

# INTERIM APPROACH FOR INTEGRATING URBAN WATER MANAGEMENT WITH LAND USE PLANNING WITHIN THE SOUTHERN RIVER AREA

## Guidance for developers

Prepared for the Southern River Steering Committee

By Essential Environmental Services

March 2006



Environmental Protection Authority



CITY OF GOSNELLS



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## **ACKNOWLEDGEMENT**

This strategy has been formulated to aid development of the Integrated Land and Water Management Plan for the Southern River area. The Southern River Project is a joint State and Local Government and private industry project which is aiming to achieve integrated water management within the Southern River / Forrestdale / Brookdale / Wungong District Structure Plan Area.

Agencies that have contributed significantly to the development of this strategy include Water Corporation, Department for Planning and Infrastructure, Department of Water, Department of Environment, City of Gosnells, City of Armadale, APP, Parsons Brinckerhoff and GHD.

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## 1 INTRODUCTION

There is currently significant pressure for development within the Southern River area, as several large parcels of land are in the process of rezoning and subsequent subdivision. The State Government has recognised that the critical issue for development within this area relates to water resource management – primarily the management of high groundwater which is rich in nutrients and how management of urban water issues such as stormwater will impact the receiving environments including the Swan and Canning Rivers and high value wetlands.

The State Government is building a strategy to guide the delivery of water resources management in an urban development context known as the Southern River Integrated Land and Water Management Plan (ILWMP). However, as the likely completion date of the ILWMP is not until June 2006, there is a need for a framework to ensure that good urban water management outcomes are achieved in the interim.

The aim of this document is to provide advice as to how urban water management issues should be addressed within the planning approvals system. It is focussed primarily towards land owners/developers and their consultants, although will be considered by relevant government agencies in undertaking their regulatory roles. It is not intended to create an additional layer of approval, as the proposed framework sits within the existing planning approvals system. It will ensure that the necessary 'water information' is generated and available at the appropriate time and that the outcomes will be consistent with the approach that will be outlined in the ILWMP, thereby achieving vital integrated urban water management outcomes (see section 1.3).

This document applies to all development within the Southern River/ Forrestdale/ Brookdale/ Wungong District Structure Plan area (Figure 1). This document will undergo a formal review in early 2006 as part of development of the ILWMP. The findings of this review, including comments received from government agencies, land owners, developers and consultants, will be assessed to better inform the ILWMP.

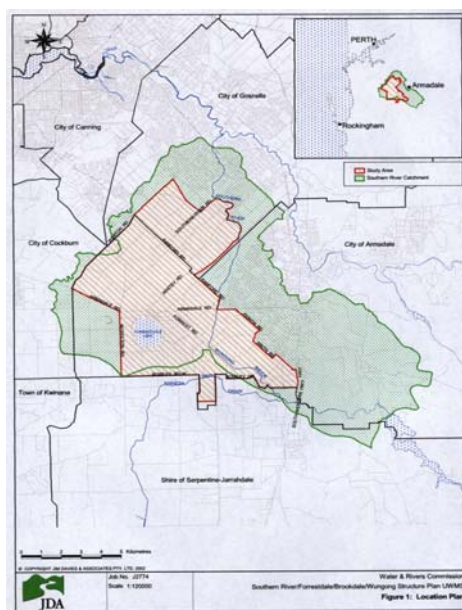


Figure 1: Southern River/Brookdale/Forrestdale/Wungong District Structure Plan Area  
(Source: JDA UWMS, WRC, 2002)

## **2 WATER MANAGEMENT AND PLANNING INTEGRATION FRAMEWORK FOR SOUTHERN RIVER**

The proposed framework for integrating total water cycle management and WSUD with the planning system for the Southern River area is depicted in Figure 2. It recommends specific actions to be taken at each of the 6 key stages of planning. The results of the required actions are proposed to be summarised within the planning report, supported by more detailed information documented in water management plans.

This framework recommends investigations of varying nature and scale at each of the stages of planning. It is recognised that although some requirements are stated, the actual nature and scale of investigation will depend on the specific site conditions. The findings of investigations and analysis undertaken for previous planning stages should be used as the basis for further investigation at subsequent stages. The actions are not intended to be repeated, rather built on and appropriate to the scale of the planning action being taken.

The framework is focussed on one element of consideration – water. It aims to integrate land and water planning to ensure best practice urban water management outcomes are achieved on the ground. It should be noted that this must occur within an overall sustainability context, where all issues are considered collectively to ensure the best overall outcome.

It is recognised, however, that in order for the implementation model to be effective in achieving WSUD outcomes, it must be supported by an overall framework that addresses key issues, assumptions, tools, monitoring, assessment and learning. These elements are being addressed for the DSP area as part of development of the ILWMP.

It is noted that the information requirements identified in this model do not constrain the Department of Water (DoW) or Department of Environment from requesting additional information where it is considered necessary to address a specific environmental issue, or prevent formal assessment of a proposal by the Environmental Protection Authority (EPA).

The information and investigations required to support each management plan are detailed in the following sections. Guidance on possible contents of the water management strategies is provided in Appendix 1. Where necessary, further, site specific advice regarding investigations and content of management plans should be sought from the DoW, Water Corporation or the relevant Local Government. A glossary of terms is contained in Appendix 2.

DoW will also provide advice to the Department for Planning and Infrastructure (DPI) and Local Government, consistent with this framework, regarding the adequacy of each management plan as part of the planning referral process.

