



Guidelines for land and water management plans

Burnett and Mary basins
July 2005

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1. About these guidelines

These guidelines set out the requirements of the Department of Natural Resources and Water (NRW) that are to be addressed in a land and water management plan (LWMP). The requirements stem from the Council of Australian Governments (COAG) water reform agenda and the allocation of water under the *Water Act 2000* to achieve the sustainable use of land and water resources.

These guidelines describe how to complete a land and water management plan (LWMP) for an irrigated enterprise located within the Burnett or Mary River basins. The guidelines include desired outcomes for specific elements of a LWMP. These will be met where the management and use of land and water resources are consistent with contemporary good agricultural practices. Achievement of these outcomes will contribute to the targets set out in regional plans for natural resource management.

These guidelines apply to the use of irrigation water described in 2.1 (below) within the regions identified on the following map. Any LWMP associated with allocations outside the regions shown in figure 1 must be based on the LWMP guidelines for that region. If no such guidelines exist, the State Guidelines for Land and Water Management Plans (available in print, or electronically at <www.nrw.qld.gov.au>) should be used as the basis for preparing a plan.



Figure 1: Burnett–Mary region

The guidelines cover any land where irrigation with surface water allocations is possible—typically in designated scheme areas or adjacent to watercourses, including all streams and watercourses feeding into the Burnett, Kolan, Elliott, Gregory, Isis, Burrum, Mary, Noosa, Maroochy and Mooloolah rivers. The guidelines indicate the type of information and the level of detail required by the State Government when assessing LWMPs for properties located within the catchments.

2. What is a LWMP?

The purpose of a LWMP is to provide individual landholders with a practical management plan that will demonstrate that water use practices are ecologically sustainable, both on and off farm. It provides a landholder with the opportunity to plan and review an irrigation enterprise and identify hazards and risks associated with irrigation practices.

A LWMP is, in effect, a management plan setting out how land and water is to be used for irrigation purposes. (It does not concern the use of water for domestic purposes or for animals.)

LWMPs must achieve certain desired outcomes for irrigation development practices. These outcomes, and some acceptable actions for achieving them, are set out in section 4: Contents of a LWMP. A LWMP does not have to incorporate all the examples of acceptable actions, unless this is necessary for the desired outcomes to be achieved. If actions different to those listed are proposed, the plan should clearly state how these proposed actions will achieve the desired outcome.

2.1 When is a LWMP required?

The *Water Act 2000* specifies that an approved LWMP is required before using water for irrigation purposes when:

- a new or additional water allocation or interim water allocation is obtained¹
- a Resource Operations Plan (ROP) specifies a LWMP is necessary for water licences
- an irrigator's land is identified in a Water Use Plan as land where a LWMP is required
- an irrigator intends to use a seasonal assignment of water as their only source of water on the same land in any two of three consecutive water years
- an irrigator intends to use on the same land both a seasonal assignment of water and water taken under a water allocation, or an interim water allocation, in any two of three consecutive water years, and water use will exceed the nominal allocation volume
- an irrigator moves some or all of their existing water allocation from one ROP zone to another ROP zone
- a development permit is required to construct works that capture tail water contaminated runoff.²

All irrigators are encouraged to prepare a LWMP for their property. Irrigators who are not required to have an approved LWMP may use these guidelines to prepare a plan for their enterprise to improve water use efficiency or to address other resource management issues.

2.2 What land and water should a LWMP cover?

The LWMP is a requirement that attaches to the use of water for irrigation. Once water has a LWMP requirement (see 2.1), a LWMP must be prepared for:

- all land where the water that initiated the LWMP is intended to be used, or
- all land that is irrigated with the total water supply, if the water that initiated the LWMP is used or mixed with other irrigation supplies or is used through common irrigation infrastructure.

While not necessary to obtain LWMP approval, landholders are encouraged to include the additional (non-irrigated) areas of their property in the plan in order to obtain a complete understanding of the natural resources of the property.

2.3 What does a LWMP consist of?

LWMPs will need to meet certain desired outcomes for irrigation management practices. These desired outcomes are set out in section 4 of these guidelines.

A LWMP should consist of:

- a property map (e.g. aerial photograph base map, if available)
- overlays (or separate maps) where required
- a written report.

¹ LWMP requirement does not apply to water and used for stock or domestic purposes, or for existing water entitlements obtained prior to the commencement of Section 73 of the *Water Act 2000*. This exemption also applies if prior existing water entitlements are converted to water allocations, or if they are purchased with land as an ongoing enterprise.

² Applies where a Water Resources Plan has declared specific types of works for taking contaminated agriculture runoff and tail water as assessable development.

The property map is an important component. This could be a recent satellite or aerial photograph image at a scale sufficiently large enough to allow clear presentation of information for planning and managing the property. The scale will vary according to the size and complexity of the property but as a guide 1:5000 to 1:10 000 would be suitable for areas over 250 hectares and 1:2000 (i.e. greater detail) for smaller areas. A map that fits on A3 or larger size paper is acceptable. Additional map overlays should be the same scale as the base map.

