TECHNICAL REPORT

IMPACTS OF CLIMATE CHANGE ON WATER RESOURCES

PHASE 1: FIRST ORDER ASSESSMENT AND PRIORITISATION

2011/01

Government of South Australia
Department for Water

IMPACTS OF CLIMATE CHANGE ON WATER RESOURCES

PHASE 1: FIRST ORDER RISK ASSESSMENT AND PRIORITISATION

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February 2011

Technical Report DFW 2011/01

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ISBN 978-1-921923-00-5

Preferred way to cite this publication
Wood, C, and Green, G, 2011, *Impacts of Climate Change on Water Resources, Phase 1: First Order Risk Assessment and Prioritisation,* DFW Technical Report 2011/01, Government of South Australia, through Department for Water, Adelaide

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FOREWORD

South Australia's Department for Water leads the management of our most valuable resource—water.

Water is fundamental to our health, our way of life and our environment. It underpins growth in population and our economy—and these are critical to South Australia's future prosperity.

High quality science and monitoring of our State's natural water resources is central to the work that we do. This will ensure we have a better understanding of our surface and groundwater resources so that there is sustainable allocation of water between communities, industry and the environment.

Department for Water scientific and technical staff continue to expand their knowledge of our water resources through undertaking investigations, technical reviews and resource modelling.

Scott Ashby
CHIEF EXECUTIVE
DEPARTMENT FOR WATER

CONTENTS

CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

This report outlines the first phase of the Department for Water's 'Impacts of Climate Change on Water Resources' (ICCWR) project. In this part of the project, a first order assessment of South Australia's water resources (both groundwater and surface water) has been conducted, in order to prioritise them according to the potential risks posed by climate change. This prioritisation process has identified a number of resources which will be the focus of more detailed modelling in Phase 2 of the project. The first order assessment focused primarily on prescribed resources, however after additional considerations identified through stakeholder consultation, a number of unprescribed resources have also been assessed.

The resource assessment methodology examined factors such as the level of reliance on each of the water resources for public water supply, irrigation and industry needs, and environmental requirements. An assessment was also made of the vulnerability of each resource, based on factors such as its sensitivity to yearly rainfall variations. Finally, climate change projection maps produced by the CSIRO (2007) were used to assess the likely extent of climate change that each resource may be subject to. Based on these criteria, a total resource risk priority score was assigned to each resource. The resources were then ranked in order of climate change risk priority according to these scores. It must be emphasised that this initial risk assessment applies to likelihood of impact from climate change, not the risk to the sustainability of the resource from climate change which will be considered in the second phase of the project.

High priority groundwater resources identified include the unconfined aquifers in the South East (Lower Limestone Coast), Eastern Mount Lofty Ranges, Eyre Peninsula and Clare Valley. These resources are considered priorities because of their importance for town water and irrigation and industrial supply, as well as the environmental assets they support. Their unconfined nature and reliance on contemporary rainfall makes them particularly susceptible to climate change.

High priority surface water resources include the unprescribed watercourses of Kangaroo Island, and the prescribed resources in the Western Mount Lofty Ranges, Eastern Mount Lofty Ranges, Clare Valley and Barossa Valley. Again, it is the importance of these resources and their sensitivity to variations in annual rainfall that results in their high climate change risk priority ranking.

The risk scores and risk priority ranking, together with additional considerations indentified in this report, will be used to inform the selection and prioritisation of the resources that are to be subject to detailed analysis in Phase 2 of the ICCWR project.

It should be noted that although the surface water resource of the River Murray are considered of high significance to the State, they have not been included in this first order prioritisation. This is because existing projects and studies already have included or will include an assessment of the impacts of climate change on these surface water resources.

1. INTRODUCTION

1.1. CLIMATE CHANGE IN SOUTH AUSTRALIA

Many areas of South Australia have experienced a decline in surface water flows and groundwater levels over the past decade compared to long term averages. This has resulted in an increased threat to the security of water supplies for regional communities, industry and the environment. Strong scientific evidence indicates that climate change is occurring in Australia and CSIRO projections (CSIRO, 2007) indicate that an ongoing change in climate in South Australia can be expected. Specifically, a change is predicted in rainfall and evaporation patterns compared with long term recorded averages, including:

- increased temperatures
- reduced rainfall
- increased rainfall variability
- increased evaporation
- significantly increased frequency and severity of drought
- changes in the frequency of extreme weather events, including flooding.

In the southern agricultural areas of South Australia, annual rainfall is projected to decrease by up to 10 – 15 per cent by 2030, and up to 25 – 30 per cent by 2070. Agriculture, natural ecosystems and water resources are likely to be significantly affected if rainfall declines and temperature increases are sustained under future climate conditions. Of immediate concern to South Australia will be the impacts of decreased rainfall and its increased variability. Along with increased evaporation, the combined impacts may have significant consequences for the State's natural water resources, impacting on sustainable water allocations. With climate change projections indicating a generally drier outlook for South Australia, the State is facing a risk of reduced availability of high quality water resources.

1.2. AIMS

The aim of Phase 1 of the ICCWR project is to prioritise South Australia's water resources according to the potential risks posed by climate change. A risk assessment approach has been adopted, in which a relative risk rating has been determined from a combination of the likelihood and potential impact of the climate change risk for each water resource. The result is a priority ranking list for all of South Australia's significant surface and groundwater resources, which will guide the selection of climate change impact assessments undertaken in Phase 2 of the ICCWR project. It must be emphasised that this initial risk assessment applies to likelihood of impact from climate change, not the risk to the sustainability of the resource from climate change. This report describes the prioritisation method, and presents the results of the priority ranking. Recommendations are made on the key water resources that will be subject to climate change impact modelling in the second phase of the ICCWR project.

In Phase 2 of the Department for Water's 'Impacts of Climate Change on Water Resources' (ICCWR) project, the degree of change in water resource capacity will be projected using numerical models that simulate surface water runoff and groundwater recharge processes. These will facilitate an understanding of the effect of decadal-scale variations in climate as well as the impacts of ongoing long-term climate change.

2. RESOURCES TO CONSIDER

2.1. WATER RESOURCES IN SOUTH AUSTRALIA

The first step in prioritising South Australia's (the State) water resources was to identify all significant water resources. The State is divided into Natural Resource Management (NRM) regions, with a number of Prescribed Water Resource Areas (PWRA) and Prescribed Wells Areas (PWA) (Figure 1). Each prescribed and unprescribed area may have more than one surface water or groundwater resource subject to assessment. Resources outside of prescribed areas are referred to in this report according to their NRM region, for example 'unprescribed Northern and Yorke'. In many cases, several water resources can be identified within the unprescribed part of a NRM region. The classification of these as separate identifiable water resources is influenced by the dependence on the resource by a community. This is the case for many of the unprescribed resources listed in the northern regions of the State. For example, the groundwater resources that are significant to the communities of Fregon and Indulkana in the Alinytjara Wilurana NRM region are identified as 'Unprescribed AW (Fregon)' and 'Unprescribed AW (Indulkana)'.

Several prescribed areas have multiple resources identified. For example, the Western Mount Lofty Ranges Prescribed Water Resource Area includes surface water resources, fractured rock aquifers in the Southern Fleurieu Peninsula and Central and Northern Hills areas, and sedimentary aquifers in the Southern Fleurieu Peninsula. Other distinctions worth noting include the separation of the Tertiary Limestone Aquifer in the Malle PWA into an unconfined and a confined resource for assessment, recognising that it is present in both forms in that area.For each Prescribed and unprescribed area, the level of detail in the assessment, and number of resources assessed was dictated by how much information was available.

Table 1 lists all resources identified, and the areas they belong to. It should be noted that this list is not intended to provide definitive information on all water resources in the State. There may be further resources that have not been identified (particularly in unprescribed areas), however the intention of this assessment is to identify and prioritise the most significant resources that are at risk from climate change, with an emphasis on prescribed resources.

It should be noted that although the surface water resource of the River Murray are considered of high significance to the State, they have not been included in this first order prioritisation. This is because existing projects and studies already have included or will include an assessment of the impacts of climate change on these surface water resources.

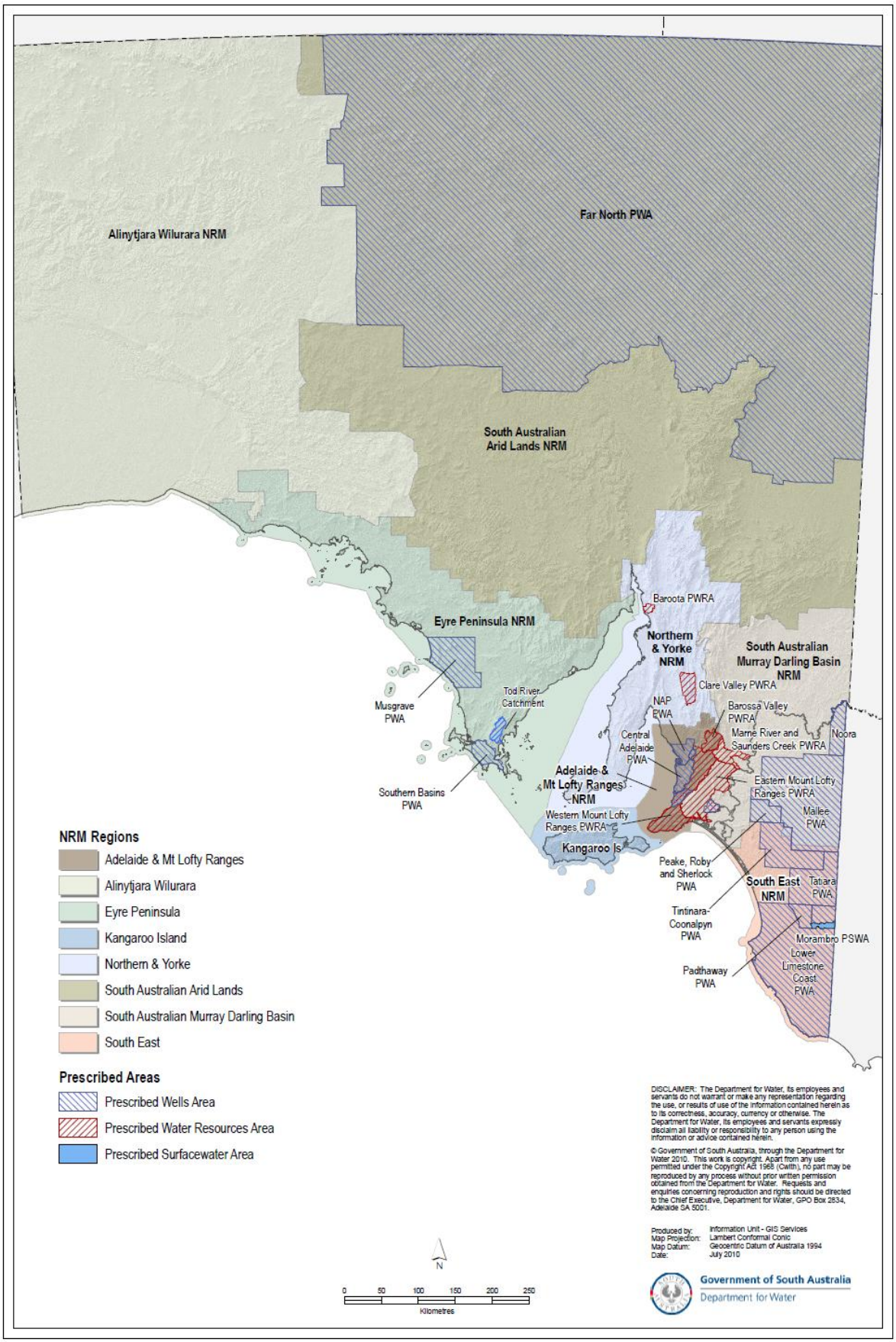

Figure 1. South Australian Natural Resource Management Regions

Table 1. Identified water resources in prescribed and unprescribed regions

Prescribed/Unprescribed Water Resource Area	Water Resource
AMLR NRM Unprescribed	Unconfined aquifer
Angas-Bremer PWA	Unconfined aquifer (Quaternary)
Angas-Bremer PWA	Confined aquifer (TL)
Baroota PWRA	Unconfined aquifer (Quaternary)
Baroota PWRA	Surface water/watercourse
Barossa Valley PWRA	Surface water/watercourse
Barossa Valley PWRA	Upper aquifer
Barossa Valley PWRA	Confined/unconfined aquifer (FR)
Barossa Valley PWRA	Lower confined aquifer
Central Adelaide PWA	Confined aquifer (TL)
Central Adelaide PWA	Unconfined aquifer (Quaternary)
Central Adelaide PWA	Surface water/watercourse
Clare Valley PWRA	Surface water/watercourse
Clare Valley PWRA	Unconfined aquifer (FR)
EMLR PWRA	Unconfined/confined aquifer (PS)
EMLR PWRA	Unconfined aquifer (FR)
EMLR PWRA	Surface water/watercourse
Far North PWA	Unconfined aquifer (GAB non-artesian)
Far North PWA	Confined aquifer (GAB Artesian)
Lower Limestone Coast PWA	Unconfined aquifer (TL)
Lower Limestone Coast PWA	Confined aquifer (TCS)
Mallee PWA	Confined aquifer (TL)
Mallee PWA	Unconfined aquifer (TL)
Marne-Saunders PWA	Unconfined aquifer (FR)
Marne-Saunders PWA	Surface water/watercourse
Marne-Saunders PWA	Unconfined aquifer (TL)
McLaren Vale PWA	Unconfined aquifer (Quaternary)
McLaren Vale PWA	Confined aquifer (TL)
Morambro Creek PWRA	Surface water/watercourse
Musgrave PWA (Eyre Peninsula)	Unconfined aquifer (Quaternary)
Noora PWA	Confined aquifer (TL)
Northern Adelaide Plains PWA	Unconfined aquifer (Quaternary)
Northern Adelaide Plains PWA	Confined aquifer (TL)
Padthaway PWA	Unconfined aquifer (TL)
Peake, Roby and Sherlock PWA	Unconfined aquifer (TL)
Peake, Roby and Sherlock PWA	Confined aquifer (TCS)
SAMDB NRM Unprescribed	Sedimentary aquifers
Southern Basins PWA (Eyre Peninsula)	Unconfined aquifer (Quaternary)
Tatiara PWA	Unconfined aquifer (TL)
Tatiara PWA	Confined aquifer (TCS)
Tintinara-Coonalpyn PWA	Unconfined aquifer (TL)
Tintinara-Coonalpyn PWA	Confined aquifer (TCS)
Unprescribed AW (Amata)	Unconfined aquifer
Unprescribed AW (Fregon)	Unconfined aquifer
Unprescribed AW (Indulkana)	Unconfined aquifer
Unprescribed AW (Kalka)	Unconfined aquifer
Unprescribed AW (Mimili)	Unconfined aquifer
Unprescribed SAAL (Nepabunna)	Unconfined aquifer
Unprescribed AW (Pukatja)	Unconfined aquifer
Unprescribed AW (Yalata)	Unconfined aquifer
Unprescribed AW (Yunyarinyi)	Unconfined aquifer
Unprescribed EP	Unconfined aquifer
Unprescribed EP (Tod River)	Surface water/watercourse
Unprescribed Kangaroo Island	Surface water/watercourse
Unprescribed Kangaroo Island	Unconfined + confined aquifers
Unprescribed NY (Balaklava)	Unconfined aquifer (TL)
Unprescribed NY (Booborowie Valley)	Unconfined aquifer
Unprescribed NY (Carribie basin)	Unconfined aquifer (Quaternary)
Unprescribed NY (Para-Wurlie basin)	Unconfined aquifer (Quaternary)
Unprescribed NY (Walloway basin)	Confined aquifer (TL)
Unprescribed NY (Willochra basin)	Unconfined + confined aquifers
Unprescribed SAAL	Unconfined aquifers
Unprescribed SAAL (Pipalyatjara)	Unconfined aquifer
Unprescribed South East NRM Region	Unconfined aquifer (TL)
Unprescribed South East NRM Region	Confined aquifer (TCS)
WMLR PWRA	Surface Water/watercourse
WMLR PWRA (Central & Northern Hills)	Unconfined aquifer (FR)
WMLR PWRA (Southern Fleurieu)	Unconfined aquifer (Sedimentary)
WMLR PWRA (Southern Fleurieu)	Unconfined aquifer (FR)

