning Guidelines 2010
- IECA best practice sediment and erosion control guide

The level of information required to be provided will depend upon the likelihood and degree of impacts from stormwater releases. For activities unlikely to have impacts off site, applicants may briefly address the required information within their application. An example where the likelihood of stormwater contamination would be minimal is where all operations are within an enclosed, roofed area.

When an application involves an ERA that has a higher risk of impacts from stormwater releases, more detailed information will be required. Examples of higher risk activities include:

- Extraction and mining activities, specifically in relation to sediment and erosion control and rehabilitation of disturbed areas.
- Waste storage, treatment and disposal activities.
- Other waste management activities (e.g. composting).
- Regulated waste/chemical related activities, where aspects of the ERA are carried out outside of roofed bunded areas.
- Activities disturbing land or causing groundwater contamination.

Management includes an ongoing commitment to maintain and operate in a proper and effective manner, the necessary management devices/controls (including but not limited to the sediment and erosion control devices and the waste water treatment and storage lagoons).

Extraction near a watercourse

If the proposed ERA will involve extraction within the bed, or within 40m of the banks of, a watercourse:

- Describe how bank stability will be preserved.
- Describe how any riparian vegetation is to be maintained or reinstated following completion of the ERA.
- Determine whether extraction activities could affect the watercourse e.g. via head erosion or its flow path(s) during flood events or for in-stream extraction, during dry times.

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- For activities with significant potential to cause head erosion in streams or alter stream flow paths, provide flood modelling for inlet and outflow structures to demonstrate that they are resistant to erosion at bank full stage.

If the application involves dredging, provide details regarding the:

- Type of dredge equipment to be used.
- Handling and disposal of dredged material, including whether there will be washing and screening of dredged material.
- Management of sediment plumes that may result during the ERA.
- Location and management of spoil placement areas.
- The management of any contaminated sediments and acid sulfate soils.
- Dewatering and placement of dredged material on land for example, management of runoff and seepage including suspended sediments, turbidity, contaminants and salinity.

The following guidelines may assist applicants in identifying and managing any acid sulfate soils.

- QASSIT guidelines and laboratory methods guidelines.
- Queensland acid sulfate soil technical manual.
- Management techniques for ASS are described in modules A–E of the 'Instructions for the treatment and management of acid sulfate soils', 2001.

The information provided will be used to determine whether the bed and banks of waters will exacerbate natural erosion processes or contribute to significant changes, such as altering river flow paths or rates. If so, this information may be used in the development of conditions to manage these risks.

4.3 How information provided on proposed management practices will be used by the department

The information provided will be used to determine whether it is appropriate to impose additional operational conditions.

The applicant is responsible for installing all reasonably practicable measures to prevent or minimise environmental harm from being caused. The assessing officer will then make a professional decision about the suitability of the activity for the location and any associated releases. This decision will take into consideration the surrounding environment and scale of the proposed ERA, the values of the receiving environment and the information provided in relation to infrastructure design.

4.4 Management plans

In keeping with the department's regulatory strategy, the department does not approve management documents or operational plans. However, as an obligation under the general environmental duty applicants are strongly encouraged to develop all relevant documents to support the successful operation of their site, including necessary management plans.

The department will condition as a minimum for environmental outcomes, performance monitoring, record keeping and reporting. If provided at the time of the application, appropriate management plans may be used to

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inform the nature of conditions, particularly if prescriptive conditions are required to reduce the level of risk associated with certain high-risk activities.

Additionally, the process of developing the necessary plans may be useful to applicants in demonstrating both due diligence as well as how they will meet their environmental obligations.

The following table includes a number of management and operational documents which may be relevant.