The format of the written report should be in accordance with the headings listed in section 4: Contents of a LWMP. The contents should be set out in a way that shows how the desired outcomes will be achieved. To ensure the LWMP is a useful, focussed farm management tool, the written report should identify any key management issues relating to natural resources, production or infrastructure.

If any significant changes to an existing development are anticipated during the currency of the plan (see section 5: Plan assessment and approval) it is recommended that they be included, along with a transition strategy. Then, an amendment to the original approved plan would not be necessary when the proposed works are commenced.

2.4 How much detail is required?

While the guidelines prescribe the issues to be addressed in a LWMP, they do not prescribe the level of detail required. The level of detail needed will depend on:

- the location of the property in the landscape
- the property's natural resources
- the level of risk to these natural resources associated with the use of water.

As part of the plan preparation a landholder should examine their current and proposed operations; take into account any risk of degradation to land and water resources, and provide sufficient information to show how these risks will be managed. Section 4.2: Issues identification and risk assessment explains how this can be done.

3. Who is responsible for plan preparation?

It is the responsibility of individual landholders to prepare their plans using their own expertise, or that of consultants, industry organisations or other sources. The Department of Natural Resources and Water is not responsible for preparing plans but can provide information to assist in their preparation.

It is in the landholder's interest to prepare the LWMP at the earliest opportunity, firstly to ensure that a proposed development will meet the obligations required of a water entitlement holder, and secondly to ensure that there are no delays in being able to use the water.

3.1 Assistance with plan preparation

To assist landholders in the Burnett–Mary region to prepare a LWMP, the Department of Natural Resources and Water has developed:

- a resource manual, which includes regionally specific information about soils, water resources, topography, mapping, etc.
- a workbook that guides landholders step-by-step through the preparation process
- a sample LWMP
- a reference manual, which explains the interrelationship between the ecological and production issues relevant to an irrigation enterprise, and supports industry codes of practice and best management practices.

These publications are available from local NRW offices, or from the department's web site at <www.nrw.qld.gov.au>.

The Department of Primary Industries and Fisheries and the Environmental Protection Agency may also be able to provide useful information.

Local offices of the Department of Natural Resources and Water may have information about soils, water resources, topography, and aerial photography, and lists of consultants with the expertise to prepare LWMPs.

Industry groups are developing a range of programs and services to assist landholders with the development of property plans and management systems that support sustainable natural resource management. These are generically known as Farm Management System (FMS) programs and may include best management practice programs or Environmental Management Systems. The *Water Act 2000* allows the department to accept an FMS that is certified under an accredited FMS program³ as the equivalent of a LWMP.

Landholders may wish to contact an industry representative and service organisations for assistance. If you have already adopted a FMS or prepared a property management plan (PMP) or other plans and/or documents, contact NRW to see whether they meet some, or all, of the requirements of a LWMP.

3.2 Can the preparation of a plan be delayed?

A landholder who has a genuine need to use a water allocation before completing their LWMP can apply to NRW for a deferral, which may be approved for a maximum period of 12 months.

4. Contents of a LWMP

This section sets out what information you must provide in your plan. This section also gives information on outcomes that must be achieved and examples of ways in which these outcomes can be met.

Note: these are examples only and do not represent the only ways the desired outcomes can be met.

4.1 Property information

In this part of the LWMP you are asked to provide details of ownership and management of the property, evidence of the relevant licences/approvals and a map showing the property and adjacent lands.

4.1.1 Property description and ownership

<p>Desired outcome</p> <p>Property, ownership, interests and authorities affecting the subject land and water have been accurately described.</p> <p>Relevant property details and resources have been mapped.</p>	
<p>Information you need to provide</p> <ul style="list-style-type: none"> • Name of the property owner. • Name of the property manager. • Property name, rural property address number or street address. • Lot and plan numbers (from most recent rates notice). • Land tenure (whether leasehold or freehold). 	<p>Example of acceptable actions</p> <p>An accurate description of property, address, ownership and tenure has been provided.</p>

³ The FMS program must be accredited by NRW as meeting LWMP requirements.

4.1.2 Permits, notices and existing approvals

Information you need to provide	Example of acceptable actions
<p>Provide evidence of relevant approvals or notices associated with the irrigation development. For example:</p> <ul style="list-style-type: none"> • water entitlements, volumes and ownership details (NRW) • works in a watercourse, lake or spring (NRW) • vegetation clearing permit or development permit (NRW) • floodplain works approval (local government) • approved soil conservation plan (NRW) • waste water reuse authority (local government and NRW) • drainage diversion approval (water service provider) • sites listed on the Environmental Management Register (EPA) • notifiable activities (such as cattle dips and spray races) as listed in Schedule 2 of the <i>Environmental Protection Act 1994</i> • heritage places as listed on the Queensland Heritage Register. 	<p>Approvals or notices relevant to the irrigation development have been obtained and are current.</p> <p>Areas covered by existing permits, approvals, licences, etc. have been identified.</p>