FR = Fractured Rock, TL = Tertiary Limestone, TCS = Tertiary Confined Sand, GAB = Great Artesian Basin

3. METHODOLOGY

3.1. RISK ASSESSMENT METHOD

A 'first order' risk assessment of the State's water resources was conducted, intended to enable the identification of key priority areas for detailed modelling in Phase 2 of the ICCWR project. Significant water resources within each of the prescribed water resource areas in South Australia were assessed. In several cases, multiple resources are present within a prescribed area (such as upper and lower aquifers, and surface watercourses) and each has received its own assessment. Unprescribed regions were also assessed, however less data were available for these, reducing the level of confidence in the assessment compared to the prescribed areas.

Overall risk ranking scores were determined from risk rating values assigned to three components of risk:

- Resource significance
- Resource sensitivity to climate
- Climate change risk

The rating schemes used to assign risk rating values for these components to each identified water resource are described below.

3.1.1. RESOURCE SIGNIFICANCE RATING SCHEME

Resource significance was assessed according to the importance of the resource to meet the demands of water users in three categories:

Public water supply: An assessment of how important the resource is for public water supply in towns or communities. The risk was assigned on a score from zero to three. Scores of one, two and three represent low, medium and high reliance of public/community water supply of the resource, while a score of zero indicates no users of the resource in this category. A score of three indicates the resource is a primary source for reticulated water supply for a town or community. A score of two indicates the resource supplements a primary source for reticulated town/community water supply or is used for a large number of individual domestic water supplies. A score of one indicates minor use for individual domestic or stock water supplies.

Irrigation, stock and industrial: An assessment of how important the resource is as source for licensed irrigation and industrial uses and for non-licensed stock water use. The risk was assigned a score out of three, representing low, medium and high reliance of irrigation, stock and industrial users on the resource. A score of zero indicates no identified users of the resource in this category.

Environmental water requirements: An assessment of how reliant water dependant ecosystems (WDEs) are on the resource. The risk was based on a score out of three. A score of three indicates high value ecosystems known to be dependent on the resource. A score of one indicates the presence of ecological assets, which may be at least partly dependent on the resource. A score of zero indicates no significant ecosystems are thought to be dependent on the resource.

3.1.2. RESOURCE SENSITIVITY RATING SCHEME

Resource sensitivity was assessed on four criteria:

Aquifer confinement: Refers to groundwater systems, and is an assessment of whether the aquifer is unconfined (ie. groundwater levels are at atmospheric pressure), and more likely to be linked to the current atmospheric climate and contemporary rainfall. The risk was based on a score out of three (three being unconfined, zero being confined). Scores between zero and three have been assigned for semi-confined aquifers. All surface water resources and watercourses automatically received a score of three, as they are effectively unconfined.

Reliance on modern rainfall recharge: An assessment of whether the resource is reliant upon rainfall to maintain sustainable supplies. The risk was based on a score out of three (three being highly reliant, zero being non-reliant). Unconfined groundwater resources were assessed on the seasonal response of the aquifer and the depth of the water table below ground level. Confined aquifers were generally assessed to have a relatively low reliance on contemporary rainfall and were given scores of 1 or 2 for this criterion. All surface water resources and watercourses automatically received a score of three because of their direct reliance on contemporary rainfall.

Aquifer response buffering: An assessment of how responsive the resource is to variations in climate, based on data available from resource monitoring. For groundwater resources, this is an assessment of how they behave in wet and dry periods (ie. do groundwater levels decline significantly in drought periods and do they recover rapidly in response to periods of rainfall). This assessment is also largely influenced by the storage capacity of the resource. Larger groundwater resources have a lower ratio of recharge to storage, such that the capacity of the resource is less susceptible to inter-annual rainfall variations. The risk was assigned a score out of three. A score of three represents a strong relationship between rainfall and water levels, while a score of zero indicates no relationship. As with the previous criteria, all surface water resources and watercourses were given a score of three because of their reliance upon rainfall.

Recharge catchment within resource boundary: An assessment of whether recharge (or run-off in the case of surface water and watercourses) occurs within the Prescribed/unprescribed area in the locale of the resource. This criterion identifies resources where recharge may not be a localised or contemporary process. Recharge may occur at a distance from the groundwater resource, such that changes to climate and recharge rates in the recharge catchment may affect the resource only over very long time scales, resulting in a low risk of climate change to the groundwater resource. The deep confined aquifers of the GAB in Far North SA are an example. This aspect of the assessment was not scored, but assigned a Yes or No indicating whether the recharge catchment occurs within the resource boundary or not.

In areas, for which insufficient data was available to make a clear assessment with regard to these resource sensitivity criteria, a score of 1.5 was assigned in order to have a neutral impact on the overall resource sensitivity rating.

In the detailed assessment of climate changes impacts in Phase 2 of the ICCWR project, it is the effects of climate change within the recharge catchment that will be assessed. The assessment of the locality, or otherwise, of the recharge catchment with respect to the groundwater resource was made during the first order risk assessment partly in preparation for this.

3.1.3. CLIMATE CHANGE RISK RATING SCHEME

The assessment of the risk of climate change occurring within the locale of each resource (or its recharge catchment) was based on the changes in average potential evapotranspiration (PET) and average rainfall that are projected by the ensemble of downscaled global climate models results presented by the CSIRO's Climate Change in Australia project (CSIRO, 2007).

Projected % change in average PET: A score was assigned to each region for this criterion, based on the 50th percentile projected percentage change in average winter-quarter PET in 2070 under a medium emissions scenario, relative to the baseline period 1980-1999 (CSIRO, 2007). The climate change risk was rated with a score from zero to six, as summarised in Table 2.

Projected % change in average rainfall: A score was assigned to each region for this criterion, based on the 50th percentile projected percentage change in average winter rainfall in 2070 under a medium emissions scenario, relative to the baseline period 1980-1999 (CSIRO, 2007). The scores ranged from zero to five, and are summarised in Table 3.

Table 2. Scoring system for % change in PET criteria

Percentage change in PET	Score
-8 to -4%	0
-4 to -2%	0
-2 to 2%	1
2 to 4%	2
4 to 8%	3
8 to 12%	4
12 to 16%	5
> 16%	6

Table 3. Scoring system for % change in rainfall criteria

Percentage change in rainfall	Score
+20 to +40%	0
+5 to +20%	0
+2 to +5%	0
-2 to +2%	1
-2 to -5%	2
-5 to -10%	3
-10 to -20%	4
-20 to -40%	5

The winter quarter projections were selected for this assessment as this is the quarter in which rainfall and PET are most significant to runoff and recharge. The 2070 projection was selected as the change in climate is much greater than in the 2030 projection and gives a clearer indicator of the direction of change in rainfall and PET, which is the intention of the climate change risk rating.

3.1.4. RISK CRITERIA WEIGHTING

Among the criteria for the resource significance and the resource sensitivity rating schemes described above, a score of 1, 2 or 3 represents a low, medium or high risk rating. However, it is acknowledged that each criterion has a different degree of significance in the overall risk rating.

To calculate a total risk rating for each water resource, different weighting factors were applied to the various criteria to recognise their importance. The weighting factors applied are summarised in Table 4. For the resource significance criteria, all three: public water supply, industrial/irrigation/stock supply, and environmental water requirements were given a weighting factor of 3. This recognises the importance of these three criteria (collectively representing the degree of demand on the resource) in evaluating a water resource's priority ranking.

Among the resource sensitivity criteria, the 'aquifer confinement' criterion was given a weighting of 1, as the degree of confinement does not necessarily qualify a resource to be at high or low risk. The 'reliance on modern recharge' criterion was given a weighting factor of 3, recognising its importance in affecting climate change impact on the resource. The 'aquifer response buffering' criterion was multiplied by two. This was to recognise that, while some groundwater resources may be predominantly reliant on rainfall recharge (and allocations based on estimates of recharge), they may not be responsive to rainfall events (for example, areas with a depth to water >10 m).

The climate change risk ratings were given weightings of 1. There was not a great deal of variation in scores for the climate change risk criteria (total climate change scores ranged from seven to nine) as the CSIRO projections for rainfall and PET change do not vary greatly across South Australia.

Table 4. Weighting factors applied to individual risk rating criteria scores

Risk Assessment Criterion	Weighting
Significance – Public water supply	3
Significance – irrigation, stock and industrial uses	3
Significance – environmental water requirements	3
Sensitivity – aquifer confinement	1
Sensitivity – reliance on modern rainfall	3
Sensitivity – aquifer response buffering	2
Climate change – rainfall	1
Climate change – potential evapotranspiration	1

3.1.5. METADATA

For each resource that was assessed by the criteria detailed above, a data sheet was recorded giving reasons for the scores and appropriate references. Each of these data sheets provide a justification for the scores assigned. All data sheets are presented in Appendix B.

4. RESULTS AND DISCUSSION

4.1. PRIORITY RESOURCES

Table 5 shows the twenty water resource areas with the highest total risk ranking scores of the 69 water resource areas assessed. A full listing of the resource ratings is provided in Appendix A. The resource risk rankings are also displayed in colour-coded maps in Figures 2, 3 and 4. The resources have been displayed according to their prescribed or unprescribed area, and separated into three maps according to the three resource types: unconfined aquifers, confined aquifers and surface water/watercourses. Their division in this way improves clarity in displaying results, where multiple resources are present within individual prescribed areas.

The higher priority resources are predominantly those that received the highest scores for total resource significance. This is unsurprising in view of the high weighting applied to this part of the assessment. The unconfined aquifer in the Lower Limestone Coast PWA (LLC PWA) received the highest overall score, recognising its importance for town supply to Mount Gambier (the Blue Lake being groundwater fed), irrigation and groundwater-dependent ecosystems. It also scored highly on resource sensitivity, as the link between rainfall and groundwater levels is well established for this resource.
The surface water and watercourses of the Western Mount Lofty Ranges (WMLR) received the same scoring as the LLC unconfined aquifer for resource significance (reflecting the importance of this resource for public water supply in Adelaide) and for resource sensitivity. The LLC and WMLR resources only received different scores because they were located in different zones for the 'projected percentage change in average PET' criteria.

The currently unprescribed surface water resources of Kangaroo Island received a high score because of their significance as the primary water source for the island (groundwater resources being of low quality and yield). Similarly, the Permian Sand aquifer in the Eastern Mount Lofty Ranges was highly ranked because of its importance for town supply (Mount Compass), as well as for irrigation in the Finniss River, Tookayerta and Currency Creek catchments, and its importance for environmental water requirements.

The risk assessment and prioritisation process produced some unexpected results. The prescribed groundwater resources of Eyre Peninsula were deemed to be priority areas at the outset of the project, as there are no other significant sources of water in the region to supplement public water supply should groundwater resources become unsuitable for use. However they ranked just outside of the ten highest priority resources in this assessment. This is because they received lower scores for their significance in supporting irrigation and industrial uses, which are minimal in these areas (their main significance is to serve public water supply). The groundwater resources of the Central Adelaide Prescribed Area also received a relatively low ranking, due largely to their confined nature, which resulted in a low score for resource sensitivity. For cases such as these, additional considerations will be made (see Section 5) to help guide the selection of priority areas for further modelling, and the risk assessment prioritisation serves as a first-order guide.

Overall, the ranking of the twenty highest-priority resources listed above provides a credible assessment of which water resources are most likely to cause water supply impacts as a result of climate change. This provides a sound basis for selecting priority areas in which to conduct more detailed modelling to understand the potential impacts of climate change on South Australia's water resources.

