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Berri-Renmark Numerical Goundwater Model 2007 Volume 1 – Report and figures

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Government of South Australia
Department of Water, Land and Biodiversity Conservation

Berri – Renmark Numerical Groundwater Model 2007

Volume 1 – Report and Figures

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FOREWORD

South Australia's unique and precious natural resources are fundamental to the economic and social wellbeing of the State. It is critical that these resources are managed in a sustainable manner to safeguard them both for current users and for future generations.

The Department of Water, Land and Biodiversity Conservation (DWLBC) strives to ensure that our natural resources are managed so that they are available for all users, including the environment.

In order for us to best manage these natural resources it is imperative that we have a sound knowledge of their condition and how they are likely to respond to management changes. DWLBC scientific and technical staff continues to improve this knowledge through undertaking investigations, technical reviews and resource modelling.

Scott Ashby
CHIEF EXECUTIVE
DEPARTMENT OF WATER, LAND AND BIODIVERSITY CONSERVATION

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http://www.dwlbc.sa.gov.au/publications/rpts/index.html

EXECUTIVE SUMMARY

The Renmark, Chaffey, Berri and Cobdogla Irrigation Trust areas (also referred to as the Berri – Renmark area in this report) are located adjacent to the River Murray in the northeast region of the South Australian part of the Murray Basin. Over the past 60 years, concerns have been raised regarding the salt load impacts on the river resulting from irrigation development. The original pre-development base salt load entering the river is estimated (by the model) to be around ~ 10 t/day in the Berri area and around ~ 11 t/day in the Renmark area. Current modelling predicts approximately 14 t/day and 32 t/day of salt entered the river in the Berri and Renmark areas respectively in 2006. Much of this additional salt load results from the increased flux of saline groundwater that has occurred in response to the development of irrigation drainage groundwater mounds.

To meet obligations under the Murray-Darling Basin Commission's (MDBC) Basin Salinity Management Strategy (BSMS), SA is undertaking to develop a suite of accredited MODFLOW groundwater models to bring entries forward to the BSMS Salinity Registers. This work is undertaken by the Knowledge and Information Division of the Department for Water, Land and Biodiversity Conservation (DWLBC) under the broad direction of Strategic Policy Division DWLBC, in liaison with MDBC. Through the groundwater modelling process, scenarios are established that assist in determining the origin and volume of salt entering the River Murray from groundwater sources.

DWLBC developed a MODFLOW numerical groundwater flow model (Border to Lock 3 Model) from the SA–VIC border to the Woolpunda area in South Australia (Yan et al. 2005). This model covers most of the Riverland area, including the Berri – Renmark project area (Fig. 1). The objectives of this initial modelling project were to develop a model capable of simulating the regional aquifer system in the Riverland area that could be used to:

- Improve the understanding of the hydrogeology of the regional aquifer system and processes in the model area.
- Predict the flux of saline groundwater and salt load entering the River Murray under different accountable development and management actions (100 year predictions from current year), hence provide modelled salt loads for use as Salinity Register entries.
- Assist with broad scale planning with the possibility for future groundwater management schemes (eg salt interception scheme- SIS) that will control the flux of saline groundwater (and therefore salt load) entering the River Murray.

In late 2005, Aquaterra Consulting Pty Ltd (Aquaterra), in partnership with Resource & Environmental Management Pty Ltd (REM) and Australian Water Environments (AWE) was commissioned by DWLBC to update the Border to Lock 3 model in the Berri – Renmark area. The model was used to provide a sound technical basis for evaluating the flux of saline groundwater and salt load entering the River Murray resulting from accountable actions, existing and future irrigation development and salt interception schemes in the Renmark, Chaffey, Berri and Cobdogla Irrigation Trust areas. After transferring the model back to DWLBC in 2006, DWLBC and Aquaterra have made significant improvements to the model throughout the Berri and Renmark region. The fundamental objective of the modelling work has been to improve confidence in the model parameters and results to levels that will enable and assist:

- Accreditation of the model by the MDBC
- Use of modelled salt loads as Salinity Register entries

After improved calibrations were made, the transient model was used to run scenarios which have produced estimates of the groundwater fluxes (and resultant salt load) entering the River Murray resulting from accountable irrigation and management actions in the Berri and Renmark areas. The scenarios are summarised in Table ES–1 and predicted salt loads entering the River Murray are summarised in Tables ES–2 and ES–3.

Table ES–1. Summary of modelling scenarios

Scenario	Name	Model Run	Irrigation development area	IIP[1]	RH[2]	SIS[3]
S–1	Natural system	Steady State	None	–	–	–
S–2	Mallee clearance	1920–2106	None (but includes Mallee clearance area)	–	–	–
S–3A	Pre-1988, no IIP, no RH	1988–2106	Pre-1988	No	No	–
S–3B	Pre-1988, with IIP, no RH	1988–2106	Pre-1988	Yes	No	–
S–3C	Pre-1988, with IIP and with RH	1988–2106	Pre-1988	Yes	Yes	–
S–4	Current irrigation	1880–2106	Pre-1988 + Post-1988	Yes	Yes	No
S–5	Current plus future irrigation	2006–2106	Pre-1988 + Post-1988 + Future development	Yes	Yes	No

Note: 1 Improved Irrigation Practices 2 Rehabilitation 3 Salt Interception Scheme (see Glossary for definitions)

Table ES–2. Summary of predicted salt load (t/day) entering the River Murray (Berri Area)

Berri Area	Year				
	1988	2000	2006	2050	2106
S–1	10.1	10.1	10.1	10.1	10.1
S–2	11.8	11.9	11.9	12.4	13.3
S–3A	13.5	13.9	14.0	14.9	15.5
S–3B	13.4	13.8	14.0	14.8	15.3
S–3C	13.4	13.8	13.9	14.7	15.2
S–4	13.4	13.9	14.1	14.9	15.5
S–5	13.4	13.9	14.1	14.9	15.5

Table ES–3. Summary of predicted salt load (t/day) entering the River Murray (Renmark Area)

Renmark Area	Year				
	1988	**2000**	**2006**	**2050**	**2106**
S–1	10.6	10.6	10.6	10.6	10.6
S–2	11.0	11.2	11.3	13.5	19.7
S–3A	68.1	68.1	68.1	68.4	68.5
S–3B	67.4	49.1	30.5	21.9	21.8
S–3C	67.4	49.1	30.5	21.9	21.7
S–4	67.4	50.6	31.9	23.4	23.4
S–5	67.4	50.6	31.9	33.4	35.5

1. INTRODUCTION

In late 2005 the Department for Water, Land and Biodiversity Conservation (DWLBC) commissioned Aquaterra Consulting Pty Ltd (Aquaterra), in partnership with Resource & Environmental Management Pty Ltd (REM) and Australian Water Environments (AWE), to refine an existing DWLBC numeric groundwater model (Border to Lock 3 model) specifically in the Berri – Renmark area. The aim of the project was to provide a management tool for determining salt loads entering the River Murray from the Berri–Cobdogla and Renmark–Chaffey irrigation areas, and to assess a concept design for Salt Interception Schemes (SIS) in these areas. The refined model provided quantitative estimates of salt loads entering the River Murray under a range of past and future land and water use conditions. This work was reported by Aquaterra et al. (2006).

Accreditation of the groundwater model by the Murray-Darling Basin Commission (MDBC) is required for Salinity Register entries. The DWLBC commissioned an independent review of the model by Lisdon Associates based on the MDBC groundwater flow modelling guideline (MDBC 2001) and requirements for MDBC Salinity Register entries. This review (Lisdon Associates 2006) recommended that:

- Salt load estimates from the model should not be used as Salinity Register entries.
- Further work is needed to address model issues related to calibration performance and salt loads in terms of the long–term averages as seen in the River Murray and those modelling recommendations made by Lisdon Associates and DWLBC.