4.1.3 Base maps

Information you need to provide	Example of acceptable actions
<p>Provide a detailed base map that covers the irrigation area and surrounding lands or features that may be affected by the development. Features that should be marked on this map or other maps/overlays include:</p> <ul style="list-style-type: none"> • natural features i.e. watercourses, vegetation, wetlands etc. • soil types and boundaries, spot heights/surface contours • existing and proposed infrastructure/buildings, water sources, distribution system etc. • field(s) layout, irrigation layout, crops and areas, buffer areas etc. • areas of concern i.e. salinity, erosion, waterlogging, flooding etc. <p>More detail on mapping requirements is given in later sections.</p>	<p>Suitable map(s) covering the irrigation development have been provided at an appropriate scale.</p>

4.2 Issue identification and risk assessment

In this section you are asked to identify and assess landscape issues (e.g. salinity, erosion, water quality etc.) that impact on your enterprise, either from outside the property or from within, and how any actions link with catchment or regional strategies.

<p>Desired outcomes</p> <p>Off-site impacts on the enterprise or as a result of the enterprise have been accounted for.</p> <p>On-farm issues have been recognised and their implications taken into account.</p> <p>Ecosystems that may be affected by land and water use in the enterprise are identified.</p>	
<p>Information you need to provide</p> <p>Consider the property in the context of its position within the local catchment. Mark on a map and/or describe:</p> <p>Landscape issues</p> <p>a) Any processes and issues occurring or situated outside the property that may have an impact on the irrigation enterprise. These may be salinity, floodplain or riparian issues etc.</p> <p>b) Outline any community natural resource management plans, programs or works being undertaken outside the property that address natural resource management issues that may impact on the property e.g. salinity control programs. Information on these plans could be obtained from regional natural resource management bodies or NRW.</p> <p>Property impacts on surrounding landscape</p> <p>c) Any property development issues or practices that may affect the surrounding landscape e.g. any sensitive areas such as wetlands, mangroves, remnant and other locally significant vegetation.</p> <p>Risk assessment</p> <p>d) Describe any natural resource issues on the property that have or may have an impact on your enterprise.</p> <p>e) Assess whether or not your irrigation farming activities have an adverse impact on land and water resources. Where an issue is evident (e.g. erosion, salinity, high/rising watertable, soil degradation etc.) identify the likely cause and contributing factors. Take into account the impacts of infrastructure, farm layout, irrigation method and practices and farm run-off.</p> <p>f) Describe the management actions that will address each issue in sections 4.4 and 4.5.</p>	<p>Examples of acceptable actions</p> <p>The issues and targets identified in regional or district natural resource management plans have been taken into account.</p> <p>LWMP is consistent with the outcomes or strategies of these plans.</p> <p>Issues such as risks of salinity and rising watertable are identified and assessed.</p> <p>On-farm natural resource issues have been dealt with in management strategies.</p> <p>Existing or potential risk areas are shown on property map and described.</p>

4.3 Farm resources

In this part of the LWMP you are asked to provide details about what land and water resources you have access to (using a series of maps, plans or overlays that are at the same scale).

4.3.1 Land—soils, topography and natural landscape features

<p>Desired outcomes</p> <p>Landform survey information that is adequate for planning purposes has been provided.</p> <p>Information on soil types and properties is provided and soils are shown to be suitable for the proposed crops and irrigation method.</p> <p>Landscape attributes that may affect crop production and methods of water use are identified, and measures to overcome any limitations are identified.</p>													
<p>Information you need to provide</p> <p>Survey information that is adequate for planning purposes.</p> <p>Show on a map or overlay:</p> <ul style="list-style-type: none"> • soil type boundaries • spot heights and/or contours of ground level at a spacing suitable for irrigation layout and design • vegetation to be retained, and buffer areas. <p>Provide a soil profile description of the major soil types.</p> <p>The following table can be used as a guide to mapping scale and soil sampling intensity.</p> <table border="1"> <thead> <tr> <th>Area (Ha)</th> <th>Soil sampling intensity* (Ha/site)</th> </tr> </thead> <tbody> <tr> <td>Up to 10</td> <td>1</td> </tr> <tr> <td>10–50</td> <td>1–5</td> </tr> <tr> <td>50–100</td> <td>5–10</td> </tr> <tr> <td>100–250</td> <td>10–25</td> </tr> <tr> <td>>250</td> <td>25</td> </tr> </tbody> </table> <p>* Soil sampling intensity should be higher in areas of complex soil patterns.</p>	Area (Ha)	Soil sampling intensity* (Ha/site)	Up to 10	1	10–50	1–5	50–100	5–10	100–250	10–25	>250	25	<p>Examples of acceptable actions</p> <p>Topographic data and/or supporting evidence has been provided to indicate the landscape complexity (e.g. slope, watercourses, gullies, erosion gullies, run-off flow direction).</p> <p>Land slope information provided as necessary to determine the effectiveness of practices used for:</p> <ul style="list-style-type: none"> • soil conservation • irrigation design • irrigation application • stormwater disposal • drainage works. <p>Soil attributes relevant to irrigation management have been identified e.g. plant available water capacity, erosion risk, infiltration rate, nutrients, physical characteristics, rockiness, salinity, wetness.</p> <p>Limitations to irrigated cropping have been determined.</p> <p>Areas of erosion or salinity risk have been identified.</p> <p>Development of landscapes susceptible to salinity is avoided.</p>
Area (Ha)	Soil sampling intensity* (Ha/site)												
Up to 10	1												
10–50	1–5												
50–100	5–10												
100–250	10–25												
>250	25												