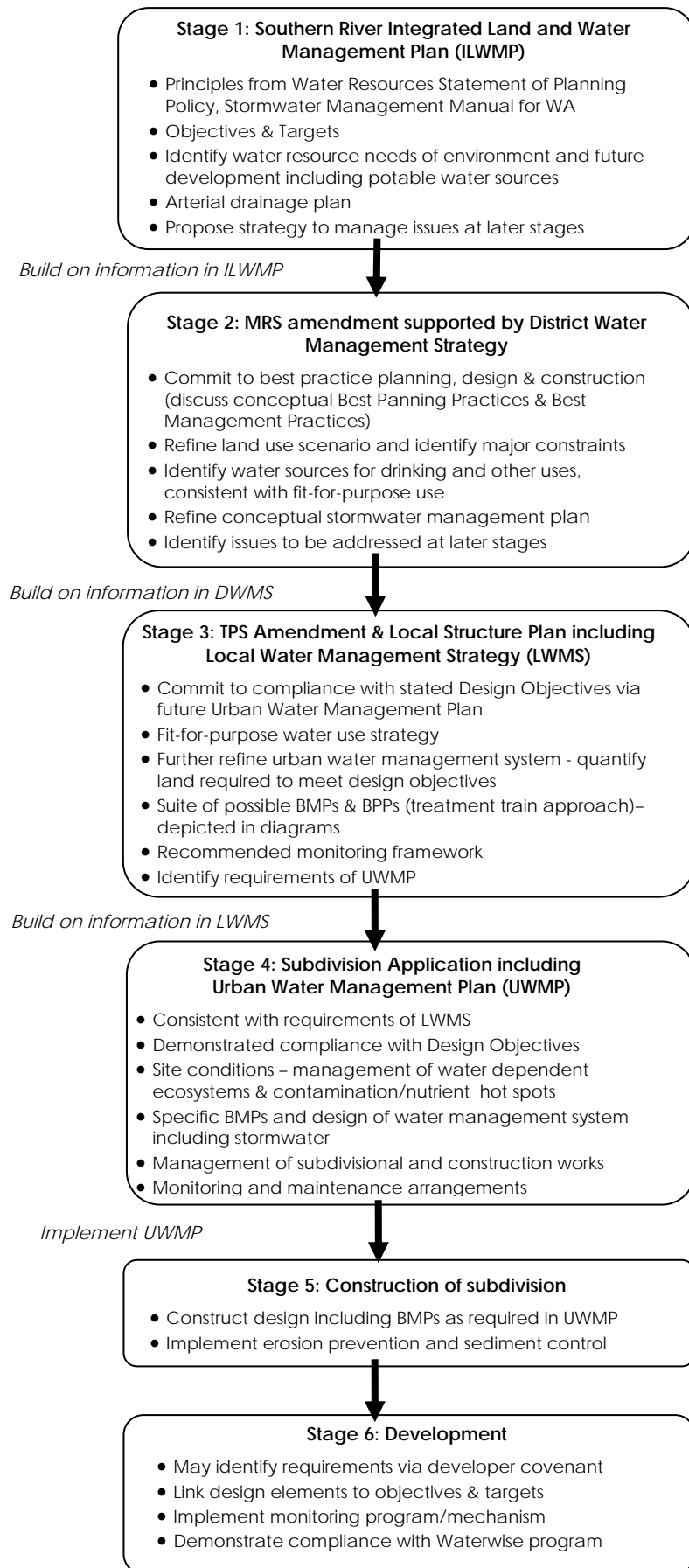


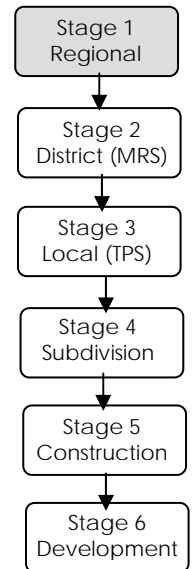
Figure 2: Implementation model for integrating water planning into the planning approvals process in the DSP area

## Stage 1: Regional planning - preparation of the ILWMP

This stage is preparation of the ILWMP. As this framework is for the interim approach, it is recognised that development can proceed to the next stage prior to completion of the ILWMP.

Some regional work has been completed and is documented in the *Urban Water Management Strategy* (WRC, 2002) for the Southern River/ Forrestdale/ Brookdale/ Wungong District Structure Plan area. This strategy, developed by JDA Consultant Hydrologists, and hereafter referred to as the JDA UWMS, was undertaken to address the significant issue of drainage and nutrient management and potential impacts on wetlands, groundwater and the Swan and Canning Rivers, raised by the EPA.

The JDA UWMS provides a framework for addressing drainage and nutrient management within the Southern River/ Forrestdale/ Brookdale/ Wungong District Structure Plan area. It is primarily a drainage strategy however, as it does not consider the total urban water cycle, which includes potable water and wastewater. Elements of the JDA UWMS are being further refined as part of development of the ILWMP and so the JDA UWMS should be used as a guide only. Consultation will need to occur with the DoW and Water Corporation regarding the management of major storm events.



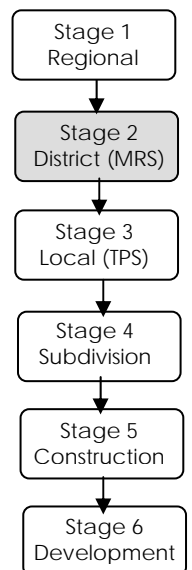
## Stage 2: Statutory change of land use (MRS Amendment)

Rezoning to Urban should be consistent with the Southern River/ Forrestdale/ Brookdale/ Wungong District Structure Plan (WAPC, 2001).

MRS rezoning to Urban should be supported by a District Water Management Strategy, which should be guided by the JDA UWMS (WRC, 2002). Subsequent to completion of the ILWMP, the District Water Management Strategy should be consistent with the ILWMP.