Table 5. Water resource areas with the highest climate change risk ranking scores

Prescribed/Unprescribed Water Resource Area	Resource	Total resource significance	Total resource sensitivity	Total climate change risk	TOTAL ranking score
Lower Limestone Coast PWA	Unconfined aquifer (TLA)	27	18	9	54
WMLR PWRA	Surface Water/watercourse	27	18	8	53
Unprescribed Kangaroo Island	Surface water/watercourse	25.5	18	8	51.5
EMLR PWRA	Unconfined/confined aquifer (PS)	27	15	8	50
EMLR PWRA	Unconfined aquifer (FR)	24	14	8	46
WMLR PWRA (Central & Northern Hills)	Unconfined aquifer (FR)	24	14	8	46
Padthaway PWA	Unconfined aquifer (TLA)	18	18	9	45
EMLR PWRA	Surface water/watercourse	18	18	8	44
Clare Valley PWRA	Surface water/watercourse	18	18	8	44
Clare Valley PWRA	Unconfined aquifer (FR)	18	18	8	44
Musgrave PWA	Unconfined aquifer (Quaternary)	18	18	8	44
Southern Basins PWA	Unconfined aquifer (Quaternary)	18	18	8	44
Unprescribed EP (Tod River)	Surface water/watercourse	18	18	8	44
Barossa Valley PWRA	Surface water/watercourse	16.5	18	8	42.5
WMLR PWRA (Southern Fleurieu)	Unconfined aquifer (Sedimentary)	18	16	8	42
Tatiara PWA	Unconfined aquifer (TLA)	15	18	9	42
Morambro Creek PWRA	Surface water/watercourse	15	18	9	42
Unprescribed SAAL	Unconfined aquifers	21	12	8	41
Marne-Saunders PWA	Unconfined aquifer (FR)	15	18	8	41
Marne-Saunders PWA	Surface water/watercourse	15	18	8	41

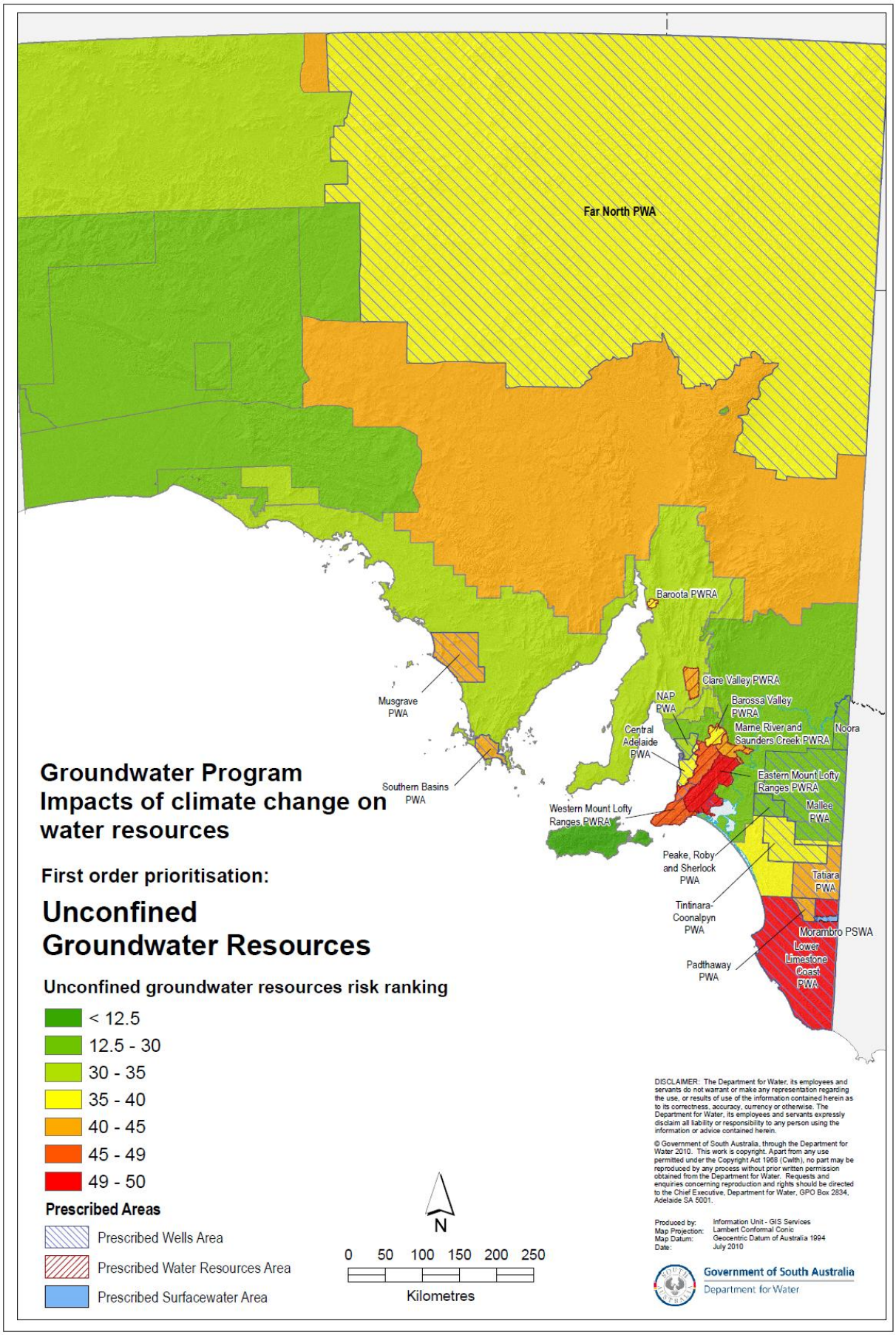

Figure 2. Climate change risk ranking for unconfined groundwater resources in South Australia

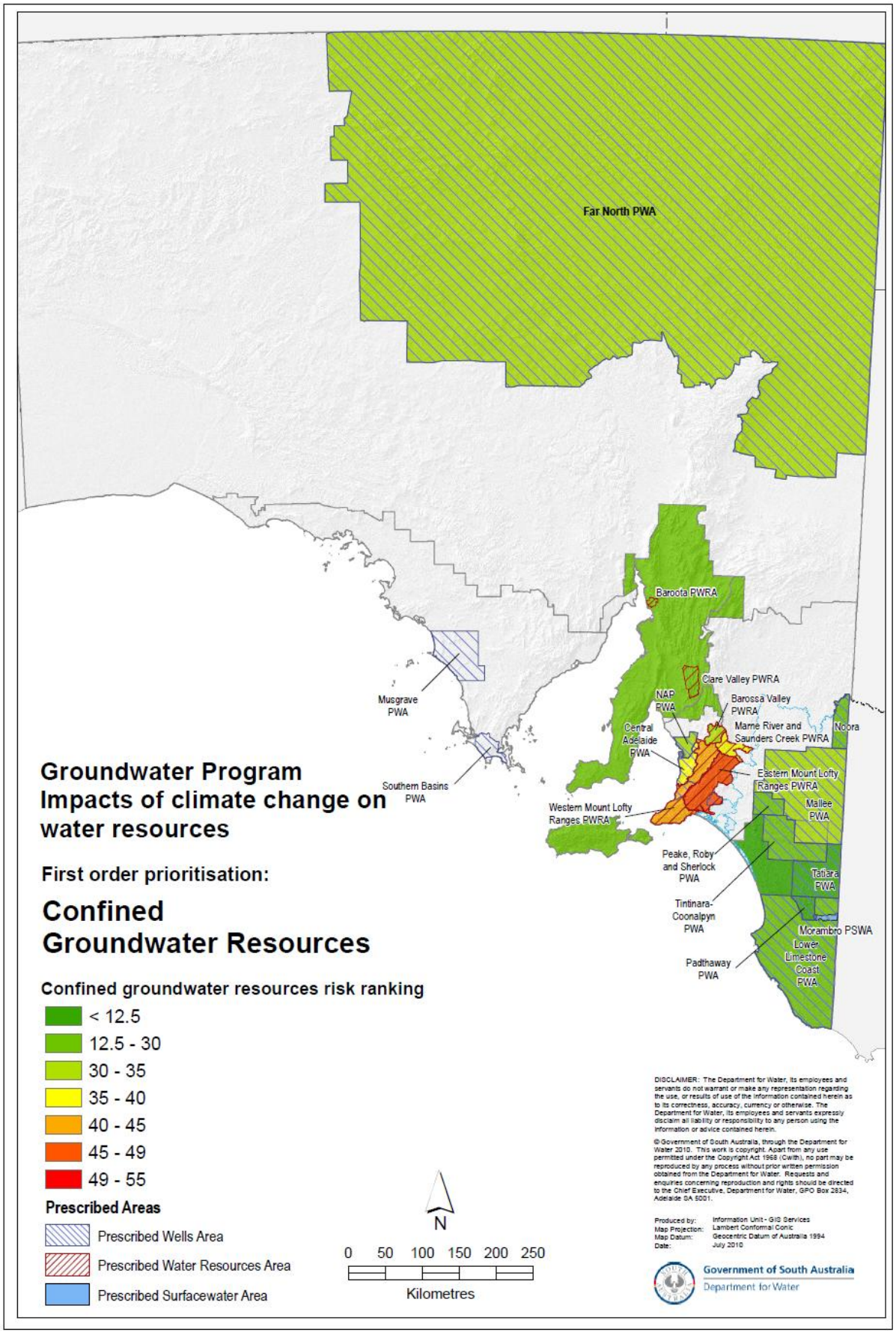

Figure 3. Climate change risk ranking for confined groundwater resources in South Australia

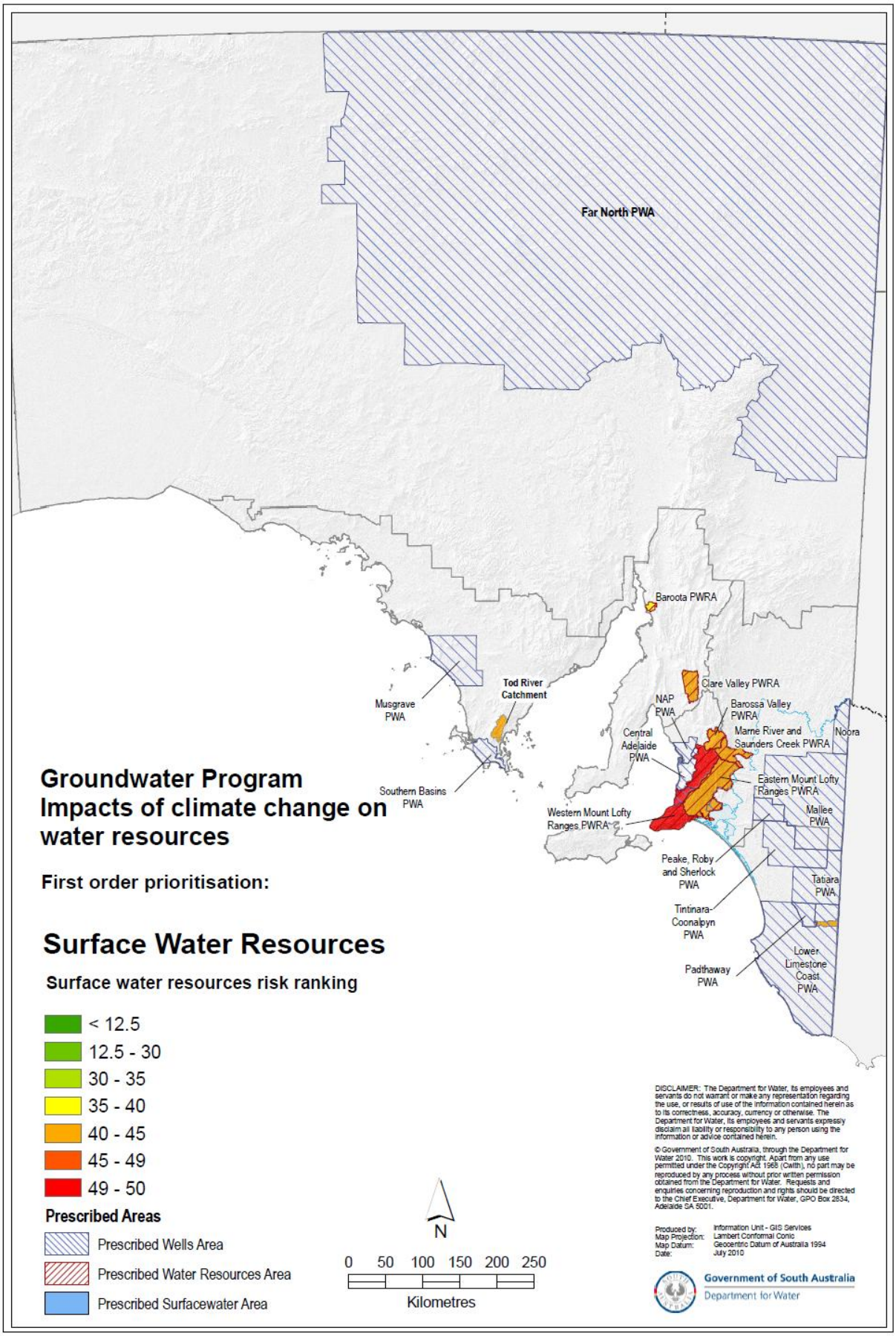

Figure 4. Climate change risk ranking for surface water resources in South Australia

5. ADDITIONAL CONSIDERATIONS AND RECOMMENDATIONS

5.1. REGIONAL SUPPLY AND DEMAND STATEMENTS

The Department for Water is preparing Demand and Supply Statements for the water resources of each of SA's NRM regions. These statements provide a demand-supply projection to 2050, outlining the state and condition of all water resources in the region, drinking and non-drinking quality, the demands on these resources and likely future pressures, such as changes in population and climate and changes in industrial and agricultural uses of water etc. The impact of climate change on the capacity of South Australia's native water resources is a key component of the supply projections in these statements. Regional Demand and Supply Statements are to be prepared between 2009 and 2014, starting with the Eyre Peninsula NRM region, followed by all other SA NRM regions in the following order: Northern and Yorke, Alinytjara Wilurara, SA Arid Lands, Adelaide and Mount Lofty Ranges, Kangaroo Island, SA Murray-Darling Basin, South East.

As a key user of the information generated by the ICCWR project, the order in which these statements are to be produced must be considered when prioritising water resources for climate impact modelling.

5.2. EMERGING RESOURCE CONDITION ISSUES

Some groundwater resources in South Australia have shown marked declines over the past decade. While these cannot yet be definitively attributed to successive years of below average rainfall, there remains an imperative to gain an understanding of the relationship between rainfall variations and groundwater levels in these resources. Some resources in this category may not have been identified among those of highest priority by the risk assessment and prioritisation process described in this report, however, they will receive special consideration when the resources selected for first attention in the ICCWR project.

5.3. DEVELOPING WATER ALLOCATION PLANS

The development of water allocation plans have in the past adopted an adaptive management approach which responds to changes in the capacity of water resources at regular WAP reviews. The outcomes of the ICCWR project will facilitate a transition from this reactive approach to a more proactive water resource adaptation planning capability. In selecting water resources for first attention in the ICCWR project, the immediate needs of water allocation plans in development or review will be taken into account.

5.4. RECOMMENDATIONS

The resources selected for first attention in Phase 2 of the ICCWR project should be a consensus decision of the project team and stakeholders, represented by the project's End User Reference Group, in consideration of the priority rankings identified in this report and the issues discussed above. These decisions will be made as part of the project scope review, occurring prior to the commencement of Phase 2.