4.3.2 Water—sources, quantity and quality

<p>Desired outcome</p> <p>Water sources are identified.</p> <p>Water quality is suitable for irrigation purposes and will not degrade soils.</p>	
<p>Information you need to provide</p> <p>A description of each water source or entitlement used for irrigation (including the nominal volume or annual yield).</p> <p>A description of the water quality for each water source.</p>	<p>Examples of acceptable actions</p> <p>The quality and suitability of the water supply has been determined.</p> <p>A water analysis (e.g. electrical conductivity, pH, sodium adsorption ratio) is provided.</p> <p>Water used is suitable for irrigation purposes.</p>

4.4 Farm design and layout

In this part of the LWMP you are asked to provide details about how the farm and its infrastructure are designed (using overlays showing field layout, land use and the location of buildings, bores, pumps, storages, etc).

4.4.1 Current land use and infrastructure

<p>Desired outcome</p> <p>Current land use and infrastructure do not lead to degradation of watercourses or contribute to watertable rise. Current land use and infrastructure do not cause adverse impacts on environmental values.</p>	
<p>Information you need to provide</p> <p>A map (or overlay) that shows:</p> <ul style="list-style-type: none"> • boundary of each field or block that is irrigated • area of the field • crop type generally grown • current irrigation method • soil conservation layout, if applicable. <p>Details of existing infrastructure:</p> <ul style="list-style-type: none"> • all water sources (bores, storages, etc.) • buildings, pumps, pipelines, channels • bubblers, checks or drop structures • inverted siphons, surface and subsurface drains • sumps, silt traps • powerlines, main access tracks • pesticide, fertiliser and fuel stores. <p>Describe any measures intended to avoid undesirable impacts as a result of land use and infrastructure.</p>	<p>Examples of acceptable actions</p> <p>Irrigated areas are restricted to suitable land. Existing irrigation areas, crop types, block layout, row direction, etc. are shown. Existing infrastructure (buildings, irrigation, transport) are described and accurately located. Solutions are proposed for any constraints identified.</p>

4.4.2 Proposed land use and infrastructure

<p>Desired outcome</p> <p>Proposed land use and infrastructure do not lead to degradation of watercourses or contribute to watertable rise.</p> <p>Proposed land use and infrastructure do not cause adverse impacts on environmental values.</p>	
<p>Information you need to provide</p> <p>A map (or overlay) that shows:</p> <ul style="list-style-type: none"> • boundary of each field or block that is to be irrigated • area of the field • crop type to be grown, generally • proposed irrigation method. <p>Details of proposed infrastructure:</p> <ul style="list-style-type: none"> • all water sources (bores, storages, etc.) • buildings, pumps, pipelines, channels • bubblers, checks or drop structures • inverted siphons, surface and subsurface drains • sumps, silt traps • powerlines, main access tracks • pesticide, fertiliser and fuel stores • design details of any landform works to be undertaken. <p>Describe any measures intended to avoid undesirable impacts as a result of land use and infrastructure</p> <p>A timeframe for the proposed development.</p>	<p>Examples of acceptable actions</p> <p>Proposed irrigation areas, crop types, block layout, row direction, etc. have been accurately described and are to be restricted to suitable land.</p> <p>Proposed infrastructure (buildings, irrigation and transport) has been accurately described and is to be restricted to suitable land.</p> <p>Impacts of proposed landform changes have been provided.</p> <p>The proposed timetable for this development is indicated.</p>

4.4.3 Irrigation system

<p>Desired outcome</p> <p>The irrigation system is designed to be efficient and appropriate for topography and soil types.</p>	
<p>Information you need to provide</p> <p>Details of how your irrigation system suits your soil types, slopes, water quality and crop.</p> <p>Where applicable show that the irrigation system accounts for land types that have different management characteristics.</p> <p>Describe any measures intended to overcome deficiencies with the system.</p>	<p>Examples of acceptable actions</p> <p>Irrigation system design accounts for slopes and soil types.</p> <p>System designed to achieve >75% water application uniformity.</p> <p>Design capacities of irrigation system are provided.</p> <p>System designed to apply water at rates compatible with soil infiltration rates and soil water holding capacity.</p> <p>An assessment of the appropriateness of the system for soils and landform has been made.</p>