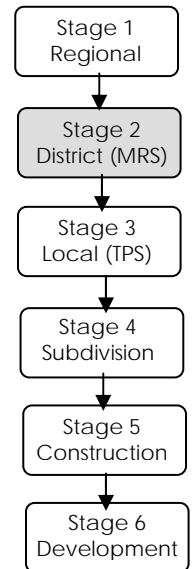
The District Water Management Strategy should address the following:

- Recognition of the principles, objectives and requirements of total water cycle management as outlined in the draft *Statement of Planning Policy No 2.9: Water Resources Policy* (WAPC, 2004), *Liveable Neighbourhoods Edition 3* (WAPC, 2004) and the *Stormwater Management Manual for WA* including the Decision Process (DoW, 2004 – current);
- Interim Water Related Design Objectives for the DSP Area (Appendix 3);
- Broad description of constraints to total water management within the proposal area due to existing infrastructure, existing land uses, possible groundwater pollution plumes and groundwater capture zones of significant wetlands and other water dependent ecosystems (WDE);
- Where necessary, more detailed desk top assessment of past land use with the potential for contamination including high levels of nutrients and identification of areas affected or potentially affected by acid sulfate soils;





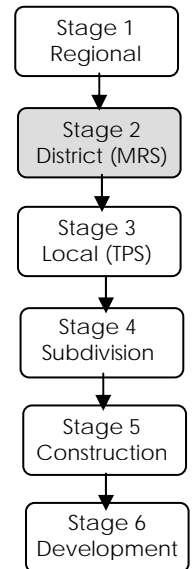
- Discussion of potential water sources for drinking water and other uses having consideration of impacts of use/allocation and infrastructure and management requirements, highlighting the preferred options for supply of non-potable water for fit-for-purpose use (where proposed) and giving consideration to infrastructure needs;
- Results of more detailed water quality monitoring, as well as other more detailed surface and groundwater investigations and modelling, focusing on potential risk areas;
- Conceptual stormwater management plan – quantity aspects to be based on recommendations and information in the JDA UWMS; however, consultation will need to occur with the Department of Water, Water Corporation and the relevant Local Government to obtain agreement of the specific approach;
- Recommendation for strategies and responsibilities for local surface and groundwater monitoring, both pre and post development including data analysis, presentation and reporting mechanisms;
- Identification of specific issues/areas likely to require specialised investigation and management at later stages of planning; and
- Recommended implementation framework identifying funding and ongoing maintenance responsibilities.



Work required to support the recommendations in the District Water Management Strategy includes:

Water balance modelling - broadscale	Identify predevelopment and post development water balances at the district-level scale to inform the assessment of EWRs and options for use of potable and non-potable water sources
Environmental Water Requirements for WDE's and ecological health	<ul style="list-style-type: none"> <li>• Determination of EWRs for regionally significant WDEs in consultation with DoW</li> <li>• Protocols for ecological health monitoring where WDEs are of regional significance both pre- and post development</li> </ul>
Desktop historical land use assessment	<ul style="list-style-type: none"> <li>• Where necessary, identification and assessment of potentially contaminated sites or areas where high nutrients are likely to be found in groundwater</li> <li>• Assessment for presence of acid sulfate soils consistent with Planning Bulletin 64 (WAPC, 2003)</li> </ul>
Groundwater monitoring and modelling (primarily for high water table areas)	<ul style="list-style-type: none"> <li>• Assess superficial/surficial groundwater quantity and quality</li> <li>• Determine need for controlling the groundwater level and potential impacts on WDEs</li> <li>• Identify potential for short-term or long-term mobilisation of nutrients and contaminants</li> </ul>

<p>Surface water monitoring and modelling</p>	<ul style="list-style-type: none"> <li>• Mapping of existing natural and/or constructed drainage system and floodplains</li> <li>• Statement of arterial drainage network required to support development</li> <li>• Assess potential impacts from development on surface water dependent ecosystems</li> </ul>
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Rezoning of the MRS must occur before the Town Planning Scheme (TPS) can be amended to facilitate residential development. TPSs are required to be brought in to line with an amended region scheme within 3 months of gazettal. The time taken to complete an MRS Amendment is usually between 12 and 18 months.

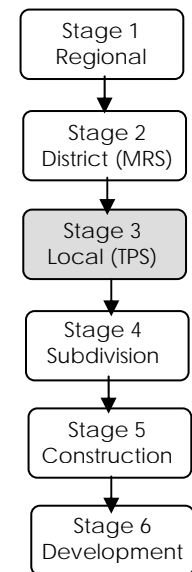
Amending the MRS requires formulation of an amendment report that highlights issues associated with the proposal. The amendment report outlines issues that will need to be addressed at later stages of planning. It is proposed that all future MRS Amendments provide comment consistent with this interim approach until such time as the ILWMP is adopted.

### Stage 3: Local Planning - TPS Amendment

The Town Planning Scheme provides for the statutory control and management of land use. Town Planning Schemes may apply to all or part of a LGA and are changed through an Amendment process where supported by strategic planning and the Local Government.

Planing at the local level is guided by the “higher level” strategic planning. This level of detail is enhanced via Local Structure Plans and Outline Development Plans, which provide the justification for zones and reserves represented in Town Planning Schemes.

Where land is proposed to be rezoned prior to preparation of a local structure plan, the preference is to rezone the area to a “residential development” zone, which requires preparation of a local structure plan prior to approval of any subdivision application. Subdivision and development are generally required to be “in accordance with” the approved structure plan, dependent on the individual Town Planning Scheme.



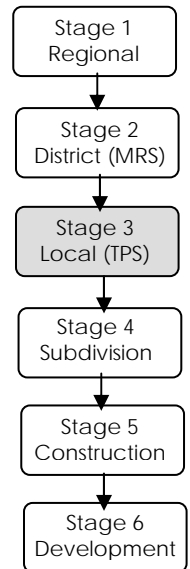
The provisions of this zone should stipulate the requirements of the local structure plan. It is recommended that the local structure plan requirements include, in addition to the usual requirements for structure plans, detailed information relating to potable and non-potable water use and stormwater and groundwater management, outlined in a Local Water Management Strategy which should accompany the local structure plan. The Local Water Management Strategy should be consistent with the water quantity management elements of the JDA UWMS (WRC, 2002) and any regional water management strategy, however liaison with the DoW, Water Corporation and the relevant Local Government is still recommended. Details of the recommended requirements of the Local Water Management Strategy are outlined in the next section.