After the model transferred back from Aquaterra in 2005, DWLBC and Aquaterra have made further significant improvements to the groundwater model throughout the Berri and Renmark region. The fundamental objective of the modelling work undertaken has been to improve confidence in the model parameters and results to levels that will enable and assist:

- Accreditation of the model by the MDBC.
- Use of modelled salt loads as Salinity Register entries.

This report summarises the model changes and extensively documents the model inputs and outputs in a format that will assist completion of the MDBC review and accreditation process. The report has two volumes:

- Volume 1 – Report and Figures, which contains the report and key figures depicting the project area, model structure, parameters and model results.
- Volume 2 – Appendices, which contain detailed model inputs (recharge zones and rates) and outputs of groundwater flux and salt loads for the various scenarios modelled.

1.1 POLICY BACKGROUND

In 2001, the Murray-Darling Basin Ministerial Council approved the publication of the Basin Salinity Management Strategy 2001–2015 (BSMS). Similarly, the South Australian Government adopted the River Murray Salinity Strategy 2001–2015 in 2001. These initiatives followed the adoption of the Ministerial Councils' Salinity and Drainage Strategy 1988

(S&DS), taking into account the 1999 Basin Salinity Audit and the National Land and Water Resources Audit.

The objectives of the BSMS are to:

1. Maintain water quality of the shared water resources of the River Murray and River Darling.
2. Control the rise in salt loads in all tributary rivers of the Murray–Darling Basin.
3. Control land degradation and protect important terrestrial ecosystems, protect farmland, cultural heritage and built infrastructure.
4. Maximise net benefits from salinity control across the Basin.

Under the S&DS, 1st January 1988 was adopted as a baseline from which any subsequent actions that affected River Murray salinity were the responsibility of the State in which the action occurred. One of the main components carried forward from the S&DS was the system of salinity credits and debits, however changes were made to the manner in which credits and debits were entered on the Salinity Registers. Under the 1988 Strategy, debits and credits were entered as the impact at 30 years. Within the BSMS, entries onto the register are the average over the 30 years, with the impact at 100 years also recorded. The BSMS allows for any action resulting in an increase in river salinity, such as new irrigation developments to occur, provided that salinity credits, gained by contributing to the funding of salt interception schemes or other measures, are available to offset any salinity debits arising from these accountable actions.

The S&DS has significantly reduced salinity in the River Murray through implementation of salt interception schemes and improved land and water management. The target of restricting river salinity at Morgan below a threshold of 800 EC at least 95% of the time is close to being met. However, the 1999 Salinity Audit highlighted that the future impacts of salt mobilisation, due to further irrigation developments and the effects of dryland salinity, would diminish the achievements of the S&DS unless further action was taken. Consequently, the BSMS commits the partner governments to an initial seven-year investment program of salinity mitigation works and measures to be implemented across the Murray-Darling Basin to deliver 61 EC credits to the river and to offset the States accountable actions.

There are currently five operational salt interception schemes within SA (Woolpunda, Waikerie, Waikerie IIA, Qualco – Sunlands Groundwater Control Scheme and Bookpurnong). The Loxton SIS is currently under construction and further scheme extensions are being investigated in the Woolpunda – Cadell reach near Waikerie, and in the Pike – Murtho area.

SA proposed a credit allocation and cost–sharing methodology on the basis of the model results of the various pre–1988 and post–1988 actions undertaken in each of the areas. The assessment of those impacts is required to be consistent with the reporting requirements of both Schedule ‘C’ of the Murray–Darling Basin Agreement 1992 and the Basin Salinity Management Strategy Operational Protocols 2005.

1.2 BORDER TO LOCK 3 MODELLING BACKGROUND

Figure 1 shows that the model domain (Border to Lock 3 model) is considerably larger than the Berri – Renmark project area. The model domain was designed to cover the entire Riverland area for various projects and also to avoid potential model boundary effects interfering with model results within the project area. The major irrigation districts included in the Border to Lock 3 model are Loxton, Bookpurnong, Pike, Murtho, Berri, Renmark, Kingston, Moorook, New Residence and Pyap. The Border to Lock 3 model has been refined in all areas except Kingston, Moorook, New Residence and Pyap.

The Border to Lock 3 model was developed progressively by DWLBC and its consultants. Australian Water Environments (AWE) undertook preliminary hydrogeological investigations in the Loxton – Bookpurnong area aimed at increasing the knowledge of the hydrogeology in relation to the construction of a SIS in both areas. This work culminated in a submission (DWLBC 2003) to the MDBC High Level Inter–Jurisdictional Working Group on Salt Interception in February 2003 regarding SIS in the Loxton – Bookpurnong area. AWE developed a MODFLOW model of the Loxton – Bookpurnong area in 1999, and developed a more complex model early in 2003 (AWE 2003).

DWLBC commenced further hydrogeological investigations in the Loxton area from mid 2003. One component of these investigations was modelling, and in late 2003 DWLBC took over further development of the model.

By 2004 and 2005, Border to Lock 3 model refinements were concentrated on the Loxton – Bookpurnong and Pike – Murtho areas and on the following model features:

- Replicating the gradient between the highland and floodplain
- Improving modelled potentiometric heads on the floodplain and improving the gradient between the floodplain and the River Murray
- Revising model layer structure contours and simplifying model layers based on all information from old and new investigations.

The model was then used by DWLBC for SIS investigations at Loxton – Bookpurnong and Pike – Murtho areas. The model and results for the Loxton area were reviewed and accredited by MDBC in 2004 and for Bookpurnong in 2005.

Since the model transfer back to DWLBC, DWLBC has made further significant improvements to the Border to Lock 3 model throughout the Pike and Murtho region that address the issues raised by Salient Solutions (2005) and REM–Aquaterra (2005). The fundamental objective of the modelling work has been to improve confidence in the model parameters and results to levels that will enable and assist accreditation of the model by the MDBC. The model and modelled results in the Pike and Murtho areas were reviewed and accredited by MDBC in 2006.

Subsequent to the above model development, DWLBC commissioned Aquaterra in partnership with REM and AWE to refine the Border to Lock 3 model for the Berri – Renmark region in early 2006. The conceptual and numerical models for the Berri and Renmark areas are described by Aquaterra et al. (2006). The model also retained the previous refinements made in the Loxton – Bookpurnong and Pike – Murtho areas in 2006.

The Border to Lock 3 model for the Berri – Renmark area was independently reviewed by Lisdon Associates based on the groundwater modelling guidelines (MDBC 2001) and requirements for MDBC Salinity Register entries in 2006. This review recommended that:

- Salt load estimates from the model should not be used as Salinity Register entries.
- Further work is needed to address model issues related to calibration performance and salt loads in terms of the long–term averages as seen in the River Murray and those modelling recommendations made by Lisdon Associates (2006) and DWLBC.

After transferring the model back to DWLBC in mid 2006, DWLBC and Aquaterra have made further improvements to the model throughout the Berri – Renmark region. Modifications were made to aquifer structure and new estimates of aquifer hydraulic conductivities were applied in the Berri – Renmark area such that it now better matches the declining water level trends observed from the 1980's onwards. The improved calibration addressed some key issues raised by DWLBC, MDBC and Lisdon Associates. The fundamental objective of the modelling work undertaken has been to improve confidence in the model parameters and results to levels that will enable and assist:

- Accreditation of the model by the MDBC.
- Use of modelled salt loads as Salinity Register entries.
- Assist with the broad scale planning of groundwater management schemes (e.g. salt interception scheme – SIS) that will control the flux of saline groundwater (and therefore salt load) entering the River Murray.

This latest version of the Border to Lock 3 model now represents the platform for all future numerical salt load calculation estimates and salt interception concept designs between Lock 6 (SA border) and Lock 3.