<p>Monitoring program</p> <p>For activities where a release to water is unavoidable, provide details of the monitoring program to monitor and manage the impacts of the ERA on the environmental values and water quality objectives, where relevant.</p> <p>For example, the monitoring program should include:</p> <ul style="list-style-type: none"> • Stormwater monitoring. • Waste water release monitoring. • Receiving environment monitoring (including surface and ground waters). • Quality assurance, assessment of results and reporting outcomes. <p>For resource projects, describe the location of any stream flow gauging stations. Specifically, they are to be located at a minimum distance from the proposed discharge point(s), such that water flow under trigger flow events will not significantly diminish before reaching the discharge point. The location of the gauging station should ideally be such that it is not significantly affected by other upstream point source releases.</p> <p>For projects with limitations on stormwater release, access to relevant rainfall data may be relevant e.g. a nearby Bureau of Meteorology record site, or if not available, on-site measurements will likely be required.</p>
<p>Groundwater monitoring program</p> <p>One of the performance outcomes for water is establishing contingency measures. For activities that pose a high risk of impacting groundwater, applicants are strongly encouraged to establish a groundwater monitoring program for the site. The monitoring program should be suitable to monitor the impacts to the environment and provide a detection system to identify if environmental harm has or has the potential to occur.</p> <p>As a minimum, a groundwater monitoring program would usually:</p> <ul style="list-style-type: none"> • Be developed by a person possessing appropriate qualifications and experience in hydrogeology and groundwater monitoring program design, to be able to competently make recommendations about these matters. • Include a sufficient number of bores, and in high-risk cases, vadose zone monitoring, in locations that will provide early detection of contamination from potential sources of impact. • Provide the following: <ul style="list-style-type: none"> – Representative groundwater samples from the aquifer(s). – Sufficient sampling to characterise background groundwater quality, levels and likely flow directions within the immediate vicinity of the proposed ERA. – Sufficient spatial and temporal replication of samples to make valid conclusions about the presence or absence of contamination or another impact on groundwater down gradient of any

potential source of contamination. This will include groundwater passing the relevant bore(s) of compliance.

- Contaminant trigger levels for the detection of contaminant migration from the ERA or likely material failure of any waste water containment system(s).
- Monitoring of qualities such as common anions and cations that can be used to discriminate groundwater influences.
- Confirmation that the bores will be constructed and sampled in accordance with the requirements of Australian standard AS/NZS 5667.11:1998 water quality sampling: guidance on sampling groundwaters.
- Confirmation that the proposed groundwater monitoring network will be installed, sampled and maintained by a suitably trained and experienced person. An annual review (including a report) of the monitoring must also be conducted by a person possessing appropriate qualifications and experience in hydrogeology and groundwater monitoring.

The following websites and guidelines may assist applicants in developing their groundwater monitoring strategies.

- DESI Water publications available on the department's [website](#)
- Water monitoring and data available on the Queensland government's [website](#)
- Monitoring and sampling manual
- Urban stormwater quality planning guidelines 2010
- Guideline - Model water conditions for coal mines in the Fitzroy basin (ESR/2015/1561)
Model conditions for coal mines have been developed for the Fitzroy basin. If any applications have an impact to the Fitzroy basin, these model conditions may assist the applicant in understanding the appropriate release limits, technology and management techniques that may be appropriate.
- The *Environmental Protection (Assessment of Site Contamination) Measure 1999*

Stormwater management

Provide the following information about how stormwater will be managed:

- Identify the discharge point(s) to the receiving environment, including release to a stormwater system, including any waterway, channel or drain.
- A description of the catchment area for each stormwater release discharge point, and the use of these areas.
- Details of any structures and systems used to minimise or prevent the contamination of stormwater in accordance with water quality objectives.
- A description of storage or systems available to capture and/or treat contaminated stormwater before release or reuse.
- Erosion and sediment controls which address:
 - The minimisation of topsoil being disturbed at any one time by staging development
 - The diversion of upstream runoff from disturbed areas

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- The re-vegetation or mulching of disturbed areas
- The installation and maintenance of control measures such as sediment and erosion control devices (e.g. silt fences, settling basins, energy dissipaters and vegetated buffers) and storage lagoons.
- Describe how:
 - Clean stormwater which runs on to, or falls directly on, the site will be directed away from areas where it may become contaminated (e.g. waste water ponds, composting pads, disturbed soils).
 - Any stormwater which does become contaminated from the ERA will be captured and reused or tested and/or treated before release to ensure that it does not contain contaminants in concentrations that may cause environmental harm when released.
 - Sediment and erosion controls are in place and adequate storage is available to enable capture of sediment-laden stormwater in most storm events.
 - All waste water treatment and/or storage lagoons have adequate freeboard and design capacity to prevent overtopping during expected rainfall events.