4.4.4 Pumping, storage and distribution

<p>Desired outcomes</p> <p>Storages, channels and pipelines do not cause watertables to rise or cause erosion or erosive flooding. Pumping installations do not cause erosion or stream bank degradation.</p>	
<p>Information you need to provide</p> <p>The type and size of pipelines, channels, storages, etc. The capacity of the pumping or distribution equipment. How seepage and erosion from channels, pipelines and storages will be prevented. How you will minimise any degradation caused by pump installations and associated works. If proposing a new dam or ring tank—design and construction details (site investigation, compaction techniques, bywash details) describing how you will build it, and the associated infrastructure to:</p> <ul style="list-style-type: none"> • minimise seepage loss • prevent embankment failure and by-wash erosion • avoid adverse impacts on overland flow. 	<p>Examples of acceptable actions</p> <p>Pumping installations take the risk of degradation to watercourses or channels into account. Storages and earthen channels have been investigated, designed and constructed to prevent seepage. Channels and furrows are designed to carry water at non-erosive velocities, and their dimensions are described. Measures have been taken to control erosion associated with water storages. Risk of degradation from existing storage and distribution works have been identified.</p>

4.4.5 Field layout and erosion control

<p>Desired outcome</p> <p>Field layout does not contribute to water erosion of soils.</p>	
<p>Information you need to provide</p> <p>A description of how the irrigated area is designed to limit erosion (row direction and length, banks, waterways, etc). A description of buffer systems and sediment traps in place to filter and capture sediment if erosion occurs.</p>	<p>Examples of acceptable actions</p> <p>Field layout takes variations in slopes and soil types into account. Current or proposed soil conservation measures control erosion. Buffer areas filter run-off.</p>

4.4.6 Stormwater, drainage and farm run-off

<p>Desired outcome</p> <p>Storm or irrigation run-off from irrigated areas does not cause water quality degradation or stream bank instability.</p>	
<p>Information you need to provide</p> <p>Show on a map or overlay and discuss farm drainage infrastructure including any tail water and recycling sumps.</p> <p>Details of:</p> <ul style="list-style-type: none"> tail water volume and minimum stormwater volume able to be contained the stormwater containment system and any links with farm storages. <p>Show how you are able to minimise the volume of water that becomes contaminated run-off.</p> <p>Show how you will minimise the impacts of run-off water.</p>	<p>Examples of acceptable actions</p> <p>Soil conservation measures (row direction, banks, waterways) are in place.</p> <p>Silt traps and/or grass buffers are in use.</p> <p>Measures to contain or filter contaminated storm run-off are in place.</p> <p>Stormwater collection system is designed to capture contaminated stormwater run-off from high-risk areas.</p>

4.4.7 Flood risk

<p>Desired outcome</p> <p>Farm layout is designed to minimise the impacts of flooding.</p> <p>Developments on a floodplain will not cause an increase in depth or velocity of water flows that will lead to stream bank instability or an increase in soil erosion.</p>	
<p>Information you need to provide</p> <p>Details of:</p> <ul style="list-style-type: none"> what land floods and how frequently depth and likely velocity of flow, and your strategies for managing the effects known flood boundaries, flow paths or flood heights. 	<p>Examples of acceptable actions</p> <p>Where a floodplain management plan is in place:</p> <ul style="list-style-type: none"> the position of structures (e.g. channels, drains, levees and access roads) is consistent with it. <p>Where there is no floodplain management plan:</p> <ul style="list-style-type: none"> buildings are sited away from overland flows above ground structures are designed to: <ul style="list-style-type: none"> minimise concentration or restriction of flood flows avoid diversion of flow directly into streams avoid erosive flooding or a significant change to a flood hydrograph.

4.5 Farm management

This part of the LWMP covers farm irrigation management practices. You are asked to provide details about your irrigation management, farm run-off, soil management and chemical and fuel management.

4.5.1 Crop water requirements

<p>Desired outcome</p> <p>Water requirements for the enterprise have been determined.</p>	
<p>Information you need to provide</p> <p>An estimate of the total water you will require in most years for your irrigation development.</p> <p>The expected annual water requirements for each crop.</p>	<p>Examples of acceptable actions</p> <p>Water balance has been conducted.</p> <p>Annual crop requirements are detailed.</p>

4.5.2 Soil and erosion management

<p>Desired outcome</p> <p>Soil erosion or mass movement is prevented or minimised.</p> <p>The organic matter level and structure of the soil is maintained or improved.</p>	
<p>Information you need to provide</p> <p>Describe your in-field cropping practices (particularly crop rotation, avoidance of soil compaction, conservation tillage, and ground cover target levels) to maintain or improve the soil resource and minimise the risk of erosion.</p>	<p>Examples of acceptable actions</p> <p>Soil conservation strategies used, or intended, for example:</p> <ul style="list-style-type: none"> • agronomic measures • soil conservation structures • irrigation methods and practices • soil binders, conditioners, or mulches/trash blanket. <p>Strategies used to maintain soil structure, for example:</p> <ul style="list-style-type: none"> • minimum or zero tillage • trash retention • crop rotation • control traffic • soil conditioners.