1.3 OBJECTIVES

Numerical groundwater flow models enable the creation of a computer based mathematical representation of the conceptual understanding of an aquifer system. The model is a powerful tool for validating the understanding and for predicting the response of the aquifer system to imposed stresses.

The objectives of DWLBC groundwater modelling were to develop an *impact assessment model of moderate complexity* (in the terminology of the Murray-Darling Basin Commission, 2001) capable of simulating the regional aquifer system.

The objectives of this modelling were to:

- Provide additional confidence in the numerical groundwater model (Border to Lock 3 model) and its predictions specifically in the Berri – Renmark area.
- Develop a (processing) time efficient model that could be used to further revise salt loads from accountable actions, resulting from existing and future irrigation development.
- Obtain accreditation of the model (Berri – Renmark area) by the MDBC.
- Calculate modelled salt loads acceptable as Salinity Register entries.
- Develop a model that can be used to assist with broad scale planning of groundwater management schemes (e.g. salt interception) in the near future for the Berri – Renmark Irrigation Trust areas.

2. HYDROGEOLOGY AND HYDROLOGY OF THE BERRI – RENMARK AREA

2.1 LOCATION

The Berri and Renmark irrigation areas are located in the Riverland region of South Australia on the northern side of the River Murray. The Berri and Renmark Irrigation Trust Areas together occupy an area of ~ 230 km^2 (including Cobdogla and Chaffey, Fig. 1). The project area is bounded by the River Murray on the eastern, southern and western sides. Water bodies and irrigation areas are clearly distinguishable on aerial photography (Fig. 2) which also included Transient Electro–Magnetics (TEM) results discussed later in this report (Berens et al. 2004).

2.2 CLIMATE

The Riverland climate is typically characterised by hot, dry summers and cool, wet winters. The mean rainfall in Renmark since 1889 is around 260 mm per annum, with an average annual evaporation rate of ~1750 mm (Bureau of Meteorology, 2006).

The cumulative deviation of annual rainfall from the mean (not shown in this report) shows a predominant trend of below-average rainfall since the high rainfall years of the 1970s (REM–Aquaterra, 2005).

2.3 REGIONAL HYDROGEOLOGY

The Murray Basin is a closed groundwater basin containing Cainozoic unconsolidated sediments and sedimentary rock up to 600 m in thickness, and contains a number of regional aquifer systems (Evans and Kellet, 1989).

Within the study area, there are three aquifer systems of significance - Monoman Formation, Loxton Sands and Murray Group Limestone (see hydrogeological cross section in Fig. 3).

In the highland areas, a perched water table can occur within the Woorinen Formation above the Blanchetown Clay, whilst the main water table aquifer occurs in the underlying Loxton Sands. This aquifer forms a regionally extensive unconfined to semi-confined aquifer, into which the channel of the ancestral River Murray is incised. Within this channel, the semi-confined Monoman Sands aquifer has been deposited. The Loxton Sands aquifer and the Monoman Sands aquifer are considered to be in direct hydraulic communication in the study area.

Other important geological units are the clayey sediments of the Coonambidgal Formation which overlie the Monoman Sands on the river floodplain, and the Bookpurnong Beds aquitard which separates the Loxton Sands/Monoman Sands water table aquifer from the underlying confined Murray Group Limestone aquifer. A hydrostratigraphic table is given in Appendix C–1.

Within the Berri and Renmark Land and Water Management Plan areas, the groundwater flow direction in all aquifers of interest is generally towards the floodplain, Lake Bonney and the River Murray. The river, its anabranches and Lake Bonney behave as a sink for regional groundwater in the study area.

Saline groundwater (up to 40 000 mg/L) enters the River Murray by lateral flow from the Loxton Sands and Monoman Sands and by slow upward leakage through the Bookpurnong Formation from the underlying confined regional Murray Group Limestone, by the following pathways:

1. Direct inflow via seepage from exposed Loxton Sands at or near the base of cliffs adjacent to the River Murray.
2. Discharge from the Monoman Sands that act as a conduit for lateral flow from the Loxton Sands (and upward leakage from the Murray Group Limestone) underlying the floodplains.
3. Discharge from the Monoman Sands and localised hypersaline lakes (salinas), often at the back of the floodplain, that deliver high salt loads during and after periods of flood.
4. Slow upward leakage through the Bookpurnong Formation from the underlying confined Murray Group Limestone aquifer.

These processes are summarised in an idealised conceptual hydrogeological model (Fig. 4).

Groundwater discharge subsequently occurs either directly to the River Murray (or one of its backwaters or anabranches) through the Loxton Sands or Monoman Sands aquifer, or through evapotranspiration. Typical rates of evapotranspiration from the floodplain are 250 mm/yr (Holland et al., 2001). With reference to upward leakage from the Murray Group Limestone, REM-Aquaterra (2005) concluded "upward gradients are interpreted to exist across the project area providing a potential for the upward movement of groundwater from the Murray Group Limestone. However, the rate of upward leakage is expected to be low (relative to other vertical fluxes) because of the presence of a thick confining layer (combination of Lower Loxton Clays and Bookpurnong Beds)." It was also noted that "The project steering committee for this project has agreed that the Murray Group Limestone unit is unlikely to make a significant contribution to the salt load to the River Murray relative to the Loxton Sands aquifer, on the basis that the Lower Loxton Clay – Bookpurnong Beds aquitard provides a barrier to vertical flow. Consequently, structure contours and thickness are not presented for the various sub-units that lie within the Murray Group."

As anecdotal evidence indicates that only minor seepage occurs from cliff faces in the study area, it can be seen that lateral flow from the Loxton Sands aquifer is the main mechanism for saline groundwater discharge to the River Murray.

It should also be noted that within the eastern part of the project area, there is no current evidence that the River Murray is in direct contact with the Murray Group Limestone. However in the western part of the project area, downstream of Loxton, erosion of the Bookpurnong Beds has created a direct vertical connection of the river valley (Monoman Sands) with the underlying Murray Group Limestone. The Loxton Sands Aquifer maintains lateral connection with the river valley throughout the entire project area.

These factors confirm that the Loxton Sands and Monoman Sands aquifers contribute the majority of the salt load to the River Murray, and thus are the appropriate target aquifers for assessment of salt load in the Berri – Renmark region.

The schematic diagram of the Berri – Renmark conceptual hydrogeological model is presented in Figure 4 (Aquaterra et al. 2006). The figure highlights the regional groundwater flow directions and leakage between the various hydrogeological units.

2.4 HYDROGEOLOGICAL UNITS

Each of the various hydrogeological units, as shown in Appendix C–1, are discussed in order of increasing depth below ground surface.

2.4.1 WOORINEN FORMATION

The Woorinen Formation provides a thin capping of Quaternary sediments about 5 m thick across the highlands of the project area (Aquaterra et al. 2006). The Woorinen Formation is generally unsaturated in the project area.

2.4.2 COONAMBIDGAL FORMATION

The Coonambidgal Formation occurs extensively across the floodplain and comprises clay and silts deposited during periods of episodic flooding (Yan et al. 2005).

Previous drilling has indicated the unit can vary in thickness from 1 to 9 m across the floodplains. It is likely that, similar to floodplains in the Berri and Renmark regions, the greater thicknesses would be observed at or near the break in slope between the floodplain and highland.

2.4.3 MONOMAN FORMATION

On the floodplain, the Monoman Sands lie beneath the Coonambidgal Formation clay and above the regional aquitard of the Lower Loxton Clay/ Bookpurnong Beds or upper sequences of Murray Group Limestone where the Bookpurnong Beds are absent.