Additionally, applicants are strongly encouraged to use strategies which ensure:

- Clean stormwater which runs on to, or falls directly on, the site will be directed away from areas where it may become contaminated (e.g. waste water ponds, composting pads, disturbed soils).
- Stormwater which does become contaminated from the ERA (e.g. that falling within a bunded and unroofed fuel storage facility) will be captured and reused or tested and/or treated before release to ensure that it does not contain contaminants in concentrations that may cause environmental harm when released.
- Where land disturbance is planned, the soils have been characterised for potential problems such as sodicity, land contamination, dispersiveness and acid sulfate potential, and management measures developed to avoid causing environmental harm.
- Sediment and erosion controls are in place and adequate storage is available to enable capture of sediment-laden stormwater in most storm events.
- Waste water treatment and/or storage lagoons have adequate freeboard and design capacity to prevent overtopping during expected rainfall events and leakage to ground or surface waters.

The following guidelines may assist the applicant to determine the adequacy of their proposed stormwater controls:

- Urban stormwater quality planning guidelines 2010
- IECA best practice sediment and erosion control guide

The level of information required will depend on the likelihood and degree of impacts from stormwater releases. For activities unlikely to have impacts off site, applicants may briefly address the required information within their application. An example where the likelihood of stormwater contamination would be minimal is where all operations are within an enclosed, roofed area.

When an application involves an ERA that has a higher risk of impacts from stormwater releases, more detailed information will be required. Examples of higher risk activities include:

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- Extraction and mining activities, specifically in relation to sediment and erosion control and rehabilitation of disturbed areas.
- Waste storage, treatment and disposal activities.
- Other waste management activities (e.g. composting).
- Regulated waste/chemical related activities, where aspects of the ERA are carried out outside of roofed bunded areas.
- Activities disturbing land or groundwater contamination.

Management includes an ongoing commitment to maintain the necessary management devices/controls (including but not limited to the sediment and erosion control devices and the waste water treatment and storage lagoons).

Applicants may find the following documents useful when identifying storm water management strategies:

- Urban Stormwater Quality Planning Guidelines 2010
- International Erosion Control Association (IECA) guide_ 'Best practice erosion and sediment control'

Water management plans

Applicants for mining ERAs are encouraged to develop a water management plan. The primary purpose of a mining project water management plan is to examine and address all issues relevant to the importation, generation, use, and management of water on a mining project in order to minimise the quantity of water that is contaminated and released by and from the project.

A mining project water management plan systematically identifies:

- the actual and potential risks of harm to natural water flows posed by mining activities;
- the actual and potential risk of environmental harm posed by water contaminated by the mining activities; and
- defines management actions that will effectively minimise these risks.

Although there will be differences in the range of activities conducted as part of a mining project, it is possible to identify generic elements of a mining project water management plan that would be appropriate for implementation at all mining projects:

- A study of the environmental values and water quality objectives applicable to the locality where the mining project is to take place; including:
 - background water quality of the waterways proposed to receive discharges and the potential environmental impact of any discharges to the aquatic ecosystem;
 - identification of downstream uses of the waterways into which water may be discharged including, but not limited to, drinking water, agriculture and national parks;
 - a discussion of the environmental impacts resulting from the accumulation of salts and metals in waterways and their sediments including as the discharged water evaporates; and
 - a description of the extent and quality of local and regional groundwater aquifers.
- A contaminant source study that identifies the origin and chemical composition of different types of water, ie. different sources and uses, on the mining project. The study should consider options to

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reduce the level of water contamination, and re-use of contaminated water that is 'fit for purpose'. The study should identify controls that reduce the risk of discharging contaminated water to both surface and groundwaters. The following matters are of particular interest and should be evaluated in the course of the study:

- leachate testing of relevant overburden, ore and waste material from the site to identify sources of water and predictions of the quality and quantity of water that may become contaminated on site;
 - identification of any contaminants that may bio-accumulate to toxic concentrations in the environment should be considered where these are present in the overburden, ore and waste material;
 - the potential for water to be contaminated through contact with saline, dispersive and sodic materials and management measures to prevent saline drainage and the release of saline waters; and
 - the presence of acid producing material and the potential for acid mine drainage based on sampling of exploration samples and progressive characterisation of material disturbed by mining operations.
- A site water balance and model to identify the quantity of clean and contaminated waters (classified according to 'fitness for purpose') produced and used on the site. The model should inform a plan for the appropriate separation, storage and handling of clean and contaminated waters under the different hydraulic flow events (including wet and dry seasonal events) applicable for the site. The water balance should be calculated based on actual rainfall data for the site in question or from the nearest Bureau of Meteorology rainfall gauging station, with site rainfall data preferred.
 - A discussion of the impacts of the mining project including:
 - impacts resulting from the accumulation of salts and metals in waterways and their sediments including as the discharged water evaporates;
 - impacts through drawdown and contamination on local and regional aquifers and the associated environments; and
 - a discussion of the cumulative effects of other industries discharging into the same waterways.
 - Details of water management infrastructure including containment structures, channels, diversions, pipes, pumps, and monitoring facilities. The plan should include:
 - proposed actions to maintain these facilities;
 - proposed actions to maintain and monitor of freeboard in containment structures to reduce the risk of contaminants being released;
 - details of the water pumping equipment that will available to move water quickly and efficiently around the mine under both normal and emergency conditions; and
 - water treatment methods to be used if highly contaminated water would otherwise be likely to be discharged during the life of the mine.
 - A water management system that reduces the risks to the environment identified by both the contaminant source study and the site water balance and model. Water should be managed to minimise the volume of water that is contaminated and maximise the use of any contaminated water for on-site purposes. Overland flow should be diverted from operational and disturbed areas to prevent contamination. Uncontaminated water should form part of the natural flows of the receiving catchments

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and streams. Contaminated water should only be discharged off-site to surface or ground waters where no other feasible method of disposal is available, and then only if it can be demonstrated that unacceptable contamination of downstream water or underground water will not occur. If disposal to ground waters is being considered, appropriate studies will need to be used to demonstrate that any proposed water management system is appropriate given that contamination of aquifers is technically difficult and costly to remediate.

A mining project water management system should achieve the following outcomes:

- Minimisation of the generation of contaminated water by:
 - o limited site disturbance, including early rehabilitation of mined land;
 - o segregation of water by quality or source;
 - o use of the minimum volume of water necessary for operations;
 - o recycling waters in operations as much as possible; and
 - o protection of mine workings and infrastructure from floodwater inundation.
- Minimisation of the contaminants discharged from the mining project (having regard to the mass and concentration of contaminants expected to reach the receiving waters) by:
 - o minimising contaminant concentrations using suitable treatment methods eg. sedimentation dams;
 - o avoiding the accumulation of large volumes of contaminated water;
 - o substitution of uncontaminated water with contaminated water in operational uses where practicable;
 - o avoiding storage of water with a high concentration of contaminants in a dam which constitutes a designated discharge point, or which would discharge directly to the environment if overflow occurred;
 - o design of storage dams to control the risk of discharge to appropriate levels; and
 - o protection of groundwater resources from contamination.
- Minimisation of the impact of releases of contaminated water through a strategy for the timing and manner of release
- Emergency and contingency planning to suit a range of potential emergency scenarios. The scenarios considered must include the potential exceedence of the rainfall characteristics (intensity and duration) used in the design of water management structures, failure of containment structures, loss of electrical supply, inability to obtain critical equipment and spare parts, and inability to access critical control and monitoring points in all weather conditions.
- Assignment and communication of responsibility for actions under the mining project water management plan including implementation, monitoring and reporting.
- Arrangements to review the currency and adequacy of the mining project water management plan and its continual improvement. The plan should be reviewed and updated prior to the end of September each year, and after any event involving the uncontrolled release of water to the environment.