It is appropriate that consideration is given to development and gazettal of specific zone provisions to achieve stated outcomes. This may include, in addition to the Local Water Management Strategy stipulations, requirements for houses to be water efficient or that incorporate lot-level greywater systems. Consideration will need to be given to these sorts of provisions early in the process, to ensure that they are supported by the Health Department and the relevant water service provider (if proposing a coordinated service with more than 50 connections).

The zone provisions should also require advertising of the local structure plan to ensure that adequate public consultation occurs.

Support of the proposed land use change is generally provided by an accompanying local structure plan and Local Water Management Strategy (see next section). Where this is not provided, the following information is considered necessary to support amendment of a town planning scheme for residential use. This information should be obtained from the preceding District Water Management Strategy or the JDA UWMS (WRC, 2002), strengthened with additional investigations where necessary. The accompanying report should address:

- Objectives for total water cycle management supported by mechanisms to achieve them;
- Interim Water Related Design Objectives for the DSP Area (Appendix 3);
- Identification of WDEs and an assessment of the likely impact of changes in quality and quantity of groundwater and/or surface water on WDEs,
- Detailed pre and post development total water balance including consideration of imported scheme water, wastewater, stormwater and groundwater and how these interact with the environment including the ocean (outfall);
- Description of existing stormwater management infrastructure and natural systems (including wetlands), and its impact on groundwater levels;
- Identification of the capacity of the receiving infrastructure and downstream environment to adapt to the post development water balance;
- Broad assessment of any requirement for land form modification based on the above points,
- Discussion of existing superficial/surficial groundwater quality and quantity based on the regional/district level information;
- A more detailed assessment of past land use in high risk areas including soil types and nutrient pathways;
- Likely water sources and infrastructure requirements for fit-for-purpose water supply, and infrastructure for wastewater and stormwater management;
- The conceptual stormwater management plan (control of major and minor events) for the area including consideration of the ability of the system to meet any identified targets. Consideration should be given to the recommendations in the JDA UWMS (WRC, 2002) although consultation with the Water Corporation is also required; and



- Issues to be addressed through local structure planning, subdivision and development, including roles, responsibilities and timing of actions.

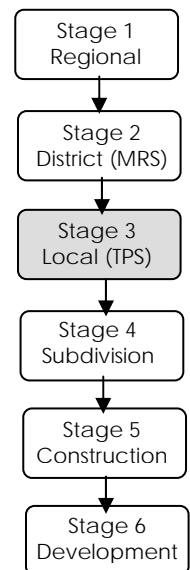
### Stage 3 continued: Local planning – Local Structure Plan

The local structure plan is the key document to guide development of an area. It provides the rationale for development and is a good indication of the developer's intentions for the area. The local structure plan is required to provide detailed information regarding site characteristics and the context of the area. It also outlines constraints and opportunities associated with the site and proposes mechanisms to deliver the identified outcomes. Detailed guidance on the expected contents of a local structure plan is contained within *Liveable Neighbourhoods Edition 3* (WAPC, 2004).

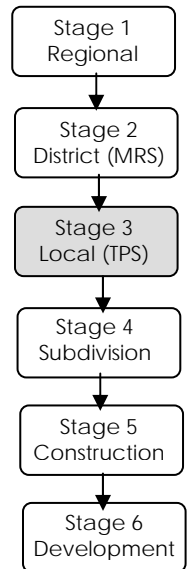
As outlined above, the provisions of the Residential Development zone should require the local structure plan to incorporate a Local Water Management Strategy, consistent with any regional or district water management strategy. The information contained within the JDA UWMS (WRC, 2002) should provide the foundation for development of the Local Water Management Strategy, including identification of areas requiring specialised investigation. The findings and recommendations of the JDA UWMS, particularly with regard to flood management (water quantity) should be acknowledged in the Local Water Management Strategy.

The Local Water Management Strategy should address the following:

- Principles, objectives and requirements for total water cycle management as outlined in the draft *Water Resources SPP* (WAPC, 2004), *Liveable Neighbourhoods Edition 3* (WAPC, 2004) and the *Stormwater Management Manual for WA* including the Decision Process (DoW, 2004 – current);
- Interim Water Related Design Objectives for the DSP Area (Appendix 3). Compliance with these objectives should be demonstrated both within the Local Water Management Strategy and at time of subdivision;
- Existing site characteristics such as geology, hydrogeology and groundwater characteristics in more detail than the regional or district strategies;
- Site constraints and opportunities (such as WDEs, remnant vegetation, landscape and landform), identifying the critical management issues;
- Conceptual urban water management system, including:
  - Quantification of land required for storage and retention of stormwater for the 1 in 100 yr ARI, 1 in 10 yr ARI and 1 yr ARI storm events;
  - Map of existing groundwater levels and any proposed controlled groundwater level (CGL) (including use of subsoil drains) with justification for this control;
  - Demonstrated understanding of the concepts and key issues associated with BMP choice - identification of types of BMPs for management of water quality and quantity and indicative drawings of possible treatment trains and design approaches;



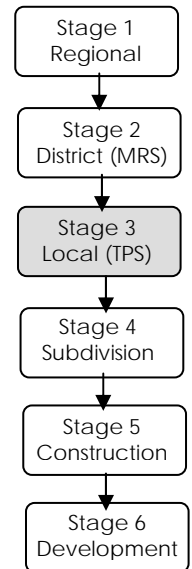
- o Fit-for-purpose water use strategy - mechanisms to conserve potable water and minimise wastewater (including those relating to development design and construction); and
- o Infrastructure and management requirements for proposed water, wastewater and stormwater systems, having consideration of infrastructure already existing and identifying any necessary approvals;
- Issues to be addressed at subdivision stage (included in an Urban Water Management Plan);
- Recommended monitoring framework, pre and post development; and
- Proposed implementation of strategy including roles, responsibilities and funding for monitoring and maintenance.