Typically, the Monoman Sands comprise a mixture of channel and sheet sand deposits with intervening sequences of silty clay. This is likely to result in highly variable transmissivity throughout the floodplain similar to that encountered in the Loxton – Bookpurnong investigations. Floodplain drilling carried out by REM in December 2004 included the Pike-Mundic, Woolenook Bend, and Gurra Gurra areas of the floodplain. Drilling revealed that the thickness of the Monoman Sands ranges between 7–19 m (REM-Aquaterra, 2005).

The data from the drilling program also indicated the Monoman Sands tended to become thicker upstream, coupled with the possibility of an increase in the likelihood of the Monoman Sands directly overlying the Loxton Sands. This would thereby increase the total aquifer thickness upstream, however it is noted that visually it is very difficult to identify the boundary at the bottom of the Monoman Sands.

There is not sufficient data to reliably construct groundwater elevation contours for the Monoman Sands aquifer for the entire length of the floodplain within the project area. However, there are observations regarding groundwater flow in the floodplain aquifers between Lock 6 and Lock 3, which are likely to be relevant to the project area. The primary observation within the REM (2003) study was that regional scale flow through the floodplain aquifers is complicated by interaction with weir pools, groundwater mounds in irrigation areas, localised evapotranspiration and interaction with surface water. It is expected that all of these processes will be relevant to the project area (REM-Aquaterra, 2005).

Due to its semi-unconfined nature and hydraulic connection, the potentiometric surface for the Monoman Sands for 1988 and 2000 has been merged with the Loxton Sands and is presented in Figure 5a and Figure 5b respectively. This is discussed in further detail in section 2.4.5.

2.4.4 BLANCHETOWN CLAY

The Blanchetown Clay aquitard occurs sporadically throughout the region. Due to its laucustrine environment of deposition, it can grade from a silty soft clay with poor plasticity and low density, to a hard dense clay with high plasticity.

The Blanchetown Clay is absent across the floodplain and in large low-lying areas to the northwest of Renmark. The clay is also absent in discrete pockets throughout the project area.

2.4.5 LOXTON SANDS

The Loxton Sands have been eroded across the floodplain but are present throughout the highland areas, often exposed in cliff faces within the project area. The Loxton Sands generally comprise three main lithofacies: (1) an Upper Loxton Sand facies dominated by pale yellow/grey medium to coarse grained sand; (2) a Lower Loxton Sand facies dominated by greyish coarse grained sand and gravel; and (3) a Lower Loxton Shells facies dominated by remnant fossiliferous shell beds. It is difficult to confirm the lateral extent of each facies across the project area (particularly the Lower Loxton Shells), as driller's descriptions of lithology in many of the older wells fail to identify these three facies' variants. Additionally, one of the recent wells (Unit Number 7029–2016) drilled by DWLBC during the 2004 program did not intersect the Lower Loxton Shells facies, indicating that this unit is not necessarily continuous across the project area.

The recent drilling program carried out by DWLBC clearly differentiated the various facies' units within the Loxton Sands. The need to distinguish these units is important. Although the Lower Loxton Sands (as a whole) is generally considered to be a less permeable unit than the Upper Loxton Sand, the "upper" part of the Lower Loxton Sand in the Berri – Renmark region contains well-sorted marginal marine sands that grade downward to the finer Lower Loxton Clay (REM-Aquaterra, 2005).

Any potential salinity mitigation strategy for the highland area is likely to target the Loxton Sands because of the favourable hydraulic properties, the relatively large saturated thickness and the elevation of this sub-unit with respect to river pool levels. The top of the Loxton Sands group sits at an elevation of more than 60 m AHD in the northeast portion of the project area and 20 m AHD in the southwest portion of the project area beneath Berri Township. These sediments thin along a northeast / southwest axis. Thickness ranges from greater than 80 m in the northeast part of the project area to ~30 m in the southwest portion of the project area beneath Berri (REM-Aquaterra, 2005).

Figure 5a and 5b show that groundwater flow in the Loxton–Parilla Sands aquifer is dominated by the groundwater mound that has developed due to recharge of excess irrigation water in a wide corridor from Berri to Cobdogla. This mound, which is at a height of approximately 7 to 8 metres above river level, has created hydraulic gradients that drive groundwater flow towards the River Murray. In the north-west, groundwater flow is directed towards Lake Bonney.

Beneath the Renmark irrigation area, a groundwater mound of about two metres above river level has developed with groundwater flow being directed eastwards towards Ral Ral Creek and the River Murray and to the south-west. The mound is lower than the mound at Berri–Cobdogla due to the low topography as well as the influence of drainage schemes (Aquaterra et al. 2006).

Groundwater salinity values in the Monoman Sands and Loxton Sands vary dramatically across the study area as shown in Figure 6, which is believed to reflect both the impact of lower salinity irrigation water on the more saline native groundwater and evaporative effects on the floodplain. In the Loxton Sands, values range from as low as 1000 mg/L (close to the river and under certain irrigation areas), to over 50 000 mg/L. The Monoman Sands aquifer is generally fresher, however it still exhibits large salinity ranges similar to the Loxton Sands.

2.4.6 BOOKPURNONG BEDS

The Lower Loxton Clay and the Bookpurnong Beds, whilst recognised as discrete stratigraphic units, form the major low permeability confining bed throughout the region separating the Murray Group Limestone and Loxton Sands aquifers. This aquitard primarily dips downward gently from southwest to northeast. South of Renmark towards Berri, the top surface of the sediments reach an elevation of 0 m AHD beneath the river, but this surface dips to an elevation of -25 m AHD to the east and -15 m AHD to the west. A maximum thickness of 30 m is attained in this sequence of sediments south of Renmark, thinning to the north and west of the project area to 10 m (REM-Aquaterra, 2005).

2.4.7 MURRAY GROUP LIMESTONE

As mentioned in section 2.3, REM-Aquaterra (2005) reported that the Murray Group Limestone (MGL) aquifer is unlikely to contribute a significant salt load to the River Murray in comparison with the Loxton Sands aquifer. This is because the Loxton Sands are hydraulically connected to floodplain sediments or are in direct contact with the River, whereas the MGL is separated by the Bookpurnong Beds from the River (at least in the eastern part of the project area). The various sub-units that exist within the MGL may thus be packaged together for numerical modelling purposes.

It is likely that the majority of the observation wells completed in the Murray Group Limestone are completed in the Pata Formation, simply due to the fact that it is the first aquifer unit intersected within the group.

REM-Aquaterra (2005) created structure contours for the top of the Murray Group litho-facies (Pata Formation) and found that the sediments are generally dipping along an approximate southwest / northeast axis. In the southeast part of the study area near Lock 4, the elevation of the top of the Murray Group is -15 m AHD, dipping down to an elevation of -50 m AHD near Lindsay Point in the North West.

Contours of potentiometric surface elevation for the Murray Group Limestone (around 1990) are presented in Figure 7. Regional groundwater flow (Barnett, 1991) occurs toward the river in the west of the project area and from the east to the west and southwest.

The groundwater contours suggest that the Murray Group Limestone does not interact significantly with the river or the groundwater mounds within the Loxton Sands in the project area.

2.5 SUMMARY OF AQUIFER TEST RESULTS

REM-Aquaterra (2005) summarised all aquifer test results in the Pike–Murtho area, which is located on the Eastern side of the river (opposite the Berri – Renmark area). The aquifer test results are presented in Appendix C-3 of Yan et al., (2006).

The primary conclusion from the aquifer tests relevant to this project is that the Lower Loxton Sands aquifer can behave as a semi–confined aquifer. Leakage occurs either downward from the Upper Loxton Sands aquifer or upward from the Lower Loxton Clays. It is reasonable to expect a semi-confined response given that the screen intervals on the observation wells are generally small (six to nine metres) in comparison to the saturated thickness of the Loxton Sands aquifer (a unit with variable lithology). Hydraulic conductivity values within the range of ~1 to ~5 m/d for the Lower Loxton Sands aquifer would seem representative (REM-Aquaterra, 2005).