APPENDICES

A. PRIORITISATION RANKING TABLE

Prescribed/Unprescribed Water Resource Area	Resource	Total resource significance	Total resource sensitivity	Total climate change risk	TOTAL ranking score
Lower Limestone Coast PWA	Unconfined aquifer (TLA)	27	18	9	54
WMLR PWRA	Surface Water/watercourse	27	18	8	53
Unprescribed Kangaroo Island	Surface water/watercourse	25.5	18	8	51.5
EMLR PWRA	Unconfined/confined aquifer (PS)	27	15	8	50
EMLR PWRA	Unconfined aquifer (FR)	24	14	8	46
WMLR PWRA (Central & Northern Hills)	Unconfined aquifer (FR)	24	14	8	46
Padthaway PWA	Unconfined aquifer (TLA)	18	18	9	45
EMLR PWRA	Surface water/watercourse	18	18	8	44
Clare Valley PWRA	Surface water/watercourse	18	18	8	44
Clare Valley PWRA	Unconfined aquifer (FR)	18	18	8	44
Musgrave PWA	Unconfined aquifer (Quaternary)	18	18	8	44
Southern Basins PWA	Unconfined aquifer (Quaternary)	18	18	8	44
Unprescribed EP (Tod River)	Surface water/watercourse	18	18	8	44
Barossa Valley PWRA	Surface water/watercourse	16.5	18	8	42.5
WMLR PWRA (Southern Fleurieu)	Unconfined aquifer (Sedimentary)	18	16	8	42
Tatiara PWA	Unconfined aquifer (TLA)	15	18	9	42
Morambro Creek PWRA	Surface water/watercourse	15	18	9	42
Unprescribed SAAL	Unconfined aquifers	21	12	8	41
Marne-Saunders PWA	Unconfined aquifer (FR)	15	18	8	41
Marne-Saunders PWA	Surface water/watercourse	15	18	8	41
WMLR PWRA (Southern Fleurieu)	Unconfined aquifer (FR)	18	14	8	40
Baroota PWRA	Unconfined aquifer (Quaternary)	13.5	18	8	39.5
Unprescribed NY (Willochra basin)	Unconfined + confined aquifers	18	13	8	39
McLaren Vale PWA	Unconfined aquifer (Quaternary)	15	16	8	39
Tintinara-Coonalpyn PWA	Unconfined aquifer (TLA)	12	18	9	39
Unprescribed South East NRM Region	Unconfined aquifer (TLA)	12	18	9	39
Far North PWA	Unconfined aquifer (GAB non-artesian)	21	10.5	7	38.5
Central Adelaide PWA	Confined aquifer (TLA)	21	9	8	38
Baroota PWRA	Surface water/watercourse	12	18	8	38
Marne-Saunders PWA	Unconfined aquifer (TLA)	12	17.5	8	37.5
Barossa Valley PWRA	Upper aquifer	13.5	15	8	36.5
Angas-Bremer PWA	Unconfined aquifer (Quaternary)	12	16	8	36
Central Adelaide PWA	Unconfined aquifer (Quaternary)	15	12.5	8	35.5
Unprescribed NY (Booborowie Valley)	Unconfined aquifer	9	18	8	35
Unprescribed NY (Para-Wurlie basin)	Unconfined aquifer (Quaternary)	9	18	8	35
Far North PWA	Confined aquifer (GAB Artesian)	24	3	7	34
Angas-Bremer PWA	Confined aquifer (TLA)	21	5	8	34
Unprescribed AW (Indulkana)	Unconfined aquifer	9	18	7	34
Unprescribed AW (Pukatja)	Unconfined aquifer	9	18	7	34
Unprescribed AW (Amata)	Unconfined aquifer	9	18	7	34
McLaren Vale PWA	Confined aquifer (TLA)	15	10.5	8	33.5
Northern Adelaide Plains PWA	Unconfined aquifer (Quaternary)	13.5	12	8	33.5
Unprescribed NY (Carribie basin)	Unconfined aquifer (Quaternary)	7.5	18	8	33.5
Central Adelaide PWA	Surface water/watercourse	9	16	8	33
Mallee PWA	Unconfined portion of aquifer (TLA)	18	6	9	33
Barossa Valley PWRA	Confined/unconfined aquifer (FR)	15	9.5	8	32.5
Northern Adelaide Plains PWA	Confined aquifer (TLA)	15	9	8	32
Barossa Valley PWRA	Lower confined aquifer	12	12	8	32
Unprescribed NY (Balaklava)	Unconfined aquifer (TLA)	9	14	8	31
Unprescribed EP	Unconfined aquifer	12	10.5	8	30.5
Mallee PWA	Confined aquifer (TLA)	18	3	9	30
SAMDB NRM Unprescribed	Sedimentary aquifers	10.5	9	8	27.5
Unprescribed AW (Mimili)	Unconfined aquifer	9	10.5	7	26.5
Unprescribed AW (Fregon)	Unconfined aquifer	9	10.5	7	26.5
Unprescribed AW (Yunyarinyi)	Unconfined aquifer	9	10.5	7	26.5
Unprescribed AW (Kalka)	Unconfined aquifer	9	10.5	7	26.5
Unprescribed SAAL (Pipalyatjara)	Unconfined aquifer	9	10.5	7	26.5
Unprescribed AW (Nepabunna)	Unconfined aquifer	9	10.5	7	26.5
Unprescribed AW (Yalata)	Unconfined aquifer	9	10.5	7	26.5
Peake, Roby and Sherlock PWA	Unconfined aquifer (TLA)	3	13.5	9	25.5
Unprescribed NY (Walloway basin)	Confined aquifer (TLA)	12	5	8	25
Lower Limestone Coast PWA	Confined aquifer (TCSA)	9	6.5	9	24.5
Unprescribed Kangaroo Island	Unconfined + confined aquifers	6	9	8	23
Noora PWA	Confined aquifer (TLA)	12	0	9	21
Peake, Roby and Sherlock PWA	Confined aquifer (TCSA)	9	2	9	20
Tintinara-Coonalpyn PWA	Confined aquifer (TCSA)	3	2	9	14
Tatiara PWA	Confined aquifer (TCSA)	1.5	2	9	12.5
Unprescribed South East NRM Region	Confined aquifer (TCSA)	1.5	2	9	12.5
AMLR NRM Unprescribed	Unconfined aquifer	9	10.5	8	27.5

Table 6. Prioritisation ranking results for South Australian water resources

B. RISK ASSESSMENT METADATA TABLES

Prescribed area	*Angas-Bremer PWA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Confined aquifer (TLA)*	
Volume allocated	*6614 ML/y (this volume is from summed confined and unconfined aquifer)*	
	Score	**Comments**
Reliance on groundwater Public water supply	2	~30 ML/y town supply for Langhorne Creek, stock and domestic use
Reliance on groundwater Irrigation and industrial	2	Use has declined in recent years due to availability of River Murray water for irrigation
Reliance on groundwater Environmental water requirements	3	Several identified ecosystems in the PWA reliant upon groundwater (Mosquito Creek Wetland, red-gum swamps and Tolderol Game Reserve)
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall)	1	Possibly receives recharge from unconfined aquifer leakage (reliant on flood waters and catchment within MLR), however processes are not fully
Aquifer characteristics Recharge catchment within PWA	No	See above
Aquifer characteristics Aquifer response buffering	1	Water levels trends more influenced by ASR and extraction, however low rainfall years may lead to increases in extraction (eg. 1993-95)
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**31**	

Prescribed area	Angas-Bremer PWA	
Region	South Australian Murray-Darling Basin NRM Region	
Resource	Unconfined aquifer (Quaternary sediments)	
Volume allocated	6614 ML/y (this volume is from summed confined and unconfined aquifer)	
	Score	Comments
Reliance on groundwater Public water supply	1	No public use except stock and domestic
Reliance on groundwater Irrigation and industrial	0	Predominantly used only for stock and domestic
Reliance on groundwater Environmental water requirements	3	Several identified ecosystems in the PWA reliant upon groundwater (Mosquito Creek Wetland, red-gum swamps and Tolderol Game Reserve)
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Recharged from leakage from the Angas and Bremer rivers, particularly after high flow/flood events
Aquifer characteristics Recharge catchment within PWA	Yes	Recharged from rivers that flow through the PWA, the catchment for which is in the Mount Lofty Ranges
Aquifer characteristics Aquifer response buffering	2	Water levels trends partially driven by river recharge (also by increased irrigation drainage from Murray River water and decreased extraction)
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	36	

Prescribed area	*Unprescribed AW (Amata)*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs in unprescribed area
Aquifer characteristics Aquifer response buffering	3	Groundwater levels are responsive to rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**34**	

Prescribed area	*Unprescribed AW (Fregon)*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	Unknown
Aquifer characteristics Recharge catchment within PWA	Yes	Unknown
Aquifer characteristics Aquifer response buffering	1.5	Unknown
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**26.5**	

Prescribed area	*Unprescribed AW (Indulkana)*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs within unprescribed area
Aquifer characteristics Aquifer response buffering	3	Groundwater levels thought to be influenced by rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**34**	

Prescribed area	*Unprescribed AW (Kalka)*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	Not known, assumed to receive some modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Assumed to be some recharge in unprescribed area
Aquifer characteristics Aquifer response buffering	1.5	Not known
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**26.5**	

Prescribed area	*Unprescribed AW (Mimli)*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	Assumed to be some modern recharge (not fully known)
Aquifer characteristics Recharge catchment within PWA	Yes	Assumed to be some recharge in unprescribed area (not fully known)
Aquifer characteristics Aquifer response buffering	1.5	Not known
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**26.5**	

Prescribed area	*Unprescribed SAAL(Nepabunna)*	
Region	*South Australian Arid Lands Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	No evidence of recharge to the aquifer, assumed to be some modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	
Aquifer characteristics Aquifer response buffering	1.5	Not known, assumed to be some response
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**26.5**	

Prescribed area	*Un-prescribed AW (Pipalyatjara)*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Pipalyatjara TWS (groundwater)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	0	No evidence of recharge to the aquifer
Aquifer characteristics Recharge catchment within PWA	0	N/A
Aquifer characteristics Aquifer response buffering	0	N/A
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**19**	

Prescribed area	*Unprescribed AW (Pukatja)*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Thought to be some modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs within PWA
Aquifer characteristics Aquifer response buffering	3	Groundwater levels noted to rise in response to rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**34**	

Prescribed area	*Unprescribed AW (Yalata)*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	No evidence of recharge to the aquifer, assumed to be some modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Some recharge assumed to occur within unprescribed area
Aquifer characteristics Aquifer response buffering	1.5	Assumed to be some response
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**26.5**	

Prescribed area	*Unprescribed AW (Yunyarinyi (formerly Kenmore Park))*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	Not known, assumed to be some modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Not known
Aquifer characteristics Aquifer response buffering	1.5	Not known, assumed to be some response
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**26.5**	

Prescribed area	*Unprescribed AW*	
Region	*Alinytjara Wilurara Natural Resources Management Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater is the main source of water for town supply
Reliance on groundwater Irrigation and industrial	0	No known irrigation
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	No evidence of recharge to the aquifer, assumed to be some modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Some recharge assumed to occur within unprescribed area
Aquifer characteristics Aquifer response buffering	1.5	Assumed to be some response
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	3	4 to 8 % increase in PET
TOTAL SCORE (after weighting)	**26.5**	

Prescribed area	*Unprescribed SAAL*	
Region	*South Australian Arid Lands NRM Region*	
Resource	*Unconfined aquifers (fractured rock, sedimentary and palaeo-channels)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Un-prescribed groundwater resources may be highly significant for domestic water supply (level of reliance unknown), also for town supply (eg. Hawker, Arkaroola, Nepabunna)
Reliance on groundwater Irrigation and industrial	2	Un-prescribed groundwater resources may be highly significant for stock water supply (level of reliance unknown)
Reliance on groundwater Environmental water requirements	2	Un-prescribed groundwater resources may be highly significant in maintaining refuges for native flora and fauna during pro-longed dry periods (level of reliance unknown)
Aquifer characteristics Unconfined	2	Majority of groundwater sources thought to be unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	2	Majority of groundwater sources thought to be reliant upon rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	For unconfined aquifers, recharge is thought to occur with the un-prescribed area
Aquifer characteristics Aquifer response buffering	2	Aquifer response to climate variation is unknown
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	4	8% to 12% increase in PET
TOTAL SCORE (after weighting)	**41**	

Prescribed area	*Baroota PWRA*	
Region	*Northern and Yorke NRM Region*	
Resource	*Unconfined aquifer (Quaternary)*	
Volume allocated	*Water Allocation Plan in development*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	Town water supply in Baroota comes from the Murray River
Reliance on groundwater Irrigation and industrial	3	Groundwater is used for irrigation in the area
Reliance on groundwater Environmental water requirements	1.5	Intertidal flats in Spencer Gulf identified as likely to have an interaction with groundwater, level of reliance not known
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs in the PWRA through leakage from Baroota Dam
Aquifer characteristics Aquifer response buffering	3	Relationship between rainfall and groundwater levels has been acknowledged
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**39.5**	

Prescribed area	*Baroota PWRA*	
Region	*Northern and Yorke NRM Region*	
Resource	*Surface water/watercourse (Baroota Creek and Baroota dam)*	
Volume allocated	*Water Allocation Plan in development*	
	Score	**Comments**
Reliance on surface water Public water supply	0	Baroota dam has been removed from SA Water's major water distribution network and town supply is from Murray pipeline
Reliance on surface water Irrigation and industrial	2	Water from Baroota Creek is used for irrigation, however levels of use are not known
Reliance on surface water Environmental water requirements	2	Environmental importance of flow in Baroota creek is not known, but assumed to be important
Resource characteristics Unconfined	3	Surface water
Resource characteristics Reliance on modern (rainfall) runoff	3	Ephemeral watercourse, reliant upon rainfall
Resource characteristics Resource catchment within PWA	Yes	Catchment for the creek is largely in the Flinders Ranges (to the east of Baroota), which has an identical climate scenarios
Resource characteristics Resource response buffering	3	Flow in creek is very responsive to rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**38**	

Prescribed area	*Barossa PWRA*	
Region	*Adelaide and Mount Lofty Ranges*	
Resource	*Groundwater – Fractured Rock Aquifer*	
Volume allocated	*~42% of 5500 ML (5500 ML extracted from upper, lower and FR aquifer)*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Some domestic wells
Reliance on groundwater Irrigation and industrial	3	Large proportion of irrigation in this area
Reliance on groundwater Environmental water requirements	1	Connected with surface water systems at edges of PWRA
Aquifer characteristics Unconfined	1.5	Confined through most of Barossa Basin, but unconfined at edges where recharge occurs
Aquifer characteristics Reliance on modern (rainfall) recharge	2	Relies on recharge from surrounding fractured rock system, in which pressure levels are largely dependent on contemporary rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Fractured rock system within and surrounding the PWA
Aquifer characteristics Aquifer response buffering	1	Highly variable amounts of seasonal fluctuation in levels but normally recovers to previous level. Appears much less sensitive than Lower aquifer
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**32.5**	