Work required to support the recommendations in the Local Water Management Strategy includes:

Water balance modelling -	Identify predevelopment and post development water balances to inform the assessment of options for reducing the need to import potable water through consideration of fit-for-purpose use (e.g. toilet flushing, laundry, hot water and ex-house including public open space).
Environmental Water Requirements for WDE's and ecological health	<ul style="list-style-type: none"> <li>• Consider findings of regional water management strategy and provide more detailed assessment where necessary.</li> <li>• Identify and map indicative buffers for wetlands and waterways. This is likely to be based on ecological information rather than water information at this stage.</li> <li>• Where WDEs are of regional significance, ecological health monitoring is recommended prior to and subsequent to development.</li> </ul>
Desktop historical land use assessment	<ul style="list-style-type: none"> <li>• Discussion of previous land use and likely impacts on the quality of surface runoff and shallow groundwater and how this will be addressed by the proposed system including further site ground truthing.</li> <li>• Identification of areas of high risk acid sulfate soils and potential acid sulfate soils, consistent with Planning Bulletin 64 (WAPC, 2004). Where these areas exist, identify an appropriate strategy to address them.</li> </ul>

<p>Groundwater monitoring and modelling</p>	<ul style="list-style-type: none"> <li>• Identify and address any potential impacts on groundwater dependent ecosystems.</li> <li>• Assess potential for short-term mobilisation of nutrients and contaminants resulting from development works as well as long-term impacts on groundwater quality from development. Where necessary, identify pollutant pathways</li> <li>• Provide support for CGL or subsoil drainage where proposed, identifying likely change in groundwater levels.</li> <li>• Assess superficial/surficial groundwater quantity.</li> <li>• Explore potential for use of shallow groundwater for a non-potable source.</li> </ul>
<p>Surface water modelling</p>	<ul style="list-style-type: none"> <li>• Flood plain modelling to determine minimum building levels, setbacks for development, and receiving water levels.</li> <li>• Flow monitoring of existing surface water streams to establish current requirement</li> <li>• Identify how to manage post development flows to meet catchment target flows.</li> <li>• Drainage modelling to determine the land requirements and flood ways needed to cope with major and minor storms (1 in 1yr, 1 in 5/10 yr and 1 in 100 yr ARI events) based on receiving water requirements in consultation with local government and Water Corporation.</li> <li>• Establish acceptability of location of surface water flow paths (streams) and floodwater storage areas (floodplains) in consultation with the DoW and drainage service provider.</li> <li>• Consider potential impacts on surface water dependent ecosystems.</li> </ul>
<p>Monitoring of flows in existing streams or constructed drainage systems</p>	<p>May be required to establish current requirements i.e. 1 in 1 year flows. Used for later subdivision planning</p>



At least 12 months monitoring is suggested to establish preliminary baselines and to support recommendations, particularly for groundwater levels, although 24 months to establish high and low flows is preferred. This should be achievable within the usual planning timeframes where a monitoring program is established on commencing development of the plan.

Where the local structure plan is not advertised in conjunction with the TPS Amendment, the provisions of the zone require that the local structure plan and accompanying Local Water Management Strategy is advertised prior to adoption. This ensures that appropriate feedback can be received from specialist agencies to ensure that the measures proposed in the local structure plan and Local Water Management Strategy are adequate and are consistent with their requirements.

Work required to identify local conditions should be undertaken by the land owner/developer. Where an area has fragmented ownership, alternative strategies may need to be explored including pre-funding of the program by the local government, with costs recouped through development contributions schemes or a coordinated approach by several land owners to employ suitably qualified professionals to undertake the work.

Further guidance on how to address urban water management at local structure plan stage is contained within *Liveable Neighbourhoods Edition 3* (WAPC, 2004) and the DoW's *Stormwater Management Manual for WA* including the Decision Process which forms part of the Manual (2004 – current).

### Stage 4: Application for Subdivision

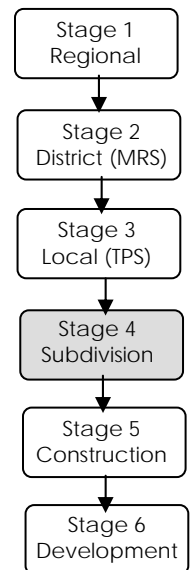
Subdivision applications are accompanied by a Plan of Subdivision which outlines the detail of lots sizes, streets, public open space and other points of detail. Occasionally this detail is further enhanced by Detailed Area Plans which may be prepared for specific areas of a subdivision. Preparation of structure plans and subdivision applications should be guided by the objectives and requirements of *Liveable Neighbourhoods Edition 3* (WAPC, 2004).

Following Preliminary Approval of a Subdivision Application (with or without Conditions), application will be made by the landowner for new Titles. These will be granted only after all conditions (if any) have been satisfied. This usually requires the approval of both the detailed engineering designs for services and roads, and the subsequent construction.

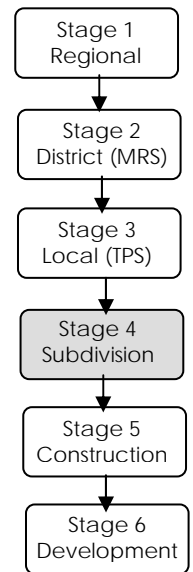
All subdivision applications within the DSP area should be accompanied by an Urban Water Management Plan (UWMP). The UWMP is largely an extension of the Local Water Management Strategy, as it provides the detail to the design proposed in the local structure plan.