At the time of writing there had only been one aquifer test analysed for the Monoman Sands in the Berri – Renmark region (which yielded a hydraulic conductivity of 18 m/d). However, there have been at least 37 tests of the same nature conducted in the Loxton – Bookpurnong area floodplain aquifer.

Howles and Smith (2005) reported on the Monoman Sands aquifer parameters (on the three major floodplains adjacent to Loxton):

- Transmissivity values (generally) of 50 to 600 m^2/day, with the most common value 100–200 m^2/day, however there may be ancient channels where the transmissivity may be much higher.
- Hydraulic conductivity values of 10 to 120 m/day, with the most common value 30–40 m/day.
- Confined storage coefficient values of $1.0x10^{-4}$ to $1.4x10^{-3}$, with the most common value $4x10^{-4}$ to $8x10^{-4}$, although there are areas where the storage coefficient may be higher.

2.6 GROUNDWATER SALINITY

All available field salinity values, within zones of four km from the River Valley and from the Loxton Sands and Monoman Formation aquifers, in the Berri – Renmark area, were considered in order to characterise the salinity of groundwater entering the River Murray and its anabranches.

The model flow budget zone boundaries were adopted from previous work (Aquaterrra 2006), however, the salinity values applied have been reviewed during the current project. The product of the modelled fluxes and salinity gives modelled salt loads. Figure 8a and Figure 8b shows the derived model flow budget zones and the salinities that were applied in the calculation of the salt load for the Berri and Renmark areas respectively.

Mr Don Armstrong (Lisdon Associates) conducted a statistical analysis and frequency distribution on the available salinity data (Section 7.2). He identified the presence of two distinct salinity populations:

- Irrigation return seepage water with TDS less than 10 000 mg/L and
- Native groundwater ranging up to in excess of 60 000 mg/L TDS.

This was more noticeable in the Renmark area where a groundwater mound consisting of relatively fresh irrigation drainage water has formed.

A sensitivity analysis has been completed (Section 6.1.3) that compares salt loads calculated from various statistically derived salinity inputs.

There are few groundwater salinity values for the Murray Group Limestone aquifer, but they show a wide range in salinity from 10 000 to greater than 50 000 mg/L TDS (REM-Aquaterra, 2005).

2.7 REGIONAL HYDROLOGY

Where shallow hydraulic gradients exist towards groundwater discharge points in the form of surface water features, it is obvious that surface water elevations play a critical role in determining how much groundwater will be discharged. Therefore a thorough understanding of the regional hydrology is required of the study area.

The weirs at Locks 3, 4, 5 and 6 provide the primary controls on the water level in the main river channel. The elevation between the upper weir pool at Lock 6 (near the upstream extent of the project area) and the upper weir pool at Lock 3 ranges from 19.2 to 9.8 m AHD.

Surface water control structures are in place on some anabranches. Ral Ral Creek is an anabranch of the River Murray located to the northeast of the Renmark irrigation area. It begins just below Lock 6 near Chowilla and rejoins the main river upstream of Lock 5. The pool level in Ral Ral Creek is the same as in the River in this reach, ~16.3 m AHD.

The Berri area borders the floodplain area that is filled with a complex network of anabranches, lagoons, evaporation basins and backwaters. Lake Bonney occupies ~19km^2 adjacent to the river channel on the northwest corner of the project area with a water elevation of 9.8 m AHD.

3. MODEL CONSTRUCTION

3.1 MODFLOW AND VISUAL MODFLOW

MODFLOW is a three–dimensional finite difference mathematical code that was developed by the US Geological Survey (McDonald and Harbaugh 1988). Visual MODFLOW Version 4.1.0.145 was developed by Waterloo Hydrogeologic Inc. in recent years and is a pre-processor for quick generation of data files for MODFLOW.

Visual MODFLOW was used as a tool for generating MODFLOW model grids, boundary conditions, observation well data and zones for aquifer hydraulic parameters. The software was also used for establishing settings to run the model, and to obtain quick and convenient output results. The PCG2 solver was used for all steady state and transient modelling runs.

3.2 MODEL DOMAIN AND GRID

The model domain simulates an area 75 km (east–west) by 78.3 km (north–south). The bounding AMG coordinates of the model domain are (southwest) E425122 N6160180 and (northeast) E500122 N6238500 (GDA 1994) (Fig. 9).

The selection of a large model domain that incorporates the smaller study area is consistent with good modelling practice. The model domain boundaries are set at a sufficient distance from the study area such that they do not influence the behaviour of the aquifer system in the study area.

The rectangular model grid was divided into 434 columns and 472 rows. The minimum grid size is 125 x 125 m in the Berri - Renmark area. The maximum grid size is 250 x 250 m in the remaining model area (Fig. 10).

3.3 MODEL LAYERS IN BERRI - RENMARK AREAS

After the model transfer back from Aquaterra et al. (2006), no changes were made to any of the model layers and structure contours.

MODFLOW layer options are given in Table 1.

Table 1. MODFLOW layer types

Layer type	Aquifer type	Aquifer hydraulic parameters
Type-0	Confined	Transmissivity and storage coefficient (specific storage, Ss) are constant.
Type-1	Unconfined	Transmissivity varies and is calculated from saturated thickness and hydraulic conductivity. The storage coefficient (specific yield, Sy) is constant. Type-1 is only valid for the uppermost layer of a model.
Type-2	Confined/ Unconfined	Transmissivity is constant - the storage coefficient may alternate between values applicable to the confined (Ss) or unconfined (Sy) states.
Type-3	Confined/ Unconfined	Transmissivity varies and is calculated from the saturated thickness and hydraulic conductivity. The storage coefficient may alternate between values applicable to the confined (Ss) or unconfined (Sy) state.

To summarise the discussion below, the regional aquifer system in the Berri – Renmark area was conceptualised as a five layer model, including four aquifer layers and one aquitard layer (Fig. 11, Table 2). The model grid was applied to the five layers resulting in 1,024,240 finite difference cells.

Table 2. Model layer aquifers and aquitards

Layer No	Hydrogeological unit	Aquifer / aquitard	MODFLOW layer
1	Loxton Sands, Monoman Formation	Aquifer	Type-1
2	Lower Loxton Clay and Shells, Bookpurnong Formation	Aquitard	Type-3
3	Pata Formation	Aquifer	Type-3
-	Winnambool Formation	Aquitard	Simulated as leakage
4	Glenforslan Formation	Aquifer	Type-0
-	Finnis Formation	Aquitard	Simulated as leakage
5	Mannum Formation	Aquifer	Type-0

Simplifying model geometry by reducing the number of model layers can reduce the input data set requirements, helping to avoid complications, reduce numerical errors, and speed up the model calculation process. According to McDonald and Harbaugh (1988), aquitards can be simulated as actual layers between aquifers when calculating vertical leakage, or simulated as vertical leakage between aquifers without an actual layer in the model (provided storage in the aquitards is not important). Without an aquitard layer, the vertical leakage will be calculated using the vertical hydraulic conductivity values, and thickness of the overlying and underlying layers. The method of using vertical leakage to simulate aquitards can be used where the aquitard layers are relatively thin and uniformly distributed.

In the model area, the Winnambool Formation aquitard is only ~3 m thick, and the Finnis Formation aquitard is uniformly less than 5 m in thickness. These aquitards can be merged into the underlying/overlying aquifers, and vertical hydraulic conductivity values in the aquifer layers can be used to calculate the vertical leakage between the aquifers.

According to modelled and observed data reported in Yan et al. (2005), the head difference between the Upper Mannum Formation and Lower Mannum Formation is very small in the project area. As there are three aquifers (Glenforslan Formation, Pata Formation and Monoman Formation) in the vertical profile between the Mannum Formation and the River Murray, upward leakage from the Mannum Formation will be very similar if the upper and lower units of the Mannum Formation are merged into one layer in the model.