4.5.3 Irrigation application

<p>Desired outcome</p> <p>Water application is matched to crop requirements and/or soil infiltration rates. Irrigation salinity development is avoided both on-site and off-site. Watertables do not rise and are not contaminated as a result of irrigation.</p>	
<p>Information you need to provide</p> <p>Details of how you schedule water applications. Description of the field monitoring tools that you use to ensure that irrigation rates:</p> <ul style="list-style-type: none"> • are matched to soil type and crop requirements • avoid salinity development • avoid run-off or deep drainage. 	<p>Examples of acceptable actions</p> <p>Irrigation is matched to infiltration, soil water holding capacity and crop demands. Management strategies in place for:</p> <ul style="list-style-type: none"> • watertable rises attributable to irrigation • shallow watertables. <p>Soil moisture content and depth of irrigation is monitored during the cropping cycle. Irrigation is scheduled to take account of weather forecasts. Recharge areas are managed to avoid accession of irrigation water to groundwater.</p>

4.5.4 Irrigation system performance

<p>Desired outcome</p> <p>The irrigation system is operated and maintained to achieve efficient performance.</p>	
<p>Information you need to provide</p> <p>Details of any regular checks that you make on the performance of your irrigation system. Describe the efficiency of the irrigation system and provide an assessment of the application uniformity of your system.</p>	<p>Examples of acceptable actions</p> <p>The operation of the irrigation system accounts for variations in soil type. The irrigation system is maintained to:</p> <ul style="list-style-type: none"> • distribute water uniformly • minimise leaks. <p>The efficiency of the irrigation system is regularly checked.</p>

4.5.5 Chemical and fuel management

<p>Desired outcome</p> <p>The storage and use of fertilisers, agricultural chemicals and fuels do not contaminate surface water, groundwater, or soil resources on-site or off-site.</p>	
<p>Information you need to provide</p> <p>Details of:</p> <ul style="list-style-type: none"> • how you currently store agricultural chemicals/fertilisers (location, bunding, security) • how and where you store fuel and oil associated with any pumps • how you apply chemicals/fertiliser so that its access to groundwater or run-off from tail water or storms is avoided • describe how you ensure that chemicals/fertilisers are applied uniformly • if a micro spray system is used, describe its flushing and system cleaning procedures. 	<p>Examples of acceptable actions</p> <p>Chemicals are stored and mixed in a secure area at an adequate distance from streams and water bodies.</p> <p>Spray-free buffer areas are maintained near streams and water bodies.</p> <p>Chemicals are applied according to legal requirements.</p> <p>Fertiliser is applied at rates determined by soil tests or expert advice.</p> <p>Safe chemical and fertiliser application is planned in accordance with weather conditions.</p> <p>Used containers are disposed of:</p> <ul style="list-style-type: none"> • off-property, by a contractor • on-property, in a non-permeable pit clearly marked for the purpose. <p>Flushing and wash down are done where water resources are not affected by the residue.</p> <p>Accreditation has been obtained for the use of farm chemicals.</p>

4.5.6 Riparian zone management

<p>Desired outcome</p> <p>Irrigation farming activities do not adversely affect the ecological condition of riparian zones. Stream bank stability is not compromised and water quality is protected.</p>	
<p>Information you need to provide</p> <p>Measures taken to protect the riparian zone and maintain stream bank stability.</p>	<p>Examples of acceptable actions</p> <p>Retained or replanted vegetation provides stability for stream banks.</p> <p>Grassed buffer zones provide a filtering mechanism where farm run-off enters a watercourse or drainage line leading to a watercourse.</p> <p>Stock access to the riparian area is minimal, and land use allows for an adequate buffer area.</p>

4.5.7 Farm run-off, drainage and water quality

<p>Desired outcome</p> <p>Stormwater run-off from irrigated areas managed to minimise the impact on water quality and stream bank stability.</p> <p>Tail water from irrigation does not harm water resources or water bodies.</p> <p>The discharge from subsurface drainage works or dewatering bores does not degrade land or water resources on-site or off-site.</p>	
<p>Information you need to provide</p> <p>A description of:</p> <ul style="list-style-type: none"> • how you prevent contaminated farm run-off from entering a watercourse, or a drainage line leading to a watercourse • how any tail water is dealt with, including how you keep it to a minimum • any water quality measuring program undertaken to monitor the quality of run-off from your property • the options considered to contain contaminated run-off and where applicable limit the capture of overland flow water • how you deal with discharge from subsurface drainage works or dewatering bores. 	<p>Examples of acceptable actions</p> <p>There is a stormwater management strategy in place.</p> <p>Silt traps and/or grass buffer areas are used to filter farm run-off.</p> <p>In-field storage is used to minimise the discharge of contaminated storm run-off.</p> <p>Stream bank protection measures are used where storm run-off enters a watercourse.</p> <p>Tail water from irrigation is recycled, or disposed of in a way that does not degrade water quality.</p> <p>Subsurface drainage water is either reused or disposed of in a way that does not degrade water quality.</p> <p>Stormwater collection system captures contaminated stormwater run-off from high-risk areas.</p> <p>Discharge of storm run-off is via constructed, grassed waterways.</p>

4.6 Monitoring and reporting

In this part of your LWMP you are asked to identify some aspects of farm management and natural resources that you may be asked to monitor. Monitoring requirements relevant to your enterprise will be negotiated at the time of plan assessment.