The UWMP should address:

- Interim Water Related Design Objectives for the DSP Area (Appendix 3). Demonstration of compliance with these criteria and objectives should be achieved through appropriate assessment tools, calculations or assessments, to the satisfaction of the DoW;
- Agreed/approved measures to achieve water conservation and efficiencies of use including sources of water for non-potable uses and detailed designs, controls, management and operation of any proposed system;
- Management of groundwater levels, including maintenance of ecosystem health and any proposed dewatering;
- Management of groundwater contamination ("hot spots") and other specific site conditions;
- Detailed stormwater management design including the size, location and design of public open space areas, integrating major and minor flood management capability;



- Specific structural and non-structural BMPs and treatment trains to be implemented including their function, location, maintenance requirements, expected performance and agreed ongoing management arrangements;
- Measure to achieve protection of waterways, wetlands (and their buffers), remnant vegetation and ecological linkages;
- Adequacy of buffers proposed in the Local Structure Plan having consideration of any CGL proposed. Demonstration that there will be no impact on WDEs;
- Where an artificial water body is proposed, identify its purpose, design and management;
- Management of subdivisional works (to ensure no impact on regional conservation areas, maintenance of any installed BMPs and management of any dewatering and soil/sediment, including dust);
- Management of disease vector and nuisance insects such as mosquitoes and midges;
- Monitoring program and/or contribution; and
- Implementation plan including roles, responsibilities, funding and maintenance arrangements. Contingency plans should also be indicated where necessary.

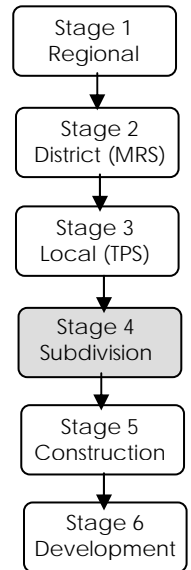


Work required to support the UWMP includes:

Site investigations	<ul style="list-style-type: none"> <li>• More detailed soil and site characteristics.</li> <li>• Further field investigations for contamination or ASS where required, consistent with DoW guidelines.</li> </ul>
Conservation of drinking water	<ul style="list-style-type: none"> <li>• Where non-potable water supply is proposed, detailed modelling of site water balance and demonstration of sustainable sources for non-potable, fit-for-purpose use (e.g. toilet flushing, laundry, hot water and ex-house). Any strategy should have the necessary approvals and agreements in place.</li> <li>• Alternative strategies to achieve water conservation including agreements and implementation mechanisms and expected performance.</li> </ul>
Groundwater monitoring and modelling	<ul style="list-style-type: none"> <li>• Identify nutrient levels and pollutant pathways relating to background levels and contamination/nutrient 'hot spots'.</li> <li>• Map groundwater level contours – existing and proposed.</li> <li>• Identify floor level heights (and fill requirements).</li> <li>• If proposed, outline subsoil drainage strategy including impacts on WDEs and management of any nutrient-rich groundwater.</li> <li>• Identify groundwater recharge rates.</li> </ul>



Surface water modelling	<ul style="list-style-type: none"> <li>• Demonstrate how post development flows will meet catchment criteria.</li> <li>• Modelling of up to the 1 yr ARI event to determine capability for retention/detention and water quality treatment, where/if required.</li> <li>• Modelling of 'minor' and 'major' stormwater systems to identify and size flow paths (via pipes or overland flow) and required flood detention volumes in consultation with Water Corporation and local government.</li> <li>• Refinement of 1 in 100 yr flood way if required.</li> </ul>
Management of WDEs	<ul style="list-style-type: none"> <li>• Identify and map buffers for wetlands and waterways.</li> <li>• Where WDEs are of regional significance, continued ecological health monitoring is recommended prior to and subsequent to development.</li> <li>• Reference to a detailed spring survey of flora &amp; fauna to support management requirements proposed in the Local Structure Plan.</li> </ul>



A UWMP should be lodged with all applications for subdivision in the DSP area. This will ensure that the detailed design is assessed at an appropriate stage in the process and minimise any delays in construction of the subdivision.

In exceptional circumstances, the WAPC may consider an application for subdivision without the UWMP; however, one will be required to be lodged and approved prior to any site works as a condition of subdivision.

Recommended wording is as follows:

*“An Urban Water Management Plan to be prepared prior to commencement of ground disturbing activities, consistent with the [name] Local Water Management Strategy and the [name] [Regional or District] Water Management Strategy[delete if not appropriate], to the satisfaction of the WAPC on advice of the Department of Environment.”*

This ensures that if changes are required to the design to improve the performance of the urban water system, these can be done prior to commencing civil works. The timing of this approval has implications for construction schedules and land owners should allow at least 4 weeks for approval of UWMPs.

An additional condition is recommended to ensure that the UWMP is implemented as intended, such as:

*“The approved Urban Water Management Plan shall be implemented by the landowner, including construction of the identified wastewater, stormwater and groundwater management systems, to the satisfaction of the WAPC on advice of Local Government.”*

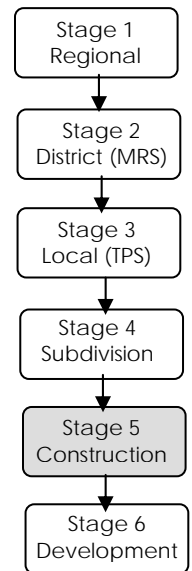
Further guidance on how to address urban water management at subdivision is contained within *Liveable Neighbourhoods Edition 3* (WAPC, 2004), the DoW's *Stormwater Management Manual for WA* (2004 – current), the draft *Australian Runoff Quality Guidelines* (IEA, 2003) and *Australian Rainfall and Runoff, A Guide to Flood Estimation* (IEA, 2001).

### Stage 5: Construction of subdivision

Actions at this stage of construction tend to be dictated by the need to clear the conditions of subdivision applied by the WAPC. Although it is a relatively short stage in the process, it can result in significant impacts on the water quality of receiving environments. These impacts result largely from dewatering, erosion and transfer of sediment.

There is a need, therefore to ensure that the subdivision is constructed in compliance with the approved UWMP, including water quality BMPs, stormwater management systems and measures to prevent erosion and control sediment transport. Monitoring of construction activities and approval of the final form of the subdivision is generally the delegated responsibility of the Local Government, through their role as clearing agency for the majority of the subdivision conditions.