Prescribed area	*Barossa PWRA*	
Region	*Adelaide and Mount Lofty Ranges*	
Resource	*Groundwater - lower aquifer*	
Volume allocated	*~24% of 5500 ML (5500 ML extracted from upper, lower and FR aquifer)*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Some domestic wells
Reliance on groundwater Irrigation and industrial	3	Significant proportion of irrigation in this area
Reliance on groundwater Environmental water requirements	0	Not directly connected with surface water systems
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Relies on recharge from surrounding fractured rock system, in which pressure levels are largely dependent on contemporary rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Fractured rock system within and surrounding the PWA
Aquifer characteristics Aquifer response buffering	1.5	Large seasonal fluctuation in levels in response to pumping, but normally recovers to previous level
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**32**	

Prescribed area	*Barossa PWRA*	
Region	*Adelaide and Mount Lofty Ranges*	
Resource	*Groundwater - upper aquifer*	
Volume allocated	*~16% of 5500 ML (5500 ML extracted from upper, lower and FR aquifer)*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Some domestic wells
Reliance on groundwater Irrigation and industrial	2	Important for irrigation in south of Barossa, but most irrigation in Barossa is from lower aquifers
Reliance on groundwater Environmental water requirements	1.5	Maintains some permanent pools in North Para River
Aquifer characteristics Unconfined	2	Partly unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Relies on direct rainfall recharge and recharge from adjacent fractured rock system
Aquifer characteristics Recharge catchment within PWA	Yes	
Aquifer characteristics Aquifer response buffering	2	Large seasonal fluctuation in levels in response to pumping, but normally recovers to previous level
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**36.5**	

Prescribed area	*Barossa PWRA*	
Region	*Adelaide and Mount Lofty Ranges*	
Resource	*Surface water/ watercourse*	
Volume allocated	*3800 ML*	
	Score	**Comments**
Reliance on surface water Public water supply	1	Approx. 1 ML of stock and domestic use
Reliance on surface water Irrigation and industrial	3	Majority of allocation is for irrigation of vines.
Reliance on surface water Environmental water requirements	1.5	Water courses have moderate ecosystem value
Resource characteristics Unconfined	3	Surface water
Resource characteristics Reliance on modern (rainfall) runoff	3	Stream flow is heavily reliant on rainfall
Resource characteristics Resource catchment within PWA	Yes	Surface water catchments extend beyond the PWRA, however they are in areas of identical climate projection
Resource characteristics Resource response buffering	3	Decreased stream flow and surface water availability is observed in dry periods
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**42.5**	

Prescribed area	*Central Adelaide PWA*	
Region	*Adelaide and Mount Lofty Ranges NRM Region*	
Resource	*Confined aquifer (Tertiary limestone aquifer)*	
Volume allocated	*Water Allocation Plan currently in development*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Aquifer is predominantly used for domestic use
Reliance on groundwater Irrigation and industrial	3	Important aquifer for industrial use in Adelaide
Reliance on groundwater Environmental water requirements	1	Medium potential for groundwater/surface water interactions in Barker Inlet/West Lakes
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	2	Receives little modern recharge, recharge via lateral through-flow from Mount Lofty Ranges
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge catchment within Western Mount Lofty PWA
Aquifer characteristics Aquifer response buffering	1.5	Not fully known
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**38**	

Prescribed area	*Central Adelaide PWA*	
Region	*Adelaide and Mount Lofty Ranges NRM Region*	
Resource	*Surface water / watercourses*	
Volume allocated	*Water Allocation Plan currently in development*	
	Score	**Comments**
Reliance on surface water Public water supply	0	No public water supply extracted from watercourses
Reliance on surface water Irrigation and industrial	1	Some parkland irrigation
Reliance on surface water Environmental water requirements	2	Torrens, Brownhill Creek, and 1st – 5th creeks have relatively low ecological value but have high social/ aesthetic value. Onkaparinga estuary has moderate ecological value.
Resource characteristics Unconfined	3	Unconfined/confined
Resource characteristics Reliance on modern (rainfall) runoff	3	Partly rainfall recharge, partly recharge via lateral through-flow from Mount Lofty Ranges
Resource characteristics Resource catchment within PWA	Yes and no	Partly rainfall runoff within CAGA PWA, partly runoff from Mount Lofty Ranges
Resource characteristics Resource response buffering	2	No, as surface water system. However, extent of impervious surface may improve reliability of runoff compared with surface water systems elsewhere in SA.
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**33**	

Prescribed area	*Central Adelaide PWA*	
Region	*Adelaide and Mount Lofty Ranges NRM Region*	
Resource	*Unconfined aquifer (Quaternary sands/gravels aquifer)*	
Volume allocated	*Water Allocation Plan currently in development*	
	Score	**Comments**
Reliance on groundwater Public water supply	2	Many domestic bores, primarily for garden watering
Reliance on groundwater Irrigation and industrial	1	Some parkland & school oval irrigation
Reliance on groundwater Environmental water requirements	2	Discharge to Torrens, Brownhill Crk, and 1st – 5th creeks, however, these have relatively low ecological value. In Noarlunga embayment, Q aquifers discharge to Onkaparinga estuary.
Aquifer characteristics Unconfined	2.5	Unconfined/confined
Aquifer characteristics Reliance on modern (rainfall) recharge	2	Partly rainfall recharge, partly recharge via lateral through-flow from Mount Lofty Ranges
Aquifer characteristics Recharge catchment within PWA	Yes and no	Partly rainfall recharge within CAGA PWA, partly recharge via lateral through-flow from Mount Lofty Ranges
Aquifer characteristics Aquifer response buffering	2	Not fully known. Variety of aquifers within this category. Some are likely to have little buffering capacity against variations in recharge
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**38.5**	

Prescribed area	*Clare Valley PWRA*	
Region	*Northern and Yorke NRM Region*	
Resource	*Unconfined aquifer (fractured rock aquifer)*	
Volume allocated	*2650 ML/y*	
	Score	**Comments**
Reliance on groundwater Public water supply	2	Majority town water supply comes from Murray pipeline, however ~150 ML of groundwater supplements supply
Reliance on groundwater Irrigation and industrial	3	GW used extensively for irrigation
Reliance on groundwater Environmental water requirements	1	GW discharge to Hill River has been identified as important for supporting macrophytes (Clare WAP)
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs in PWRA
Aquifer characteristics Aquifer response buffering	3	Groundwater levels do change in response to rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**44**	

Prescribed area	*Clare Valley PWRA*	
Region	*Northern and Yorke NRM Region*	
Resource	*Surface water/ watercourse*	
Volume allocated	*~2250 ML*	
	Score	**Comments**
Reliance on surface water Public water supply	0	Surface water not used for town supply
Reliance on surface water Irrigation and industrial	3	Surface water relied upon for stock and irrigation use
Reliance on surface water Environmental water requirements	3	Ecosystems present in water courses
Resource characteristics Unconfined	3	Surface water
Resource characteristics Reliance on modern (rainfall) runoff	3	Stream flow is heavily reliant on rainfall
Resource characteristics Resource catchment within PWA	Yes	Surface water catchments extend beyond the PWRA, however they are in areas of identical climate projection
Resource characteristics Resource response buffering	3	Decreased stream flow and surface water availability is observed in dry periods
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**44**	

Prescribed area	*Eastern Mount Lofty Ranges PWRA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Surface water/water course*	
Volume allocated	-	
	Score	**Comments**
Reliance on surface water Public water supply	1	
Reliance on surface water Irrigation and industrial	2	
Reliance on surface water Environmental water requirements	3	
Resource characteristics Unconfined	3	Surface water/water course
Resource characteristics Reliance on modern (rainfall) runoff	3	Highly dependant on rainfall/run-off
Resource characteristics Resource catchment within PWA	Yes	16 catchments within the PWA
Resource characteristics Resource response buffering	3	Stream flow highly influenced by rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**44**	

Prescribed area	*Eastern Mount Lofty Ranges PWRA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Groundwater – Fractured Rock*	
Volume allocated	*11300 ML (from L&WS data in EMLR draft WAP document)*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Reticulated town water supplies of Meadows and Macclesfield are from FR aquifer
Reliance on groundwater Irrigation and industrial	3	Irrigation and stock water for much of EMLR
Reliance on groundwater Environmental water requirements	3	Numerous GDEs relying on GW-sustained pools for dry-season refuge
Aquifer characteristics Unconfined	2	Unconfined / semi-confined fractured rock system
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern rainfall recharge
Aquifer characteristics Recharge catchment within PWA	3	Recharge catchment is within PWA
Aquifer characteristics Aquifer response buffering	1.5	Some areas show close relationship between rainfall and GW levels (eg. Harrogate network), other areas don't (Mt Barker network)
Percentage change in rainfall	4	-10% to -20%
Percentage change in potential ET	4	+8% to +12%
TOTAL SCORE (after weighting)	**49**	

Prescribed area	*Eastern Mount Lofty Ranges PWRA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Groundwater(Permian sand unconfined/confined aquifer system)*	
Volume allocated	*4200 ML (from L&WS data in EMLR draft WAP document)*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Reticulated town water supply of Mt Compass is from Permian sand aquifer
Reliance on groundwater Irrigation and industrial	3	Irrigation and stock water for Finniss River, Tookayerta and Currency Creek catchments
Reliance on groundwater Environmental water requirements	3	Flows in Tookayerta Creek and parts of Finnis River and wetland of Black Swamp depend on discharge from PS aquifers
Aquifer characteristics Unconfined	3	Unconfined sedimentary aquifer system with shallow depth-to-water in some locations
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge catchment is within PWA
Aquifer characteristics Aquifer response buffering	1.5	Many observation wells show large seasonal and annual fluctuations in response to both annual recharge and summer pumping. However this resource is supported by connection with the larger regional FRA system.
Percentage change in rainfall	4	-10% to -20%
Percentage change in potential ET	4	+8% to +12%
TOTAL SCORE (after weighting)	**50**	

Prescribed area	*Musgrave PWA*	
Region	*Eyre Peninsula NRM Region*	
Resource	*Unconfined Quaternary sediments*	
Volume allocated	*~3000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	SA Water has allocation of 2990 ML, currently not extracting from Polda lens. Approx 70 ML/y drawn from Bramfield lens for Elliston town water supply. Rural residents also dependent on unconfined aquifer for domestic supply.
Reliance on groundwater Irrigation and industrial	1.5	Small amount of irrigation and stock demand
Reliance on groundwater Environmental water requirements	1.5	Some discharge to coastal/estuarine systems. And some support of deep-rooted perennials.
Aquifer characteristics Unconfined	3	Majority of freshwater aquifers unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	All recharge is direct rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge entirely within PWA
Aquifer characteristics Aquifer response buffering	3	System appears very sensitive to rainfall variations
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**44**	

Prescribed area	*Southern Basins PWA*	
Region	*Eyre Peninsula NRM Region*	
Resource	*Unconfined Quaternary Limestone*	
Volume allocated	*~9000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Water supply for Port Lincoln, Coffin Bay
Reliance on groundwater Irrigation and industrial	1	Small amount of irrigation demand
Reliance on groundwater Environmental water requirements	2	Some discharge to coastal/estuarine systems plus support of native forest over shallow water table areas
Aquifer characteristics Unconfined	3	Majority of freshwater aquifers unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	All recharge is direct rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge entirely within PWA
Aquifer characteristics Aquifer response buffering	3	System appears very sensitive to rainfall variations
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**44**	

Prescribed area	*Unprescribed Eyre Peninsula*	
Region	*Eyre Peninsula NRM Region*	
Resource	*Unprescibed groundwater: unconfined quaternary limestone and palaeochannel sand aquifers*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Small communities west of Ceduna rely on small, sand dune aquifers
Reliance on groundwater Irrigation and industrial	2	Extensive use for stock. Increasing demand from mining, mainly for water from FRAs and palaeochannel sand aquifers
Reliance on groundwater Environmental water requirements	1	Minimal data suggests some dependent ecosystems
Aquifer characteristics Unconfined	3	Most GW extracted is from paleochannel sand aquifers and small limestone aquifers
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	Highly variable. Small limestone aquifers largely dependent on rainfall. Palaeochannel sand aquifers receive recharge from fractured rock.
Aquifer characteristics Recharge catchment within PWA	Yes	All recharge occurs in EP unprescribed areas
Aquifer characteristics Aquifer response buffering	1.5	Highly variable. Small limestone aquifers have v little buffering capacity. Paleochannel sand aquifers receive recharge from fractured rock and have high buffering capacity.
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**30.5**	

Prescribed area	*Unprescribed Eyre Peninsula*	
Region	*Eyre Peninsula NRM Region*	
Resource	*Tod River*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	1.5	Tod River Reservoir has been taken off line by SA Water because of salinity issues, however it remains important for contingency plans
Reliance on groundwater Irrigation and industrial	2	Extensively used for stock water supply, not heavily used for irrigation
Reliance on groundwater Environmental water requirements	3	Several water dependant ecosystems identified in lower reaches of Tod River
Aquifer characteristics Unconfined	3	Surface water
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Strong relationship in catchment between rainfall and stream flow
Aquifer characteristics Recharge catchment within PWA	Y	
Aquifer characteristics Aquifer response buffering	3	Strong relationship in catchment between rainfall and stream flow
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**44**	

Prescribed area	*Far North PWA*	
Region	*South Australian Arid Lands Natural Resources Management Region*	
Resource	*Confined Aquifer (GAB artesian (Cadna-owie – Algebuckina) formation aquifer)*	
Volume allocated	*127,750 ML/y*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Main source of water for domestic use and town water supply
Reliance on groundwater Irrigation and industrial	2	Not used for irrigation but may be used by industry (eg. Petroleum industry) and for stock use
Reliance on groundwater Environmental water requirements	3	Artesian flows are principal source of water for GAB springs
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	1	Some modern recharge occurs in PWA (western recharge zone), although most recharge occurs along western slopes of the Great Dividing Range (in QLD and NSW)
Aquifer characteristics Recharge catchment within PWA	Yes	See above
Aquifer characteristics Aquifer response buffering	0	Relationship between rainfall and groundwater levels is not established
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET (in south-western recharge zones)
TOTAL SCORE (after weighting)	**34**	

Prescribed area	*Far North PWA*	
Region	*South Australian Arid Lands Natural Resources Management Region*	
Resource	*Unconfined aquifer (non artesian aquifer, Eyre Formation, Tertiary sediments)*	
Volume allocated	*127,750 ML/y*	
	Score	**Comments**
Reliance on groundwater Public water supply	2	Not thought to be used for TWS, possibly for domestic use
Reliance on groundwater Irrigation and industrial	2	Non artesian aquifers are used for stock supply
Reliance on groundwater Environmental water requirements	3	Appear to be important in supporting wetland systems like Coongie Lakes
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	Yes	May receive modern recharge, very low recharge rates though
Aquifer characteristics Recharge catchment within PWA	1.5	Some recharge within PWA
Aquifer characteristics Aquifer response buffering	1.5	No acknowledged relationship between rainfall and recharge
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**38.5**	