3.3.1 GROUND SURFACE (IN BERRI–RENMARK)

The Department of Environment and Heritage (DEH) provided regional elevation data. Ground surface elevation is given in Figure 12. The elevation of the floodplain is ~15–20 m AHD and the elevation of the highland is ~30–80 m AHD in the project area.

3.3.2 LAYER 1 (IN BERRI–RENMARK): LOXTON SANDS, MONOMAN FORMATION AQUIFER

Layer 1 represents the Loxton Sands unconfined/semi-unconfined aquifer and the Monoman Formation semi-unconfined/semi-confined aquifer:

1. In the highland area the unconfined aquifer is represented by the Loxton Sands. The base of Layer 1 is the base of the Loxton Sands.
2. The Monoman Formation represents the bulk of the unconfined aquifer in the River Murray floodplain. In reality, the Monoman Formation occurs in the unconfined / semi-confined state depending on the thickness and competence of the overlying Coonambidgal Formation. The representation of the Monoman Formation in the model as an unconfined aquifer results in the maximum flux of saline groundwater entering the river, and the most conservative (SIS) wellfield design in terms of production well spacing and pumping rates. Regardless of the actual state of confinement of the Monoman Formation, when production wells are pumped, the aquifer becomes unconfined to some radial distance from the production well. The base of Layer 1 (top of Layer 2) is the base of the Monoman Formation.
3. Base elevations were determined from geological and geophysical logs and extrapolation of these values. The elevation of the base of Layer 1 (top of Layer 2) occurs from between -30 and 45 m AHD in the model domain (Fig. 13).
4. The representation of Layer 1 as a Modflow Type-1 layer (unconfined) results in conservative behaviour when concept design wellfields are applied in the model.
5. The Blanchetown Clay has not been modelled as the effect of this aquitard in perching water is accounted for by controlling the time lag and recharge rate to the Loxton Sands groundwater table (refer to section 3.6).

3.3.3 LAYER 2 (IN BERRI–RENMARK): LOWER LOXTON CLAY AND SHELLS, BOOKPURNONG FORMATION AQUITARD

Layer 2 represents the Lower Loxton Clay and Shells and Bookpurnong Formation aquitard:

1. In the highland area, Layer 2 represents the Lower Loxton Clay and Shells and Bookpurnong Formation. The base of Layer 2 is the base of the Bookpurnong Formation.
2. In the River Murray valley, Layer 2 represents the Bookpurnong Formation. The base of Layer 2 is the base of the Bookpurnong Formation.
3. Base elevations were interpreted from geological and geophysical logs and the extrapolation of these values. Layer 2 has a thickness of 5–30 m. The base elevation of Layer 2 (top of Layer 3) occurs between -55 and 40 m AHD in the model domain (Fig. 14).

3.3.4 LAYER 3 (IN BERRI–RENMARK): PATA FORMATION AQUIFER

Layer 3 represents the regionally distributed Pata Formation semi-confined low permeability aquifer. The base elevation of Layer 3 was interpreted from geological and geophysical logs and extrapolation of these values, and by examination of cross-sections similar to the one given in Figure 3. Layer 3 has a thickness of 2–10 m. The base elevation of Layer 3 (top of Layer 4) occurs between -65 and 40 m AHD in the model domain (Fig. 15).

3.3.5 WINNAMBOOL FORMATION AQUITARD

The Winnambool Formation vertical hydraulic conductivity was applied to the Pata Formation (layer 3) and the upper part of the Glenforslan Formation (layer 4) to allow calculation of the leakage between these aquifers. This modelling method simulates the effect of the Winnambool Formation.

3.3.6 LAYER 4 (IN BERRI–RENMARK): GLENFORSLAN FORMATION AQUIFER

Layer 4 represents the regionally distributed Glenforslan Formation semi-confined, low permeability aquifer. Thickness of Layer 4 (~25 m) was taken from AWE (2003). The base elevation of Layer 4 (top of layer 5) occurs between -90 and 15 m AHD in the model domain (Fig. 16).

3.3.7 FINNIS FORMATION AQUITARD

The Finnis Formation vertical hydraulic conductivity was applied to the lower part of the Glenforslan Formation (layer 4), and is combined with the specified vertical hydraulic conductivity of the Mannum Formation (layer 5), to allow calculation of the leakage between these aquifers. This modelling method simulates the effect of mainly vertical flow through the Finnis Formation.

3.3.8 LAYER 5 (IN BERRI–RENMARK): MANNUM FORMATION AQUIFER

Layer 5 represents the regionally distributed Mannum Formation confined moderate permeability aquifer. Layer 5 has a thickness of 80 m, taken from AWE (2003). The base elevation of layer 5 occurs between -200 and -75 m AHD in the model domain (Fig. 17).

3.4 MODEL HYDRAULIC PARAMETERS (IN BERRI–RENMARK)

In order to constrain the model calibration, a physically realistic range of aquifer and aquitard hydraulic parameters were derived from previous reports, and referenced to current pumping tests.

Spatial variability in aquifer hydraulic properties was modified in specific areas during both steady state and transient calibration to achieve the final values required for accurate calibration. The final aquifer and aquitard hydraulic parameters are given in Table 3, with their spatial distribution within each layer given in Figures 18–23. Note that the aquifer distributions for layers 2 to 5 are unchanged from the model described in the Yan et al. (2006) report. However, Layer 1 (Loxton Sands and Moroman formation) aquifer parameters have been updated for the Berri – Renmark (north) side of the river to achieve calibration in the project area.

Table 3. Calibrated aquifer and aquitard hydraulic parameters in the project area (Berri-Renmark)

Aquifer / aquitard	Layer	Hydraulic conductivity		Storage	
		Kh (m/day)	**Kv** (m/day)	**Sy** (-)	**Ss** (/m)
Loxton Sands[1]	1	0.5–5	0.1	0.15–0.2	
Monoman Formation	1	15	0.15	0.15	
Bookpurnong Formation	2	0.006	0.002		$1x10^{-4}$
Pata Formation	1, 2, 3	0.5	$5x10^{-5}$ – $1x10^{-4}$		$1x10^{-4}$
Winnambool Formation			*		
Glenforslan Formation	4	1.5–2	$5x10^{-4}$ – $2x10^{-4}$		$1x10^{-4}$
Finnis Formation			*		
Mannum Formation	5	1–2	0.2		$5x10^{-5}$

[1] Loxton Sands Aquifer Parameters for the Berri - Renmark area only (north side of river). Please refer to Yan et al. 2006 for aquifer parameters on the south side of the river.

* Vertical leakance calculated by the model for each cell

3.4.1 AQUIFER HYDRAULIC PARAMETERS

Aquifer hydraulic parameters in the Berri and Renmark area, as refined by further calibration, include:

1. A horizontal hydraulic conductivity of 15 m/day, and a specific yield of 0.15 for the Monoman Formation. Horizontal hydraulic conductivity values remain very close to (and within the same order of magnitude) as values determined from pumping tests (20–40 m/day). Due to the representation of the Monoman Formation in the model as an unconfined aquifer, confined storage coefficient values determined from pumping tests are not applicable.
2. Horizontal hydraulic conductivities of 0.5–5 m/day, and a specific yield of 0.15 for the Loxton Sands resulted in the best fit to the observed (historic) potentiometric head data. The range of horizontal hydraulic conductivity values are well within the range determined from previous pumping tests. In 2005, REM determined a Kh range between 0.3 to 4 m/day for the Loxton-Parilla sands during a series of pump tests for the Pike - Murtho study (REM-Aquaterra 2005).
3. Pata and Glenforslan Formation aquifer hydraulic parameters are unchanged from the previous modelling report by Yan et al. (2006).