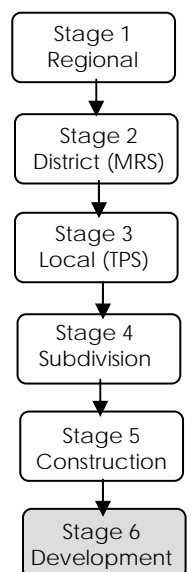
It should also be noted that where a subdivision application is not accompanied by the UWMP, approval from the DoW will be required prior to commencement of site works. All efforts will be taken to ensure that any approval occurs within a reasonable period of time; however this will depend largely on the quality of information and level of justification of statements and strategies in the UWMP. The DoW will also need to consult with the relevant Local Government as well as the Water Corporation to ensure that the strategy is designed and constructed to their requirements. The land owner should therefore allow time for approval of the UWMP in their subdivision construction schedule.



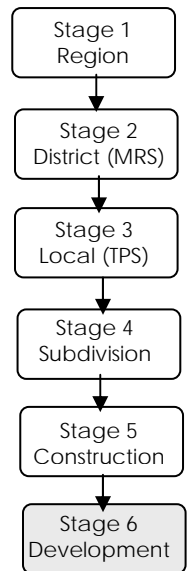
### Stage 6: Development

This stage relates to construction of the dwelling. It is recognised that certain elements of the Local Water Management Strategy and UWMP will be implemented during development. As the construction of a single house does not usually require development approval, there is limited opportunity for statutory requirements at this stage.

Significant advances in water conservation and water quality management (particularly where this relates to erosion) can be achieved at the design and construction stage of dwellings. Mechanisms to achieve this are largely through education and awareness programs such as the Water Corporation's WaterWise program, or through requirements that are stipulated in the provisions of a zone in a town planning scheme.



Where no zone provisions have been created, a similar outcome may be achieved through using covenants imposed by developers. Covenants that require installation of water conservation and management devices such as water efficient fittings and appliances, rain water tanks, porous paving, xeriscaping and appropriate reticulation systems are generally supported by State and Local Government.



## **APPENDIX 1: WATER MANAGEMENT STRATEGY DOCUMENTS**

The following outlines are proposed to provide guidance on the structure and format of the various water management plans identified in this strategy. The following suggested Tables of Contents should, however, in no way restrict the author of the document in their actions considered necessary to support the planning proposal or action. However efforts should be made to ensure that the strategy addresses the critical issues and forms a concise, well substantiated report.

### **MRS rezoning (district level planning) - District Water Management Strategy**

- Introduction

  - Principles & Objectives

  - Previous studies and recommendations

- Design and management objectives

- Pre-development environment

  - Site characteristics

    - Opportunities

    - Constraints

    - Areas requiring specialised investigation and management

  - Hydrologic information

    - Previous work

    - Recent investigations

    - Groundwater levels and flow

    - Groundwater and surface water quality

- Analysis of development impacts and options

  - Assessment of proposed land use scenario

  - Response to assessment

  - Strategies and recommendations for planning precincts to guide and control land uses and development where necessary.

- Water source planning

  - Allocation

  - Infrastructure – existing and required

- Water management strategy

  - Water conservation and efficiency

  - Surface water management

    - Flood management

    - Conceptual stormwater management system

    - Best Planning Practices

    - Appropriate Best Management Practices

  - Groundwater management

Implementation framework

Considerations and requirements for Local Planning

Monitoring

Pre development

Post development

Data analysis, presentation and reporting mechanisms

Technical review

Funding and ongoing maintenance responsibilities

## **Local level planning - Local Water Management Strategy (LWMS)**

Introduction

Total water cycle management – principles & objectives

Planning background

Previous studies

Proposed Development

Key elements of the structure plan

Environmental Report and Management Plan

Pre-development environment

Geotechnical information

Soils

Environmental assets and WDEs

Existing information

Recent investigations

Surface water flows and quality

Groundwater flows and quality

Design Criteria

Water conservation

Stormwater management

Groundwater management

Commitment to best management practice

Water Conservation strategy

Drinking water

Fit-for-purpose use

Wastewater

Stormwater management strategy

Flood management

Impact on WDEs

Surface water quantity

Surface water quality

Groundwater management strategy

Groundwater levels

Impact on WDEs

Implications for Fill

Groundwater quality – nutrient/contamination “hot spot” management

The next stage – Subdivision and Urban Water Management Plans  
Matters to be addressed in the UWMP

Monitoring

Recommended program for UWMP  
Recommended program post-development

Implementation

Roles & Responsibilities  
Funding  
Review

## **Subdivision planning - Urban Water Management Plan (UWMP)**

Introduction

UWMS  
Land use and subdivision plan

Design objectives

Demonstration of compliance (Appendix)

Site characteristics

Existing information  
More detailed assessments

Water conservation strategy

Water supply & efficiency  
Fit-for-purpose strategy  
Wastewater management

Stormwater and groundwater management design

Flood management  
Groundwater levels  
Quality and contamination  
Structural and non-structural BMPs and treatment trains  
Protection of waterways, wetlands (and their buffers), remnant  
vegetation and ecological linkages  
Management of disease vector and nuisance insects

Management of subdivisional works

Construction activities

Monitoring program

Implementation plan

Roles, responsibilities,  
Funding  
Maintenance  
Assessment and review

## **APPENDIX 2:        ABBREVIATIONS**

BMP	Best Management Practice
BPP	Best Planning Practice
CGL	controlled groundwater level
DoA	Department of Agriculture
DoE	Department of Environment
DoW	Department of Water
DPI	Department for Planning and Infrastructure
DWMS	District Water Management Strategy
ILWMP	Integrated Land and Water Management Plan
IUWM	Integrated Urban Water Management
LASCAM	Large Scale Catchment Model
LGA	Local Government area
LSP	local structure plan
LWMS	Local Water Management Strategy
POS	Public Open Space
RWMS	Regional Water Management Strategy
SPP	Statement of Planning Policy
TPS	Town Planning Scheme
TWCM	Total Water Cycle Management
UWMP	Urban Water Management Plan
WAPC	Western Australian Planning Commission
WDE	water dependent ecosystems
WSUD	Water Sensitive Urban Design

## **APPENDIX 3: INTERIM WATER RELATED DESIGN OBJECTIVES FOR THE DSP AREA**

### **Preamble**

The Interim Water-Related Design Objectives are a set of numerical objectives that can be used by developers during the design phase of new development or redevelopment projects in the Southern River Area to promote best practice in water sensitive urban design. The numbers are intended to reflect what can be reasonably achieved using best practice technologies as part of the infrastructure created to facilitate the new development. How these objectives are delivered is very much dependent upon the constraints and characteristics of the site, the performance of the installed infrastructure and the future behaviour of the community that will live and work in the development area.