Prescribed area	*Unprescribed Kangaroo Island*	
Region	*Kangaroo Island Natural Resources Management Area*	
Resource	*Unconfined + confined aquifers*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	Not used for public water supply
Reliance on groundwater Irrigation and industrial	0.5	Very limited use for irrigation
Reliance on groundwater Environmental water requirements	1.5	Ecosystems with a medium potential for groundwater dependence have been identified
Aquifer characteristics Unconfined	1.5	Mixture of confined and unconfined aquifers
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	Some aquifers reliant upon modern rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	
Aquifer characteristics Aquifer response buffering	1.5	Very little known, it is assumed that those aquifers which are unconfined and receive modern recharge will be responsive to changes in rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**18.5**	

Prescribed area	*Unprescribed Kangaroo Island*	
Region	*Kangaroo Island Natural Resources Management Region*	
Resource	*Surface water/watercourse*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on surface water Public water supply	3	Important for town supply (Middle River reservoir). Major water resource for whole island / NRM region.
Reliance on surface water Irrigation and industrial	2.5	Main source of water for irrigation (little groundwater opportunities) and stock use (~10,000 small stock dams)
Reliance on surface water Environmental water requirements	3	River flow important for a number of ecological reasons
Resource characteristics Unconfined	3	Surface water
Resource characteristics Reliance on modern (rainfall) runoff	3	Rivers have been identified as ephemeral
Resource characteristics Resource catchment within PWA	Yes	
Resource characteristics Resource response buffering	3	Relationship between drought and reduced flows acknowledged.
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**51.5**	

Prescribed area	*Lower Limestone Coast PWA*	
Region	*South East NRM Region*	
Resource	*Confined aquifer (TCSA)*	
Volume allocated	*~55,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Not as extensively used as the Unconfined aquifer for town supply in the LLC
Reliance on groundwater Irrigation and industrial	2	Important source of water in artesian areas (Kingston, Lucindale, Greenways)
Reliance on groundwater Environmental water requirements	0	No known reliance on the confined aquifer of groundwater dependant ecosystems
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	May received modern recharge via downward leakage through faults (eg. Nangwarry area)
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment is largely outside of PWA (Dundas Plateau in Victoria) however a small amount of leakage from the overlying unconfined aquifer may take place via faults and fractures, especially in the Nangwarry and Tarpeena areas.
Aquifer characteristics Aquifer response buffering	1	There is a relationship between water levels in the confined aquifer and the overlying unconfined aquifer (which is very responsive to rainfall recharge), although this is likely to be due to hydrostatic loading.
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**24.5**	

Prescribed area	*Lower Limestone Coast PWA*	
Region	*South East NRM Region*	
Resource	*Unconfined aquifer (Tertiary Limestone Aquifer)*	
Volume allocated	*~670,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Unconfined aquifer water is extremely important for town water supply (eg. Blue Lake in Mt Gambier is fed by unconfined aquifer), however some towns rely more on the confined aquifer
Reliance on groundwater Irrigation and industrial	3	Main source of water for irrigation
Reliance on groundwater Environmental water requirements	3	The majority of water dependant ecosystems in the LLC have a high potential for interaction with the unconfined aquifer, and some studies detail the importance of groundwater on maintaining environmental flows
Aquifer characteristics Unconfined	3	Aquifer is unconfined throughout PWA
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Numerous studies have shown the importance modern rainfall recharge in replenishing the aquifer, especially in shallow watertable areas. Allocation is based on estimates of recharge.
Aquifer characteristics Recharge catchment within PWA	Yes	Rainfall recharge occurs predominantly within the PWA
Aquifer characteristics Aquifer response buffering	3	Relationship between rainfall and groundwater level has been noted in previous studies
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**54**	

Prescribed area	*Mallee PWA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Tertiary limestone aquifer (confined portion)*	
Volume allocated	*~53,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Acts as town supply for four towns in the PWA
Reliance on groundwater Irrigation and industrial	3	Main source of water for irrigation
Reliance on groundwater Environmental water requirements	0	No known relationship with water dependant ecosystems
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	0	No modern recharge (groundwater ~20,000 y/a), and depth to water generally 40-60 m-bgl
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment in SW Victoria
Aquifer characteristics Aquifer response buffering	1.5	Groundwater levels may decline as an indirect response of low rainfall years, with increased pumping extraction when rainfall decreases
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**30**	

Prescribed area	*Mallee PWA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Tertiary limestone aquifer (unconfined portion)*	
Volume allocated	*~53,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Acts as town supply for four towns in the PWA
Reliance on groundwater Irrigation and industrial	3	Main source of water for irrigation
Reliance on groundwater Environmental water requirements	0	No known relationship with water dependant ecosystems
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	0	No modern recharge (groundwater ~20,000 y/a), and depth to water generally 40–60 m (BGL)
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment in SW Victoria
Aquifer characteristics Aquifer response buffering	1.5	Groundwater levels may decline as an indirect response of low rainfall years, with increased pumping extraction when rainfall decreases
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**33**	

Prescribed area	*Marne Saunders Prescribed Water Resources Area*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Unconfined aquifer (TLA)*	
Volume allocated	*2170 ML/ y*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Minor domestic use
Reliance on groundwater Irrigation and industrial	1	Approx 25% of licensed use comes from the Tertiary Limestone Aquifer
Reliance on groundwater Environmental water requirements	2	Several ecosystems identified as reliant upon baseflow, level of dependence not fully known
Aquifer characteristics Unconfined	2.5	Partially confined in some areas
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Reliant upon rainfall recharge as well as recharge from stream flow where the stream is losing
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs within PWA
Aquifer characteristics Aquifer response buffering	3	Groundwater levels acknowledged to be influenced by changes in stream flow and rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**37.5**	

Prescribed area	*Marne Saunders Prescribed Water Resources Area*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Unconfined aquifer (fractured rock aquifer)*	
Volume allocated	*2000 ML/y*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Some domestic use
Reliance on groundwater Irrigation and industrial	2	Approximately 45% of licensed use comes from the fractured rock aquifer
Reliance on groundwater Environmental water requirements	2	Several ecosystems identified as reliant upon baseflow, level of dependence not fully known
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Reliant upon rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs within PWA
Aquifer characteristics Aquifer response buffering	3	Groundwater levels acknowledged to be influenced by changes in stream flow and rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**41**	

Prescribed area	*Marne Saunders Prescribed Water Resources Area*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Surface water and water course*	
Volume allocated	*2317 ML/y*	
	Score	**Comments**
Reliance on surface water Public water supply	1	Some domestic use
Reliance on surface water Irrigation and industrial	1	Approximately 30% of licensed comes from surface water and watercourses
Reliance on surface water Environmental water requirements	3	Several ecosystems identified as reliant upon run-off etc.
Resource characteristics Unconfined	3	Surface water system
Resource characteristics Reliance on modern (rainfall) runoff	3	Stream flow highly reliant on rainfall
Resource characteristics Resource catchment within PWA	Yes	Prescribed area is catchment area
Resource characteristics Resource response buffering	3	Changes in rainfall have a large influence on streamflow
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**41**	

Prescribed area	*McLaren Vale PWA*	
Region	*Adelaide and Mount Lofty Ranges NRM Region*	
Resource	*Confined aquifer (semi-confined in some regions, Tertiary sandstone and limestone)*	
Volume allocated	*6560 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Confined groundwater only used for irrigation and some stock and domestic, not town supply
Reliance on groundwater Irrigation and industrial	3	Groundwater is the primary source of water for irrigation use
Reliance on groundwater Environmental water requirements	1	There are GDEs in the McLaren Vale PWA, however they are mostly reliant upon groundwater from shallow Quaternary aquifers
Aquifer characteristics Unconfined	1.5	Tertiary aquifers are mostly confined, but T1 (Pt Willunga Formation) is unconfined in the central and eastern part of the basin, and T2 outcrops in the northern part
Aquifer characteristics Reliance on modern (rainfall) recharge	2	Tertiary aquifers are recharged directly in areas where PWF and Maslin Sands outcrop, but recharge also occurs via aquifer through-flow from fractured rock aquifer system in parts of PWA and WMLR PWRA
Aquifer characteristics Recharge catchment within PWA	Yes	See above
Aquifer characteristics Aquifer response buffering	1.5	High rate of extraction with decreased rainfall in Summer leads to large seasonal fluctuations.
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**33.5**	

Prescribed area	*McLaren Vale PWA*	
Region	*Adelaide and Mount Lofty Ranges NRM Region*	
Resource	*Unconfined aquifer (Quaternary)*	
Volume allocated	*Most allocations are from confined aquifer*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Quaternary aquifer only used for some stock and domestic, not town supply
Reliance on groundwater Irrigation and industrial	1	Deeper, Tertiary confined groundwater is the primary source of water for irrigation use. Quaternary aquifer not widely used for irrigation/industry.
Reliance on groundwater Environmental water requirements	3	There are GDEs in the McLaren Vale PWA reliant upon groundwater from shallow Quaternary aquifers
Aquifer characteristics Unconfined	3	Upper Quaternary aquifers are unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Quaternary aquifers rely on modern recharge from stream flow and diffuse rainfall recharge. May be recharge via upward leakage from underlying T aquifers in some places
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge is from streams and rainfall within McLaren Vale PWA
Aquifer characteristics Aquifer response buffering	2	Many wells show significant seasonal fluctuation in water levels.
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**39**	

Prescribed area	*Morambro Prescribed Surface water area*	
Region	*South East NRM Region*	
Resource	*Surface water/watercourse*	
Volume allocated	*~730 ML (816 ML when flooding)*	
	Score	**Comments**
Reliance on surface water Public water supply	1	Minor use for stock and domestic, which is supplemented by use from the underlying groundwater resources
Reliance on surface water Irrigation and industrial	1	Very small amount of water is diverted for irrigation
Reliance on surface water Environmental water requirements	3	Flow from the creek is important for recharging the underlying aquifer. Ecosystems in the downstream Marcollat Watercourse are also reliant upon flow from the creek.
Resource characteristics Unconfined	3	Surface water
Resource characteristics Reliance on modern (rainfall) runoff	3	Morambro Creek is an ephemeral creek, in other words it is driven primarily by rainfall.
Resource characteristics Resource catchment within PWA	No	70-90% flows originate from a catchment in Victoria
Resource characteristics Resource response buffering	3	Ephemeral creek, dependant upon rainfall to generate flow
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**42**	

Prescribed area	*Noora PWA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Confined aquifer (Tertiary limestone aquifer)*	
Volume allocated	*5,138 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Minor use of the resource for stock water (~28 ML/y)
Reliance on groundwater Irrigation and industrial	0	High salinity restricts the use of groundwater for anything other than minor stock water use.
Reliance on groundwater Environmental water requirements	3	Saline ecosystems that depend on year round saline groundwater discharge are present in the PWA
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	0	Little if any reliance on modern recharge (recharge ~ 11mm/y in overlying aquifers)
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment in SW Victoria
Aquifer characteristics Aquifer response buffering	0	No acknowledged relationship between rainfall and water levels
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**21**	

Prescribed area	*North Adelaide Plains PWA*	
Region	*Adelaide and Mount Lofty Ranges NRM Region*	
Resource	*Confined aquifer (Tertiary limestone aquifer)*	
Volume allocated	*~18,000ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	2	No town water supply, only stock and domestic use
Reliance on groundwater Irrigation and industrial	3	Heavy reliance on groundwater for irrigation
Reliance on groundwater Environmental water requirements	0	Intertidal flats have medium potential for interaction with groundwater, however they're most likely dependent on shallow Quaternary aquifers not targeted for irrigation
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	2	Reliant upon recharge via lateral through-flow from the Mount Lofty Ranges (thousands of years)
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment in Mount Lofty Ranges
Aquifer characteristics Aquifer response buffering	1.5	Groundwater level trends driven by extraction, which may be influenced by rainfall trends
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**32**	

Prescribed area	*North Adelaide Plains PWA*	
Region	*Adelaide and Mount Lofty Ranges NRM Region*	
Resource	*Unconfined aquifer (Quaternary sediments)*	
Volume allocated	*~18,000ML (most of use is un underlying confined aquifer)*	
	Score	**Comments**
Reliance on groundwater Public water supply	1.5	Only used for domestic supply
Reliance on groundwater Irrigation and industrial	1.5	Only used for stock supply
Reliance on groundwater Environmental water requirements	1.5	Intertidal flats have medium potential for interaction with groundwater, and are most likely dependent on shallow Quaternary aquifers
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	2	May receive rainfall recharge in some areas, but level of reliance is not specified
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs in the PWA
Aquifer characteristics Aquifer response buffering	1.5	Seasonal fluctuations in the upper Quaternary aquifers may be due to modern recharge
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**33.5**	

Prescribed area	*Unprescribed NY (Balaklava)*	
Region	*Northern and Yorke NRM Region*	
Resource	*Unconfined aquifer (TLA)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	TWS for Balaklava comes from Murray
Reliance on groundwater Irrigation and industrial	3	GW used for irrigation of racecourse and golf course
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	2	Not specified (assume unconfined)
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives recharge from Wakefield River during peak flows
Aquifer characteristics Recharge catchment within PWA	Yes	However Wakefield River does extend beyond Balaklava
Aquifer characteristics Aquifer response buffering	1.5	Not known, assumed to be some relationship between rainfall and recharge though
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**31**	

Prescribed area	*Unprescribed NY (Booborowie Valley)*	
Region	*Northern and Yorke NRM Region*	
Resource	*Unconfined aquifer*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	Booborowie TWS from Murray
Reliance on groundwater Irrigation and industrial	3	Groundwater used for stock and irrigation of lucerne
Reliance on groundwater Environmental water requirements	0	No identified GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Aquifer thought to receive modern recharge (not fully known)
Aquifer characteristics Recharge catchment within PWA	Yes	Likely (not fully known)
Aquifer characteristics Aquifer response buffering	3	A relationship between rainfall and GW levels has been identified
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**35**	

Prescribed area	*Unprescribed NY (Carribie basin)*	
Region	*Northern and Yorke NRM Region*	
Resource	*Unconfined aquifer (Quaternary)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	Not used for TWS
Reliance on groundwater Irrigation and industrial	1.5	Very little irrigation use, minor stock use
Reliance on groundwater Environmental water requirements	1	Potentially some GDEs in basin
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs within basin
Aquifer characteristics Aquifer response buffering	3	Seasonal fluctuations and long term declines influenced by rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**33.5**	