3.4.2 AQUITARD HYDRAULIC PARAMETERS

Aquitard hydraulic parameters were applied to control the upward and downward leakage between the Loxton Sands, Monoman Formation, and the Pata Formation:

Due to the relative scarcity of data in the project area, layer parameters were adopted from pumping tests done in the Loxton-Bookpurnong and Pike-Murtho project areas and nearby areas.

1. Bookpurnong Formation vertical hydraulic conductivity was obtained from reference to pumping tests (vertical hydraulic conductivity range $1x10^{-3}$ to $5x10^{-3}$ m/day) in the Loxton area.
2. Winnambool Formation vertical hydraulic conductivity was obtained from reference to pumping tests (vertical hydraulic conductivity range $1x10^{-5}$ to $1x10^{-3}$ m/day) in the Loxton area.
3. Finnis Formation parameters were adopted from Yan et al. (2005). The pumping tests were undertaken in the Loxton area (vertical hydraulic conductivity range $1x10^{-5}$ – $1x10^{-4}$ m/day).

3.5 MODEL BOUNDARIES

The five-layer model has a complex structure, and different boundary conditions were applied to simulate the aquifer system, River Murray, and their hydraulic communication.

3.5.1 LAYER 1: LOXTON SANDS AND MONOMAN FORMATION

The regional groundwater flow is generally from the eastern model edge to the River Murray within the model domain with groundwater flux discharging to the River Murray. Where the aquifers are laterally continuous, groundwater flows from the Loxton Sands into the Monoman Formation, and then discharges to the river. The following boundary conditions were applied to layer 1 (Fig. 24):

1. No-flow boundaries where groundwater flow is parallel to the model edge.
2. General head (head dependent flow) boundaries simulate groundwater flow on the model edges where flow occurs into and out of the model.
3. Constant head boundary cells simulate the River Murray (river stage AHD):
   a. 19.2 m AHD upstream Lock 6
   b. 16.3 m AHD Lock 6 to Lock 5
   c. 13.2 m AHD Lock 5 to Lock 4
   d. 9.8 m AHD Lock 4 to Lock 3
   e. 6.1 m AHD downstream Lock 3.
5. In the project area, model river cells simulate anabranch creeks on the floodplain including Ral Ral creek (stage of 16.3m AHD) and Bookmark Creek (stage of 13.3 to 16.3m AHD) in the Renmark area.
6. River cells simulate Lake Bonney (stage of 9.8m AHD).
7. Drainage cells represent the Comprehensive Drainage Scheme (CDS) at Berri and Renmark to control the groundwater table if it rises to the elevation of the CDS. The drain elevations at Berri were set at 23m AHD for all time, however the drain elevations at Renmark reduce from 19m and 20m AHD to 17.5m and 18.5m AHD respectively to represent commissioning of the CDS in 1945.

8. Drainage cells in the floodplain near the Berri – Renmark area to represent all the disposal/evaporation basins including Disher creek, Berri Evaporation Basin etc.
9. In the project area, model drainage cells simulate groundwater seepage discharges from the interface between the highland and the floodplain.
10. Drain cells represent individual caissons in the Berri – Renmark area. See section 3.7 for further detail.

Aside: The Berri – Renmark Comprehensive Drainage System (CDS)

The CDS was constructed to control the perched groundwater table that developed above the Blanchetown Clay. There is no requirement for the Blanchetown Clay to be simulated in the model for historical runs, as the effect of this aquitard in perching water is accounted for by controlling the recharge rate and lag times to the Loxton Sands, where the true groundwater table occurs.

However, the model does require control of the groundwater table during predictive modelling runs, to account for the possibility that the groundwater mound in the Loxton Sands reaches an elevation where the CDS would provide control. This control is provided by using drain cells throughout the area where the CDS occurs to control the groundwater table if it rises to the elevation of the CDS.

3.5.2 LAYER 2: LOWER LOXTON CLAY AND SHELLS AND BOOKPURNONG FORMATION

Very small volumes of water move laterally into and out of this layer due to its low permeability. The following boundary conditions were applied to layer 2 (Fig. 25).

1. No-flow boundaries were used at the model edges.
2. Some constant head boundaries were used in the western area (different project area) of the model where the River Murray is assumed to be in hydraulic connection with the Pata Formation.

3.5.3 LAYER 3: PATA FORMATION

Regional groundwater flow is from the model edge to the River Murray within the model domain. The following boundary conditions were applied to layer 3 (Fig. 26).

1. No-flow boundaries where groundwater flow is parallel to the model edge.
2. General head boundaries were used at the model edges to simulate groundwater flow into the model.
3. Constant head boundaries were used in the western area of the model where the River Murray is assumed to be in hydraulic connection with the Pata Formation. The following Constant head boundary cell elevations simulate the River Murray (river stage):
    a. 9.8 m AHD upstream Lock 3
    b. 6.1 m AHD downstream Lock 3

3.5.4 LAYER 4: GLENFORSLAN FORMATION

Regional groundwater flow is from the model edge to the River Murray within the model domain. The following boundary conditions were applied to layer 4 (Fig. 27).

1. No-flow boundaries where groundwater flow is parallel to the model edge.
2. General head boundaries were used at the model edges to simulate groundwater flow into and out of the model.
3. Constant head boundaries were used in the western area of the model where the River Murray is assumed to be in hydraulic connection with the Glenforslan Formation. The following Constant head boundary cells simulate the River Murray (river stage):

   a. 9.8 m AHD upstream Lock 3
   b. 6.1 m AHD downstream Lock 3

3.5.5 LAYER 5: MANNUM FORMATION

Regional groundwater flow is from the model edge to the River Murray within the model domain. The following boundary conditions were applied to layer 5 (Fig. 28).

1. No-flow boundaries where groundwater flow is parallel to the model edge.
2. General head boundaries were used at the model edges to simulate groundwater flow into the model.
3. Constant head boundaries (6.1 m AHD) were used in the western area of the model where the River Murray is assumed to be in hydraulic connection with the Mannum Formation.

3.6 MODEL RECHARGE

The Berri – Renmark area has a semi-arid climate with hot dry summers and some rainfall during winter months. The average rainfall is ~400 mm/year with pan evaporation of ~2000 mm/year.

Prior to clearance of the native vegetation on the highland, vertical recharge to the water table aquifer resulting from rainfall infiltration is believed to have been as low as 0.07–0.1 mm/year (Allison et al. 1990). A recharge rate of 0.07–0.1mm/year was applied in the steady state model, and to the non-cleared and non-irrigated areas in the transient model.

3.6.1 RECHARGE DUE TO MALLEE CLEARANCE

The widespread clearance of native vegetation in the dryland region of the project area has resulted in an increased rate of rainfall drainage past the root zone to the water table aquifer.

In the model domain, recharge zones (41 zones) and rates (from 0.1 up to 11 mm/year) for Mallee clearance areas have been supplied by DEH. The zones and rates (Fig. 29, App. A–1) were based on recent studies by CSIRO (Cook et al. 2004) and DEH using SIMRAT and SIMPACT models. Time lags and recharge rates to the water table aquifer were estimated using information on soil type, depth to groundwater and thickness of Blanchetown Clay. The Mallee clearance was assumed to have started in 1920.