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Documentation of a mining project water management plan should be sufficient to allow it to be audited, and as a minimum include:

- a plan of the mining project that depicts the relevant water courses, potential sources of contamination, control points and structures, monitoring points, and access routes to control and monitoring points;
- statements that clearly identifying the locality and nature of each environmental value of waters which could potentially be affected by the mining project, including any significant environmental issues identified through community consultation (Descriptions of the values must include background receiving water quality and sediment monitoring data suitable for establishing release limits for mine water discharges);
- procedures that contain objectives, measurable indicators and standards, control strategies and roles with responsibility for management actions to achieve the stated objectives; and
- supporting studies identified under the section 'content of a water management plan'.

Applicants may find the following documents useful when preparing mining water management plans:

- Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Canberra
<[ANZECC & ARMCANZ \(2000\) guidelines \(waterquality.gov.au\)](http://waterquality.gov.au)>
- Australian Government Department of Resources, Energy and Tourism 1999, Best Practice Environmental Management in Mining -Water Management
<Document available on the [Library Catalogue](#)>
- Mining Association of Canada (MAC) 2003, Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities, Ontario
<[DevelopinganOMSManualforTailingsandWaterManagementFacilities2011_0.pdf \(mining.ca\)](#)>

5 Rehabilitation of the site

The final aspect to the application process for activities which will have an impact to water, is to detail the proposed rehabilitation measures to be used. This includes providing details of how the land the subject of the application will be rehabilitated after each relevant activity ceases.

Rehabilitation

Where contaminant release to waters or disturbance of waters (i.e. reshaping of the bed and banks of a watercourse) is proposed, the applicant must identify how the site will be rehabilitated. It is important that the rehabilitation plan includes justification as to the options and management measures proposed.

The rehabilitation must provide for the effective management of actual and potential environmental impacts and for the rehabilitation of significantly disturbed waters resulting from the proposed activities. It must also provide for the proposed monitoring to verify rehabilitation success. The level of detail within the rehabilitation plan will vary depending on the level of disturbance proposed and the sensitivity of the receiving waters.

The rehabilitation plan must provide for the following (where relevant).

- Details, including a schematic representation, of the watercourse, post disturbance clearly showing any realignment or reshaping of the features of the watercourse.
- Rehabilitation objectives for contaminants levels within waters (including waters left in residual voids post operations).
- Decommissioning of tailings dams to ensure that surface waters and ground waters will not become contaminated.
- Decommissioning of pits and voids onsite.
- Decommissioning of bores.
- Managing subsidence to ensure that overland and surface water flows are not impacted.
- A program for monitoring all waters which have been contaminated or disturbed sufficient to demonstrate the rehabilitation success. The monitoring program should include:
 - Completion criteria to enable the success of rehabilitation to be measured.
 - Indicators that can measure progress towards the objectives and completion criteria (i.e. the identification of reference sites where required).
 - A minimum sampling intensity for the monitoring of progressive rehabilitation with sufficient replication of monitoring to enable statistical analysis of results at an acceptable power (i.e. not more than twelve monthly intervals).
- Contingency procedures for rehabilitation maintenance or redesign.

If the application is for a mining ERA, applicants are encouraged to review the guideline 'Rehabilitation requirements for mining projects' as additional requirements for mining projects exist.

The following information may be of assistance to applicants when planning their rehabilitation strategies.

5.1 How information on site rehabilitation will be assessed by the department

The information provided will be used when conditioning the application.

When assessing the proposed rehabilitation objectives, indicators and completion criteria, the department will have regard to any relevant rehabilitation requirements.

All rehabilitated land uses must be safe, stable, sustainable and non-polluting. However, in some instances some landforms and areas of a site will not be usable and may have the potential to generate future pollution (i.e. residual voids in arid areas containing highly saline waters). These landforms must nevertheless address safety and stability. In some cases, it may be necessary for a site management plan under chapter 7 part 8 of the EP Act to be applied to the land to address ongoing management of any hazardous contaminants.