Prescribed area	*Unprescribed NY (Para-Wurlie basin)*	
Region	*Northern and Yorke NRM Region*	
Resource	*Unconfined aquifer (quaternary limestone)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	TWS for Warooka and Point Turton
Reliance on groundwater Irrigation and industrial	0	No current irrigation activity is recognised
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs within basin
Aquifer characteristics Aquifer response buffering	3	Groundwater levels fluctuate seasonally, recent declining trends likely to be influenced by rainfall
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**35**	

Prescribed area	*Unprescribed NY (Walloway Basin)*	
Region	*Northern and Yorke NRM Region*	
Resource	*Confined aquifer (TLA)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Groundwater used for Orroroo TWS and stock and domestic use
Reliance on groundwater Irrigation and industrial	1	Very little irrigation due to limited nature of resource
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	0	The main aquifer used (Tertiary Aquifer) is confined
Aquifer characteristics Reliance on modern (rainfall) recharge	1	Not well understood, but low amounts of recharge may occur near Pekina Creek
Aquifer characteristics Recharge catchment within PWA	Yes	However recharge processes are not well understood
Aquifer characteristics Aquifer response buffering	1	Not known
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**25**	

Prescribed area	*Unprescribed NY (Willochra Basin)*	
Region	*Northern and Yorke NRM Region*	
Resource	*Groundwater (Unconfined Quaternary and confined Tertiary)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Extraction for town water supply (Quorn)
Reliance on groundwater Irrigation and industrial	3	Groundwater used to support some irrigation – level of use not fully known
Reliance on groundwater Environmental water requirements	0	No known GDEs
Aquifer characteristics Unconfined	2	Quaternary aquifer is unconfined (level of use from the two different aquifers not fully known)
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Thought to be a reliance on modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge likely to occur in unprescribed area
Aquifer characteristics Aquifer response buffering	1	Not fully known
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**39**	

Prescribed area	*Padthaway PWA*	
Region	*South East NRM Region*	
Resource	*Unconfined aquifer (Tertiary Limestone Aquifer)*	
Volume allocated	*55000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	3	Unconfined aquifer is used for town water supply for Padthaway township.
Reliance on groundwater Irrigation and industrial	3	Primary source of water for irrigation industry.
Reliance on groundwater Environmental water requirements	0	No GDEs identified in Padthaway PWA
Aquifer characteristics Unconfined	3	Aquifer is unconfined.
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Numerous studies in the PWA have shown the importance of rainfall recharge in replenishing the aquifer. Allocation is based on estimates of recharge.
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs within PWA
Aquifer characteristics Aquifer response buffering	3	Trends in groundwater level have been identified as being influenced by rainfall patterns (land use change has also played a big role in the Padthaway PWA in the past)
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**45**	

Prescribed area	*Peake Roby and Sherlock PWA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Confined aquifer (TCSA)*	
Volume allocated	*2018 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Some town water supply in the PWA (level of reliance not specified anywhere)
Reliance on groundwater Irrigation and industrial	2	2/3rds of extraction in the PWA is from the confined aquifer
Reliance on groundwater Environmental water requirements	0	No acknowledged GDEs in the PWA
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	0	No reliance on modern recharge
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment is in SW Victoria
Aquifer characteristics Aquifer response buffering	1	Indirect relationship between declining water levels and decreased rainfall as a result of increased extraction in dry years.
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**20**	

Prescribed area	*Peake Roby and Sherlock PWA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Unconfined aquifer (Tertiary limestone and Quaternary limestone)*	
Volume allocated	*3,215 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	No extraction for public water supply noted in the PWA
Reliance on groundwater Irrigation and industrial	1	Majority of metered use in the PWA is from the underlying confined aquifer
Reliance on groundwater Environmental water requirements	0	No recognised GDEs in the PWA
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	2.5	Majority of the PWA is a coastal plain that receives modern rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Majority of the PWA acts as recharge catchment, additional recharge is received via aquifer through-flow
Aquifer characteristics Aquifer response buffering	1.5	A direct relationship between rainfall and groundwater levels has not been acknowledged, however an indirect relationship may exist as groundwater extraction increases in low rainfall years
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**25.5**	

Prescribed area	*Unprescribed South East*	
Region	*South East Natural Resource Management Region*	
Resource	*Confined Aquifer (Tertiary Confined Sand Aquifer)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	Not currently used for town water supply
Reliance on groundwater Irrigation and industrial	0.5	No irrigation use, may be minor stock use
Reliance on groundwater Environmental water requirements	0	Aquifer is confined throughout the PWA, interaction with surface water is highly unlikely.
Aquifer characteristics Unconfined	0	Confined.
Aquifer characteristics Reliance on modern (rainfall) recharge	0	No data exists suggesting that the confined aquifer in Tatiara receives 'modern' (say <50 years old) rainfall recharge.
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment in Victoria (Dundas Plateau)
Aquifer characteristics Aquifer response buffering	1	There may be a relationship between water levels in the confined aquifer and the overlying unconfined aquifer (which is very responsive to rainfall recharge), although this is likely to be due to hydrostatic loading.
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**12.5**	

Prescribed area	*Tatiara PWA*	
Region	*South East Natural Resource Management Region*	
Resource	*Confined Aquifer (Tertiary Confined Sand Aquifer)*	
Volume allocated	*~365 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	Not currently used for town water supply
Reliance on groundwater Irrigation and industrial	0.5	Very little allocation for industrial (<1% of total groundwater allocation in the Tatiara PWA)
Reliance on groundwater Environmental water requirements	0	Aquifer is confined throughout the PWA, interaction with surface water is highly unlikely.
Aquifer characteristics Unconfined	0	Confined.
Aquifer characteristics Reliance on modern (rainfall) recharge	0	No data exists suggesting that the confined aquifer in Tatiara receives 'modern' (say <50 years old) rainfall recharge.
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment in Victoria (Dundas Plateau)
Aquifer characteristics Aquifer response buffering	1	There is a relationship between water levels in the confined aquifer and the overlying unconfined aquifer (which is very responsive to rainfall recharge), although this is likely to be due to hydrostatic loading.
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**12.5**	

Prescribed area	*Tatiara PWA*	
Region	*South East Natural Resource Management Region*	
Resource	*Unconfined Aquifer (Tertiary Limestone Aquifer)*	
Volume allocated	*~ 192,000 ML*	
	Score	**Reason**
Reliance on groundwater Public water supply	2	Recognising that groundwater extraction is important for stock and domestic use, and town supply in some but not all areas (ie. Keith town water supply comes off Murray pipeline)
Reliance on groundwater Irrigation and industrial	3	Nearly 100% of irrigation and industrial use comes from the unconfined aquifer (very little confined aquifer use in Tatiara)
Reliance on groundwater Environmental water requirements	0	GDE potential mapping
Aquifer characteristics Unconfined	3	No significant confining layers are known to occur in the PWA
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Numerous studies in the PWA have shown the importance of rainfall recharge in replenishing the aquifer. Allocation is based on estimates of recharge.
Aquifer characteristics Recharge catchment within PWA	Yes	Lateral throughflow from across the South Australian-Victorian border is estimated to be only ~ 20% of total inputs (rainfall recharge >50% on average)
Aquifer characteristics Aquifer response buffering	3	Recognising there is a strong relationship between rainfall (cumulative deviation) and recharge, and there is no noticeable 'lag time' between the two
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**42**	

Prescribed area	*Tintinara-Coonalpyn PWA*	
Region	*South East NRM Region*	
Resource	*Confined Aquifer (TCSA)*	
Volume allocated	*~18,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	All towns in the PWA receive water from the Murray River. The unconfined aquifer is used for stock water.
Reliance on groundwater Irrigation and industrial	1	Minor use compared to the unconfined aquifer in the PWA
Reliance on groundwater Environmental water requirements	0	No acknowledged interaction between the confined aquifer and water-dependent ecosystems
Aquifer characteristics Unconfined	0	Confined
Aquifer characteristics Reliance on modern (rainfall) recharge	0	Confined aquifer does not receive modern recharge
Aquifer characteristics Recharge catchment within PWA	No	Recharge catchment is not known to be within the PWA
Aquifer characteristics Aquifer response buffering	1	There is a relationship between water levels in the confined aquifer and the overlying unconfined aquifer (which is very responsive to rainfall recharge), although this is likely to be due to hydrostatic loading.
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**14**	

Prescribed area	*Tintinara-Coonalpyn PWA*	
Region	*South East NRM Region*	
Resource	*Unconfined aquifer (Tertiary Limestone Aquifer)*	
Volume allocated	*~62,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	All major towns in the PWA receive water from Murray River,
Reliance on groundwater Irrigation and industrial	3	Main source of water for irrigation use
Reliance on groundwater Environmental water requirements	1	Small are of very high potential GDEs identified in GDE potential mapping
Aquifer characteristics Unconfined	3	Aquifer is unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Studies have shown the area to be reliant on rainfall recharge. Allocation is based on recharge in some management areas.
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge occurs within PWA.
Aquifer characteristics Aquifer response buffering	3	Groundwater level trends have been related to rainfall in recent years.
Percentage change in rainfall	4	-10% to -20% decrease in rainfall
Percentage change in potential ET	5	12% to 16% increase in PET
TOTAL SCORE (after weighting)	**39**	

Prescribed area	*Western Mount Lofty Ranges PWRA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Unconfined aquifer (fractured rock – Central and Northern Hills)*	
Volume allocated	*Extraction limit approx. 50,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	2	Many domestic bores. Discharge from FR aquifers important component of flow to MLR reservoirs
Reliance on groundwater Irrigation and industrial	3	Many irrigators & industrial users
Reliance on groundwater Environmental water requirements	3	Many GDE environments
Aquifer characteristics Unconfined	2	Unconfined / semi-confined fractured rock system
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge catchment is within PWA
Aquifer characteristics Aquifer response buffering	1.5	Large regional aquifer system with high storage capacity
Percentage change in rainfall	4	-10% to -20%
Percentage change in potential ET	4	+8% to +12%
TOTAL SCORE (after weighting)	**46**	

Prescribed area	*Western Mount Lofty Ranges PWRA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Unconfined aquifer (Southern Fleurieu - FR)*	
Volume allocated	*Extraction limit, approx. 24,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	1.5	Some domestic bores. Some discharge to Myponga reservoir.
Reliance on groundwater Irrigation and industrial	1.5	Some irrigation and stock use
Reliance on groundwater Environmental water requirements	3	Several high value GDEs
Aquifer characteristics Unconfined	2	Unconfined / semi-confined fractured rock system
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Receives modern rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge catchment is within PWA
Aquifer characteristics Aquifer response buffering	1.5	Large regional system with high storage
Percentage change in rainfall	4	-10% to -20%
Percentage change in potential ET	4	+8% to +12%
TOTAL SCORE (after weighting)	**40**	

Prescribed area	*Western Mount Lofty Ranges PWRA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Unconfined aquifer (Southern Fleurieu - Sedimentary)*	
Volume allocated	*Extraction limit, approx. 10,000 ML*	
	Score	**Comments**
Reliance on groundwater Public water supply	1	Some domestic bores
Reliance on groundwater Irrigation and industrial	2	Extensive pasture irrigation, some vine irrigation
Reliance on groundwater Environmental water requirements	3	Several significant GDEs (Fleurieu Swamps)
Aquifer characteristics Unconfined	3	Unconfined sedimentary aquifer system with shallow depth-to-water in some locations
Aquifer characteristics Reliance on modern (rainfall) recharge	3	Largely reliant on rainfall recharge
Aquifer characteristics Recharge catchment within PWA	Yes	
Aquifer characteristics Aquifer response buffering	2	Some showing significant decline in response to pumping. However this resource is supported by connection with the larger regional FRA system in some places.
Percentage change in rainfall	4	-10% to -20%
Percentage change in potential ET	4	+8% to +12%
TOTAL SCORE (after weighting)	**42**	

Prescribed area	*Western Mount Lofty Ranges PWRA*	
Region	*South Australian Murray-Darling Basin NRM Region*	
Resource	*Surface water/watercourse*	
Volume allocated	*66,000 ML*	
	Score	**Comments**
Reliance on surface water Public water supply	3	Approx. 60% of Adelaide's water supply in an average year
Reliance on surface water Irrigation and industrial	3	High demand for irrigation & stock water
Reliance on surface water Environmental water requirements	3	Several high value WDE's
Resource characteristics Unconfined	3	Surface water
Resource characteristics Reliance on modern (rainfall) runoff	3	Stream flow is heavily reliant on rainfall
Resource characteristics Resource catchment within PWA	Yes	Surface water catchments extend beyond the PWRA, however they are in areas of identical climate projection
Resource characteristics Resource response buffering	3	Decreased stream flow and surface water availability is observed in dry periods
Percentage change in rainfall	4	-10% to -20%
Percentage change in potential ET	4	+8% to +12%
TOTAL SCORE (after weighting)	**53**	

Prescribed area	*Unprescribed Adelaide and Mount Lofty Ranges NRM Region*	
Region	*Adelaide and Mount Lofty Ranges NRM Region*	
Resource	*Groundwater (sedimentary aquifers)*	
Volume allocated	*N/A*	
	Score	**Comments**
Reliance on groundwater Public water supply	0	No known public water supply
Reliance on groundwater Irrigation and industrial	1	Potentially minor stock use (low quality water)
Reliance on groundwater Environmental water requirements	2	High potential for surface water-groundwater interactions in intertidal flats
Aquifer characteristics Unconfined	3	Unconfined
Aquifer characteristics Reliance on modern (rainfall) recharge	1.5	Unknown, assumed to receive modern recharge
Aquifer characteristics Recharge catchment within PWA	Yes	Recharge assumed to occur within non-prescribed area
Aquifer characteristics Aquifer response buffering	1.5	Assumed to be a relationship between rainfall and recharge
Percentage change in rainfall	4	-10 to -20 % decrease in rainfall
Percentage change in potential ET	4	8 to 12 % increase in PET
TOTAL SCORE (after weighting)	**27.5**	

UNITS OF MEASUREMENT

Units of measurement commonly used (SI and non-SI Australian legal)

Name of unit	Symbol	Definition in terms of other metric units	Quantity
day	d	24 h	time interval
gigalitre	GL	10^6 m^3	volume
gram	g	10^{-3} kg	mass
hectare	ha	10^4 m^2	area
hour	h	60 min	time interval
kilogram	kg	base unit	mass
kilolitre	kL	1 m^3	volume
kilometre	km	10^3 m	length
litre	L	10^{-3} m^3	volume
megalitre	ML	10^3 m^3	volume
metre	m	base unit	length
microgram	µg	10^{-6} g	mass
microlitre	µL	10^{-9} m^3	volume
milligram	mg	10^{-3} g	mass
millilitre	mL	10^{-6} m^3	volume
millimetre	mm	10^{-3} m	length
minute	min	60 s	time interval
second	s	base unit	time interval
tonne	t	1000 kg	mass
year	y	365 or 366 days	time interval