<p>Desired outcome</p> <p>The relevant parameters of land and water resources and the performance of irrigation and farm drainage systems are monitored regularly to verify that degradation is not occurring.</p>	
<p>Information you need to provide</p> <p>Identify what parameters are to be monitored, the frequency of monitoring and what information is recorded for later assessment and plan improvement. Some examples of parameters to monitor are:</p> <ul style="list-style-type: none"> • performance of on-farm water delivery systems • performance of stormwater run-off and tail water systems • water use for each crop, soil type and method of irrigation • deep drainage losses or groundwater levels • soil health • quality of surface and groundwater used • quality of run-off water • salinity of shallow watertables • riparian condition. 	<p>Examples of acceptable actions</p> <p>The location of a site is appropriate for monitoring the identified risk.</p> <p>Monitoring programs (detailing subjects, methods, frequency and the recording system used) are conducted regularly. For example:</p> <ul style="list-style-type: none"> • on-farm water delivery systems monitored for: <ul style="list-style-type: none"> - leakage adjacent to earthen channels - leakage from mains, submains and hydrants - correlation between the volume of water delivered and the volume used. • stormwater run-off and tail water systems monitored for: <ul style="list-style-type: none"> - condition of sump and storage - condition of buffer zones and waterways - number of times tail water leaves the property - nutrients or chemical residues in run-off and groundwater. • water use monitored for: <ul style="list-style-type: none"> - water quality - volume used per crop - volume used per hectare - number of waterings per crop - depth of irrigation per application. • soil health monitored for: <ul style="list-style-type: none"> - fertility, soil condition and pH - structure and levels of organic matter - compaction layers and depth - number and extent of erosion events. • riparian zone monitored for: <ul style="list-style-type: none"> - stability of stream banks - condition of vegetation - traffic, fire hazard and weed impact. • deep drainage/groundwater levels monitored for: <ul style="list-style-type: none"> - depth to shallow watertables throughout the irrigation season.

5. Assessment of plans

5.1 Plan assessment and approval

Two copies of the completed plan must be submitted to the local NRW office for assessment. These must be accompanied by the approved application form³ and the appropriate fee.

The adoption of industry recommended practices by a landholder will be considered in the assessment process. Once approved, a copy of the plan will be returned to the applicant. Where a change in farm layout or farming practices is necessary as a result of the LWMP assessment, an implementation period will be negotiated so that the enterprise is not disadvantaged.

The LWMP will be approved for a set period—maximum 10 years—and will be reviewed at the end of this period. The approval period may be for a lesser period, depending on the risk to land and water resources posed by the water use. Once the plan is approved landholders have an obligation to comply with the plan when conducting their farming operations.

During the life of the plan NRW has a responsibility to see that the LWMP is implemented and that outcomes are being achieved. This may be through property visits to conduct an audit to verify that strategies identified in the plan are in place.

Landholders must apply to have the plan reviewed before the approved period expires. An application for renewal will require evidence that the existing plan and management practices are meeting the desired outcomes. Landholders who have effectively monitored the performance of their farm practices over the term of the plan will be well prepared to revise their plan for reassessment. (See section 4.6: Monitoring and reporting.)

5.2 Variations to plans and farming practices

It is recognised that farming practices will change over time with developments in technology, changing priorities, and learning gained from experience and research. Landholders are expected to make ongoing improvements to their farming practices to ensure the long-term sustainable use of water resources.

An amendment to the plan may be required if a landholder proposes a significant change, for example:

- a change in the irrigation or cropping practice that leads to a significant change in irrigation management strategies
- a change in land use, irrigation method or irrigation infrastructure
- using the water allocation on new land.

A change that does not require a formal amendment to a plan would be:

- a change of crop that does not significantly alter irrigation practices or the area irrigated.

It is the landholder's responsibility to advise NRW of any significant change to the plan.

6. Other matters to consider

This section provides information on other regulatory approvals that are not core elements of a LWMP, but are required as part of an irrigation development. Landholders should address these regulatory requirements as part of their development planning activities to avoid delays in the assessment of the LWMP.

³ Available at www.nrw.qld.gov.au or at your local office of NRW.

6.1 Approvals and obligations

The approval of a LWMP does not alter a landholder's obligation to obtain other approvals related to the irrigation development. These may include:

- approvals for works or activities in or adjacent to declared fish habitat areas
- approvals for controlling native fauna species and related issues
- approvals for development that may use or impact on state land
- responsibility for control of declared pest plants.

Where a water resource plan prepared under the *Water Act 2000* involves overland flow water, works and practices identified in the LWMP must have regard to the Code for Assessable Development for Operational Works for Taking Overland Flow Water.

For assessment of a LWMP to proceed, the landholder must provide evidence that all associated licences, permits or approvals have been, or are being, obtained. This is particularly important where new developments are concerned. When this evidence is provided, approval for the LWMP may be given even if the statutory requirements of other regulatory agencies have not been finalised. If a separate approval is required for a critical element of the plan (e.g. a water entitlement), approval of the LWMP by NRW may be delayed until a resolution is reached. If you are in doubt, contact the local office of NRW.