6 Information and references

Type	Title
Relevant State legislation	Environmental Protection (Water and Wetland Biodiversity) Policy 2009 Environmental Protection Act 1994 Environmental Protection Regulation 2019
Plans/policies	State Planning Policy Current regional plans <ul style="list-style-type: none"> • Cape York Regional Plan • Central Queensland Regional Plan • Central West Regional Plan • Darling Downs Regional Plan • Far North Queensland Regional Plan • Gulf Regional Development Plan • Mackay, Isaac and Whitsunday Regional Plan • Maranoa-Balonne Regional Plan • North Queensland Regional Plan • North West Regional Plan • Shaping SEQ: South East Queensland Regional Plan • South West Regional Plan • Wide Bay Burnett Regional Plan Reef Water Quality Protection Plan Great Barrier Reef End-of-Basin Load Water Quality Objectives
Departmental guidelines	Guideline – Model water conditions for coal mines in the Fitzroy basin - ESR/2015/1561 Manual for assessing consequence categories and hydraulic performance of structures - ESR/2016/1933 Structures which are dams or levees constructed as part of environmentally relevant activities - ESR/2016/1934 Monitoring and sampling manual 2009 Operational policy - Licensing waste water releases from existing marine prawn farms in Queensland – ESR/2015/1683 Queensland water quality guidelines 2009 Water quality guidelines for recycled water schemes (Queensland Government) <small>Error! Bookmark not defined.</small> Queensland wetland buffer planning guideline Wetland programs, policy and legislation (Queensland Government) Urban stormwater quality Reef discharge standards for industrial activities ESR/2021/5627 Standard conditions guide (five-100 hectares) Commercial cropping and horticulture in the Great Barrier Reef catchment (prescribed ERA 13A) (PDF, 3 MB)

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Type	Title
	Applying for an environmental authority to undertake commercial cropping and horticulture (PDF, 2 MB)
Relevant Australian Standards	AS 1940:2017 The storage and handling of flammable and combustible liquids AS/NZS 2031:2012 Selection of containers and preservation of water samples for microbiological analysis. AS/NZS 5667.1:1998 Water quality - Sampling - Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples. AS/NZS 5667.4:1998 Part 4: Guidance on sampling from lakes, natural and man-made. AS/NZS 5667.6:1998 Water quality - Sampling - Guidance on sampling of rivers and streams AS/NZS 5667.9:1998 Water quality - Sampling - Guidance on sampling from marine waters AS/NZS 5667.10:1998 Water quality - Sampling - Guidance on sampling of waste waters AS/NZS 5667.11:1998 Part 11 Guidance on sampling of groundwaters AS/NZS 5667.12:1999 Water quality—Sampling—Guidance on the sampling of bottom sediments
Other government publications within Australia	Australia and NZ Food Standards Code – “Standard 1.4.1 - Contaminants and Natural Toxicants” Australia and NZ Food Standards Code generally expected levels (GELs) for metal contaminants Australian drinking water guidelines - National Health and Medical Research Council (2023) Guidance for risk assessment of wastewater discharges to surface waters (Victoria EPA) Guidance materials for acid sulfate soils (Queensland Government) Preventing acid and metalliferous drainage - Leading practice handbooks for sustainable mining (Department of Industry Science and Resources) Map of referable wetlands PFAS National Environmental Management Plan (Australian Government)
Other	Australian and New Zealand guidelines for fresh and marine water quality 2000 (ANZECC water quality guidelines) Best management practices for industrial storm water pollution control, Sacramento Stormwater Management Program. Global acid rock drainage guide (GARD Guide) Guidelines for managing risks in recreational water quality (NHMRC 2008) Healthy water Ways IECA - Best practice erosion and sediment control. International Erosion Control Association (Australasia) Water quality Australia – Guidelines (Australia Government) Seqwater development guidelines – Development guidelines for water quality management in drinking water catchments

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Type	Title
	Seqwater publications (including Strategic Plan) Environmental Protection (Assessment of Site Contamination) Measure 1999