These developer design objectives are not intended to replace other processes that are normally triggered during the development approvals process including the management of Waterways and Wetlands, Acid Sulphate Soils, Water Allocation and Flood Protection.

Local Government and State Agencies will use the design objectives to assess the urban water management performance of submitted development applications.

The management of water quality from the Southern River District Structure Plan area requires effort from the wider community, private industry and public authorities. It is recognised that the Swan Coastal Plain contains areas where groundwater is contaminated from historic land uses. The Government's goal is to ensure that development results in no deterioration of water quality leaving the site, either through increased mobilisation of existing contaminants or by increased contamination losses from activities within the development.

The engineering design objectives in this paper on their own may not prevent deterioration of stream water quality as a result of the deterioration of offsite discharge of surface or groundwater quality as a result of development. Where such deterioration is likely to occur, developers are encouraged to deliver outcomes, beyond the minimum set in the design objectives wherever practicable.

EPA's Position Statement No 9 *Environmental Offsets* (2006) indicates that potential unavoidable adverse environmental impacts from development should be counterbalanced by offsets, with an overall goal of achieving a 'net environmental benefit'. The form of offsets that would be consistent with the EPA's Position Statement for any potential deterioration of stream water quality as result of development in the Structure Plan Area would be included in the Western Australian Planning Commission's Integrated Land and Water Management Plan.

There is considerable work to be done to establish current nutrient levels to enable likely changes to nutrient levels and the effectiveness of best practice development to be assessed. The engineering design objectives proposed in this paper are interim and will need to be assessed for effectiveness in meeting the Government's goal of no deterioration. Any difference will be addressed in the development of the Integrated Land and Water Management Plan.



In seeking guidance on achieving these engineering design objectives various technical manuals may be referred to including "Australian Rainfall and Runoff", "Australian Runoff Quality" and the "Stormwater Management Manual for Western Australia", incorporating the "Decision Process for Stormwater Management in WA".

These interim design objectives will be reviewed concurrently with the preparation of the Integrated Land and Water Management Plan. At this point the principle of no deterioration will become paramount and development proposals which cannot demonstrate this outcome will need to be offset through the mechanism identified in the Integrated Land and Water Management Plan.

### ***Water Conservation – Drinking Water***

#### **Principle:**

The use of potable water should be minimised where drinking water quality is not essential, particularly outside the house

#### **Design Objectives:**

Consumption target for potable water of 40-60kL/person/year for the residential sector

### ***Stormwater Quantity***

#### **Principle:**

Post development peak flows and event discharge volume be maintained relative to pre-development conditions, unless otherwise established through determination of Ecological Water Requirements for sensitive environments.

#### **Design Objectives:**

*For Ecological Protection:* For the critical 1 year Average Recurrence Interval (ARI) event, the post development discharge volume and peak flow rates shall be maintained relative to pre-development conditions in all parts of the catchment. Where there are identified impacts on significant ecosystems, maintain or restore desirable environmental flows and/or hydrological cycles as specified by the Department of Environment.

*For Flood Management:* Manage the catchment runoff for up to the 1 in 100 year ARI event within the development area to predevelopment peak flows unless otherwise negotiated with the Water Corporation.

### ***Stormwater Quality***

These are intended to apply to run-off from impervious areas and should be met in addition to the groundwater design objectives.

#### **Principle:**

Reduction in the average annual loads of stormwater pollutants discharged by the development into the surface water and groundwater systems if it used traditional, directly connected stormwater drainage design.

#### **Design Objectives:**

As compared to a development that does not actively manage water quality:

- At least 60% reduction in the average annual load of total suspended solids
- At least 80% reduction in the average annual load of total phosphorus
- At least 45% reduction in the average annual load of total nitrogen
- At least 70% reduction in the average annual load of gross pollutants

### ***Groundwater Quantity***

#### **Principle:**

Minimise change in peak winter levels at groundwater dependent wetlands due to change in groundwater flux associated with urbanisation.

#### **Design Objectives:**

Post development end of winter operating levels at wetlands to be maintained at pre-development levels, unless otherwise established through determination of Ecological Water Requirements for sensitive environments.

## ***Groundwater Quality***

Separate principles apply, dependent on the location of the development.

### ***1. Where development is associated with a waterway or open drain that intersects the shallow water table:***

#### **Principle:**

Minimise the discharge of pollutants from the shallow groundwater to the intersecting waterway or drain.

#### **Design Objectives:**

As compared to a development that does not actively manage water quality:

- At least 60% reduction in the average annual load of total phosphorus
- At least 45% reduction in the average annual load of total nitrogen

### ***2. Where development is associated with an ecosystem that is dependent upon a particular hydrologic regime for survival:***

#### **Principle:**

- a. Minimise the discharge of pollutants from the development into the shallow groundwater;
- b. Minimise the discharge of pollutant from the groundwater to the receiving water;
- c. Maintain or restore desirable environmental flows and/or hydro-periods, water quality and habitat in specified water sensitive environments; and
- d. Develop alternative habitats if feasible and desirable.

#### **Design Objectives:**

As per the Department of Environment's requirements.