Irrespective of whether necessary approvals have been obtained, landholders have a general environmental duty to conduct their activities so as to:

- prevent environmental harm
- maintain air and water quality.

Industry codes of practice and environmental protection policies have been developed to assist individuals to comply with provisions of the *Environmental Protection Act 1994*. Landholders should familiarise themselves with these documents.

6.2 Floodplain management

Placing storages, banks or channels on a floodplain can cause a concentration of flood flows that may adversely affect upstream and downstream users. These structures can also disrupt fish migrations. Any proposal for one or more of these structures should consider fisheries issues.

Landholders have always had a common-law duty of care not to cause nuisance or harm to their neighbours through their actions. Therefore, it is in their interests to consider the consequences of causing harm to adjoining properties. Irrigation and other primary production developments must have regard to the relevant provisions applicable under:

- a water resource plan dealing with floodplain management issues prepared under the *Water Act 2000*
- a floodplain management plan, policy or local law prepared by local government.

The local office of NRW can advise whether a landholder's property is covered by either of these plans and what the requirements are.

Where there are no floodplain management provisions, landholders proposing to construct significant works are encouraged to address their common-law obligations by assessing the likely effect upon run-off volumes, concentrations and flow directions. It is recommended that the advice of an appropriate consultant be sought if hydraulic modelling of flows is necessary due to the location of the property and the relative size of the works.

6.3 Nature and cultural heritage conservation

Landholders should consider whether any proposed development will have an adverse impact on significant nature conservation or cultural heritage values. Matters that need to be addressed include:

- native vegetation management
- cultural heritage, environmental protection and biodiversity conservation.

6.3.1 Native vegetation management

The *Vegetation Management Act 1999* regulates the clearing of native vegetation to prevent the loss of biodiversity, avoid land degradation, and maintain ecological processes. Landholders must check with NRW before clearing native vegetation as part of an irrigation development.

When an application to clear vegetation is being made, the landholder will have to prepare a property vegetation management plan (PVMP) and should prepare a single property plan to satisfy the requirements of both a PVMP and a LWMP. NRW can advise landholders on how this can be achieved.

As part of the property vegetation management plan, landholders are required to provide NRW with information, including:

- the location and extent of the area proposed to be cleared
- the purpose of the application
- details of the way the proposed clearing meets the performance requirements of the regional vegetation management code for the area
- any other information the applicant considers may assist in the assessment of the application.

Landholders should consult their local Vegetation Management Officer at NRW or their local industry organisation for more information on preparing an application to clear vegetation.

6.3.2 Cultural heritage, environmental protection and biodiversity conservation

Under section 23 of the *Aboriginal Cultural Heritage Act 2003* and the *Torres Strait Islander Cultural Heritage Act 2003* a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal or Torres Strait Islander cultural heritage (the cultural heritage duty of care).

A person will comply with this duty of care in relation to Indigenous cultural heritage if the person is acting in compliance with cultural heritage duty of care guidelines gazetted under the *Aboriginal Cultural Heritage Act 2003* or in accordance with an agreement with the Aboriginal or Torres Strait Islander party for the area or a cultural heritage management plan approved under Part 7 of the Aboriginal or Torres Strait Islander cultural heritage legislation.

Duty of care guidelines highlight the need to search the Cultural Heritage Database and the Cultural Heritage Register, administered by the Cultural Heritage Coordination Unit, Department of Natural Resources and Water. For matters relating to Aboriginal or Torres Strait Islander cultural heritage, a person must take all reasonable and practicable measures to ensure the activity does not harm cultural heritage.

For matters relating to rare and threatened flora and fauna and Queensland's historic cultural heritage, it is the landholder's responsibility to contact the Environmental Protection Agency (EPA) before any action is taken. Approvals and negotiated outcomes relating to these issues and subsequent compliance are the responsibility of the EPA.

Information should be provided to show that the impacts of the irrigation development on environmentally sensitive areas such as wetlands have been considered and discussed with EPA.

The Environmental Protection Agency advises that proposed irrigation development must avoid adverse impacts in the following areas:

- Any area containing rare or threatened species listed in the *Nature Conservation Act 1992* or listed as an endangered ecological community (*Endangered Species Protection Act 1992*, Commonwealth).
- Areas of international or national significance such as World Heritage areas.
- Ramsar listed wetlands.
- Areas involving internationally protected migratory species; nationally threatened animal or plant species; or ecological communities listed under the *Environment Protection and Biodiversity Conservation Act 1999*.
- Areas defined as Important Wetlands (ANCA 1996) or other wetlands specifically identified as having high conservation value of state significance. This can include protected areas, critical habitat or areas containing rare or threatened animal or plant species listed under the *Nature Conservation Act 1992*.
- Areas containing important wetlands or significant coastal dune systems as listed in the Directory of Important Wetlands (ANCA 1996) or the regional coastal management plans prepared in accordance with the State Coastal Management Plan (Queensland's Coastal Policy 2001) or otherwise recognised.

7. References

Codes of Practice and Best Management Practice Manuals

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