Shortened forms

~	approximately equal to
bgs	below ground surface
EC	electrical conductivity (µS/cm)
K	hydraulic conductivity (m/d)
pH	acidity
pMC	percent of modern carbon
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
w/v	weight in volume
w/w	weight in weight

GLOSSARY

Aquifer — An underground layer of rock or sediment that holds water and allows water to percolate through

Aquifer, confined — Aquifer in which the upper surface is impervious (see 'confining layer') and the water is held at greater than atmospheric pressure; water in a penetrating well will rise above the surface of the aquifer

Aquifer, unconfined — Aquifer in which the upper surface has free connection to the ground surface and the water surface is at atmospheric pressure

Aquitard — A layer in the geological profile that separates two aquifers and restricts the flow between them

Arid lands — In South Australia, arid lands are usually considered to be areas with an average annual rainfall of less than 250 mm and support pastoral activities instead of broadacre cropping

Artesian — An aquifer in which the water surface is bounded by an impervious rock formation; the water surface is at greater than atmospheric pressure, and hence rises in any well which penetrates the overlying confining aquifer

Artificial recharge — The process of artificially diverting water from the surface to an aquifer; artificial recharge can reduce evaporation losses and increase aquifer yield; see also 'natural recharge', 'aquifer'

Baseflow — The water in a stream that results from groundwater discharge to the stream; often maintains flows during seasonal dry periods and has important ecological functions

Basin — The area drained by a major river and its tributaries

Biodiversity — (1) The number and variety of organisms found within a specified geographic region. (2) The variability among living organisms on the earth, including the variability within and between species and within and between ecosystems

BoM — Bureau of Meteorology, Australia

Bore — See 'well'

Catchment — That area of land determined by topographic features within which rainfall will contribute to run-off at a particular point

CMB — Chloride mass balance

Confining layer — A rock unit impervious to water, which forms the upper bound of a confined aquifer; a body of impermeable material adjacent to an aquifer; see also 'aquifer, confined'

CSIRO — Commonwealth Scientific and Industrial Research Organisation

DES — Drillhole Enquiry System; a database of groundwater wells in South Australia, compiled by the South Australian Department of Water, Land and Biodiversity Conservation (DWLBC)

DFW — Department for Water (Government of South Australia)

Domestic purpose — The taking of water for ordinary household purposes; includes the watering of land in conjunction with a dwelling not exceeding 0.4 hectares

DWLBC — Department of Water, Land and Biodiversity Conservation (Government of South Australia)

EC — Electrical conductivity; 1 EC unit = 1 micro-Siemen per centimetre (µS/cm) measured at 25°C; commonly used as a measure of water salinity as it is quicker and easier than measurement by TDS

Ecological values — The habitats, natural ecological processes and biodiversity of ecosystems

Ecosystem — Any system in which there is an interdependence upon, and interaction between, living organisms and their immediate physical, chemical and biological environment

EMLR — Eastern Mount Lofty Ranges

GLOSSARY

Environmental values — The uses of the environment that are recognised as being of value to the community. This concept is used in setting water quality objectives under the Environment Protection (Water Quality) Policy, which recognises five environmental values — protection of aquatic ecosystems, recreational water use and aesthetics, potable (drinking water) use, agricultural and aquaculture use, and industrial use. It is not the same as ecological values, which are about the elements and functions of ecosystems.

Environmental water requirements — The water regimes needed to sustain the ecological values of aquatic ecosystems, including their processes and biological diversity, at a low level of risk

EP — Eyre Peninsula

Ephemeral streams or wetlands — Those streams or wetlands that usually contain water only on an occasional basis after rainfall events. Many arid zone streams and wetlands are ephemeral.

EPNRMB — Eyre Peninsula Natural Resources Management Board

Evapotranspiration — The total loss of water as a result of transpiration from plants and evaporation from land, and surface water bodies

Flow regime — The character of the timing and amount of flow in a stream

GAB — Great Artesian Basin

GDE — Groundwater-dependent ecosystem

GIS — Geographic Information System; computer software linking geographic data (for example land parcels) to textual data (soil type, land value, ownership). It allows for a range of features, from simple map production to complex data analysis

Greenhouse effect — The balance of incoming and outgoing solar radiation which regulates our climate. Changes to the composition of the atmosphere, such as the addition of carbon dioxide through human activities, have the potential to alter the radiation balance and to effect changes to the climate. Scientists suggest that changes would include global warming, a rise in sea level and shifts in rainfall patterns.

Groundwater — Water occurring naturally below ground level or water pumped, diverted and released into a well for storage underground; see also 'underground water'

Hydraulic conductivity (K) — A measure of the ease of flow through aquifer material: high K indicates low resistance, or high flow conditions; measured in metres per day

Hydrogeology — The study of groundwater, which includes its occurrence, recharge and discharge processes, and the properties of aquifers; see also 'hydrology'

Hydrology — The study of the characteristics, occurrence, movement and utilisation of water on and below the Earth's surface and within its atmosphere; see also 'hydrogeology'

Impact — A change in the chemical, physical, or biological quality or condition of a water body caused by external sources

Irrigation — Watering land by any means for the purpose of growing plants

Irrigation season — The period in which major irrigation diversions occur, usually starting in August–September and ending in April–May

KINRMB — Kangaroo Island Natural Resources Management Board

MDBC — Murray–Darling Basin Commission

MLR — Mount Lofty Ranges

NAP — Northern Adelaide Plains

Natural recharge — The infiltration of water into an aquifer from the surface (rainfall, streamflow, irrigation etc). See also recharge area, artificial recharge

Natural resources — Soil, water resources, geological features and landscapes, native vegetation, native animals and other native organisms, ecosystems

GLOSSARY

NRM — Natural Resources Management; all activities that involve the use or development of natural resources and/or that impact on the state and condition of natural resources, whether positively or negatively

NYNRM — Northern and Yorke Natural Resources Management (region)

Observation well — A narrow well or piezometer whose sole function is to permit water level measurements

Perennial streams — Permanently inundated surface stream courses. Surface water flows throughout the year except in years of infrequent drought.

Piezometer — A narrow tube, pipe or well; used for measuring moisture in soil, water levels in an aquifer, or pressure head in a tank, pipeline, etc

Prescribed area, surface water — Part of the state declared to be a surface water prescribed area under the Act

Prescribed water resource — A water resource declared by the Governor to be prescribed under the Act, and includes underground water to which access is obtained by prescribed wells. Prescription of a water resource requires that future management of the resource be regulated via a licensing system.

Production well — The pumped well in an aquifer test, as opposed to observation wells; a wide-hole well, fully developed and screened for water supply, drilled on the basis of previous exploration wells

PWA — Prescribed Wells Area

PWRA — Prescribed Water Resources Area

Recharge area — The area of land from which water from the surface (rainfall, streamflow, irrigation, etc.) infiltrates into an aquifer. See also artificial recharge, natural recharge

SA Water — South Australian Water Corporation (Government of South Australia)

Stock use — The taking of water to provide drinking water for stock other than stock subject to intensive farming (as defined by the Act)

Sub-catchment — The area of land determined by topographical features within which rainfall will contribute to run-off at a particular point

Surface water — (a) water flowing over land (except in a watercourse), (i) after having fallen as rain or hail or having precipitated in any another manner, (ii) or after rising to the surface naturally from underground; (b) water of the kind referred to in paragraph (a) that has been collected in a dam or reservoir

WAP — Water Allocation Plan; a plan prepared by a CWMB or water resources planning committee and adopted by the Minister in accordance with the Act

Water-dependent ecosystems — Those parts of the environment, the species composition and natural ecological processes, that are determined by the permanent or temporary presence of flowing or standing water, above or below ground; the in-stream areas of rivers, riparian vegetation, springs, wetlands, floodplains, estuaries and lakes are all water-dependent ecosystems

WDE — Water-dependent ecosystem

Well — (1) An opening in the ground excavated for the purpose of obtaining access to underground water. (2) An opening in the ground excavated for some other purpose but that gives access to underground water. (3) A natural opening in the ground that gives access to underground water

Wetlands — Defined by the Act as a swamp or marsh and includes any land that is seasonally inundated with water. This definition encompasses a number of concepts that are more specifically described in the definition used in the Ramsar Convention on Wetlands of International Importance. This describes wetlands as areas of permanent or periodic to intermittent inundation, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tides does not exceed six metres.

WMLR — Western Mount Lofty Ranges

REFERENCES

Arid Areas Catchment Water Management Board, 2006, *Volume 2 State of the Catchment Report*, South Australian Arid Lands Natural Resources Management Board, Government of South Australia

Adelaide and Mount Lofty Ranges Natural Resources Management Board, 2007, *Resource Condition Summary Groundwater level trends in the McLaren Vale PWA 2004 to 2007*, Government of South Australia

Adelaide and Mount Lofty Ranges Natural Resources Management Board, 2007, *Water Allocation Plan McLaren Vale Prescribed Wells Area*, Government of South Australia

Adelaide and Mount Lofty Ranges Natural Resources Management Board, 2007, *Groundwater trends in the North Adelaide Plains 2004 to 2007*, Government of South Australia

Adelaide and Mount Lofty Ranges Natural Resources Management Board, 2008, *Concept Statement Central Adelaide Prescribed Wells Area April 2008*, Government of South Australia

Baird, D 2010, Groundwater recharge *and flow mechanisms in a perturbed, buried aquifer system: Northern Adelaide Plains, South Australia*, PhD Thesis, Flinders University South Australia

Barnett, S 2003, *Mallee PWA and Murrayville WSPA Groundwater Monitoring Status Report 2003*, DWLBC Report 2003/29, Government of South Australia

Barnett, S 2009, *Groundwater resource assessment of the Baroota Prescribed Water Resources Area*, DWLBC Technical note 2009/27, Government of South Australia

Barnett, S, & Dodds, AR 2000, *Groundwater Resources on Kangaroo Island*, PIRSA Report Book 2000/00015, Government of South Australia

Barnett, S, and Yan, W 2000, *Mallee Region Groundwater Modelling Report No.1*, PIRSA Report Book 2000/0004, Government of South Australia

Barnett, S, Zulfic, D, and Yan, W 2001, *Marne River Catchment Groundwater Assessment*, DWLBC Report 2001/009, Government of South Australia

Brown, K, Harrington, G & Lawson, J 2006, *Review of groundwater resource condition and management principles for the Tertiary Limestone Aquifer in the South East of South Australia*, DWLBC Report 2006/02, Government of South Australia

Brown, KG, Love, AJ & Harrington, GA 2001, *Vertical groundwater recharge to the Tertiary confined sand aquifer, South East, South Australia*, Department of Water Resources Report 2001/002, Government of South Australia

Cobb, M and Brown, K 2000, *Water Resource Assessment: Padthaway Prescribed Wells Area for the South East Catchment Water Management Board*, Department for Water Resources, PIRSA RB 2000/00031, Government of South Australia

REFERENCES

Cobb, M and Brown, K 2000, *Water Resource Assessment: Tatiara Prescribed Wells Area for the South East Catchment Water Management Board*, Department for Water Resources, PIRSA RB 2000/00036, Government of South Australia

CSIRO 2007, *Climate change in Australia, Technical Report 2007*, available online: http://www.climatechangeinaustralia.gov.au
Website accessed June 2010

Dodds, S, & Sampson, L 2001, *Hydrogeological report on water well monitoring in Aboriginal lands – October 2000 to April 2001*, Department for Water Resources 2001/012, Government of South Australia

Gerges, N 2006, *Overview of the hydrogeology of the Adelaide metropolitan area*. DWLBC Report 2006/10, Government of South Australia

Gerges, N 2001, *Northern Adelaide Plains groundwater review*, Department for Water Resources Report 2001/013, Government of South Australia

Hodge, B, 2009, Water *Allocation and Use in the South East 2008-2009 Summary Report*, DWLBC internal report, Government of South Australia

Hodgkin, T, Yan, W, Stadter, M, & Clarke, D 2007, *Noora Basin Groundwater Model 2007*, DWLBC Report 2007/25, Government of South Australia

Kangaroo Island Natural Resources Management Board 2005, *Kangaroo Island Water Resources Assessment Project NAP Reporting, March 2005*, Government of South Australia
Love, AJ, Cook, PG, Harrington, GA, & Simmons, CT 2003, *Groundwater flow in the Clare Valley*, Department for Water Resources report DWR02.03.0002, Government of South Australia

Magarey, PD & Deane, D 2004, *Small Groundwater Basins Risk Assessment: Northern and Yorke Agricultural District*, DWLBC 2004/54, Government of South Australia

Mallee Water Resources Planning Committee 2000, *Water Allocation Plan Mallee Prescribed Wells Area*, Department for Water Resources, Government of South Australia

Northern & Yorke Natural Resources Management Board 2009, *Water Allocation Plan for the Clare Valley Prescribed Water Resources Area*, Government of South Australia

Northern Adelaide and Barossa Catchment Water Management Board 2000, *Water Allocation Plan Northern Adelaide Plains Prescribed Wells Area*, Government of South Australia

REM/Aquaterra 2006, *Hydrogeology and Groundwater Numerical Model for the McLaren Vale Prescribed Wells Area*, Consultant report prepared for the Adelaide and Mount Lofty NRM Board

River Murray Catchment Water Management Board 2001, *Water Allocation Plan for the Noora Prescribed Wells Area*, Government of South Australia

River Murray Catchment Water Management Board 2001, *Water Allocation Plan for the Angas-Bremer Prescribed Wells Area*, Government of South Australia

REFERENCES

South Australian Murray-Darling Basin Natural Resources Management Board 2009, *Draft Water Allocation Plan for the Peake, Roby and Sherlock Prescribed Wells Area*, Government of South Australia

South Australian Murray Darling Basin Natural Resources Management Board 2010, *Water Allocation Plan for the Marne Saunders Prescribed Water Resources Area*, Government of South Australia

South East Natural Resources Management Board 2006, *Morambro Creek Water Allocation Plan*, Government of South Australia

South East Natural Resources Management Board 2007, *Tintinara-Coonalpyn Water Allocation Plan*, Government of South Australia

Zulfic, D and Barnett, S 2002, *Saunders Creek Catchment Groundwater Assessment*, DWLBC Report 2002/01, Government of South Australia

Zulfic, D and Barnett, S 2007, *Angas Bremer PWA Groundwater status report 2007*, DWLBC Report 2007/27, Government of South Australia