3.6.2 REGIONAL ASSUMPTIONS ON RECHARGE DUE TO IRRIGATION

The recharge zones and recharge rates due to irrigation in the Berri and Renmark Irrigation Trust Areas were initially adopted from Aquaterra et al. (2006). Aquaterra provided the following information regarding this issue:

- The irrigation recharge analysis began with consideration of GIS information provided by Matt Miles (DEH) and AWE in the form of DXF files of areas irrigated at specific milestones (1920, 1940, 1955, 1960, 1970, 1988, 1997, 1999, 2001 and 2003). Figure 30 gives a broad indication of the pattern of irrigation starting years. This identified the areas that could potentially have specified recharge rates applied to the model (Aquaterra et al. 2006).
- Recharge rates for irrigation districts have been estimated based on known application volumes and estimated irrigation efficiencies. Application rates were sourced from various irrigation trusts, indicating the amount of water diverted from the River Murray with time. The water diverted was then assumed to be uniformly applied at a rate per hectare across the irrigation districts.
- An assumption of 15% root zone drainage for all time periods has been made since it is believed to effectively integrate water use efficiency improvements and farm management practises appropriately on a regional scale.
- The specification of the recharge flux to the water table is dependant on the applicable time lag between irrigation application to the land and the root zone drainage to the water table. Matt Miles (DEH) provided initial estimates of time lags under irrigation areas from the SIMRAT model assuming a 120 mm/year recharge rate. The lags were zoned and applied to the numerical model (Aquaterra et al. 2006).

Recharge due to irrigation is complex to define because there is considerable uncertainty relating to commencement time of irrigation flux to the surface and the time for the flux to reach the water table. It is accepted that the values reported by Aquaterra and DEH involve the application of professional judgement in their derivation.

These recharge zones and rates have been further modified (Figure 31a for the Berri area and Figure 31b for the Renmark area) during the latest calibration process to better match the modelled water levels to the observed potentiometric heads throughout the aquifer system.

After Aquaterra's modelling in 2006, DWLBC have made the following changes:

1. *Model recharge rates:* Modelled recharge rates in some areas were adjusted during the re-calibration process to better match the trend seen in the groundwater system. Recharge zones in the irrigation areas can be seen in Figures 31a–31b, whilst irrigation start times and lag times for each zone are included in Appendix A.
2. *Caissons:* Information relating to caisson locations and effects on the water table system was unknown to Aquaterra during the initial calibration phase. Caissons in the Berri – Renmark area have now been carefully considered and are discussed further in section 3.7.

3.6.3 RECHARGE IN THE BERRI – RENMARK AREA

3.6.3.1 Recharge in the Berri area

It is believed that large areas had become irrigated in the Berri region by the early 1900's. By the 1920's, Berri had expanded to approximately 2100 ha and has seen a further expansion of about 30% by 1988. Since 1988, a slight growth in irrigated area has seen Berri expand to approximately 3080 ha to date (Aquaterra et al. 2006).

The Berri area has lag times ranging between 5 to 20 years due to the topography increasing to the north-east of the area where elevations can be greater than 50m AHD.

Specified Model Recharge (before late 1990s): Modelled recharge rates were high before the 1970's, with initial recharge rates generally between 100–200 mm/yr. From the mid 1970's, the water supply method used to supply irrigators increased in frequency from a monthly to a weekly schedule. Irrigators were thus less likely to "flood' their crops with the new schedule since they were guaranteed water weekly as opposed to waiting every four weeks (pers comm. with Ken Smith August 2006). The specified model recharge rate was thus decreased from 100–200 mm/yr to between 33–100 mm/yr. Further reduction to the modelled recharge rate was applied from the late 1980's onwards due to new infrastructure being implemented such as sprinkler systems and drip irrigation techniques (pers comm. with Ken Smith). This reduced the modelled recharge by a further 2–4 mm/year.

3.6.3.2 Recharge in the Cobdogla area

Irrigation commenced in the 1920's in the Cobdogla region based on the GIS information supplied by DEH (Fig 30). The topography at Cobdogla is approximately 30 mAHD resulting in modelled lag times of up to 15 yrs. A large portion of Northern Cobdogla is situated between Lake Bonney and the Murray River and thus the lower topography results in zero modelled time lags.

Specified Model Recharge (from 1930-2006): Since no long term monitoring bore calibration data exists in the Cobdogla irrigation area, recharge rates were based on calibrated rates from the adjacent Berri irrigation areas. The timing of groundwater recharge was originally based on DEH's estimation of irrigation start time and a lag time 0 to 15 years with small changes made during the calibration process. Modelled recharge rates commenced at approximately 170 mm/yr in the 1930's, decreasing to a range of 43–86 mm/yr by the 2000's to achieve model calibration.

3.6.3.3 Recharge in the Renmark area

Major irrigation development is assumed to have began as early as 1880 in the Renmark area. Renmark irrigation area remained at approximately 3470 ha until 1940. By 1988, the area had grown by 120 ha to 3590 ha. By 2005, a further increase of more than 2000 ha resulted in a footprint of approximately 5630 ha (Aquaterra et al. 2006).

Relatively short time lags (0-5 years) were applied to the low-lying area of Renmark adjacent to the floodplain, where depths to the water table are shallow and thus travel times are short. Several recharge zones in the highlands were assumed to have lag times of 30 – 40 years. Recharge onset time, based on irrigation start time and lag time from DEH / Aquaterra, compared well with observation data on water table responses to recharge however initial recharge rate estimates (15% of applications) were decreased to further improve calibration, especially improving the downward trend observed in the hydrographs from the late 1990's onwards.

Specified Model Recharge (before late 1990s): Modelled recharge rates were typically high prior to the 1990s. Initial recharge rates decreased from 176 mm/yr to 80–120 mm/yr by 1997 (to achieve calibration), which is due to both improvements to irrigation efficiencies, farm management practices, drought effects and the capacity for the CDS to intercept root zone drainage before it recharges the water table.

Specified Model Recharge (from late 1990s): Calibration indicated that the rate of irrigation recharge decreased to as low as 37–60 mm/yr in the Renmark area by 2000.

3.6.3.4 Recharge in the Chaffey area

The Chaffey irrigation area is located directly north of the Renmark Irrigation area. It is believed to have begun in the 1920's with major expansion towards the west in the 1940's and towards the north in the 1960's. The total area under irrigation had grown to about 1100 ha by 2005 (Aquaterra et al. 2006). The oldest irrigation areas at Chaffey are located on low-lying topography adjacent to the floodplain and thus are in areas with a zero lag time. The expansion of the Chaffey irrigation area to the west and north with time is associated with increasing lag times up to a maximum of 40 years due to the area changing from low-lying topographic relief to highland areas where the depth to the water table is much greater.

Specified Model Recharge (before late 1990s): Modelled recharge rates were typically high prior to the 1990s. Initial recharge rates decreased from 176 mm/yr to around 64–85 mm/yr by 1997 (to achieve calibration). This is due to both improvements in irrigation efficiencies, farm management practices, drought effects and the capacity for the CDS to intercept root zone drainage before it recharges the water table.

Specified Model Recharge (from late 1990s): Calibration indicated that the rate of irrigation recharge decreased to as small as 37–44 mm/yr in the Chaffey area by 2000.

3.6.4 RECHARGE APPLIED FOR PREDICTIVE MODELLING

Based on the calibrated model, five future scenarios were developed to predict salt loads to the River Murray as a result of various accountable irrigation actions. Further details of the recharge zones and rates in the scenarios are included later in this report (Section 5, Model Scenarios and Predictions).

The following groundwater recharge assumptions were made to predict salt loads to the River Murray under five irrigation scenarios:

- **Scenario-3A**, Pre-1988 irrigation without improved irrigation practices (IIP) or rehabilitation (RH):
    a. Used only recharge zones that represent irrigation that commenced prior to 1st January 1988.
    b. Recharge rates for prediction (after 1988) correspond with the adopted 1988 irrigation rates, which assume 70% irrigation efficiency. These rates came from calibration (where available due to a shorter lag time) or were adopted from a similar recharge zone.

c. Caissons are assumed to be part of the IIP and thus are deactivated for this scenario.

- **Scenario-3B**, Pre-1988 irrigation with IIP but without RH:
  a. Used only recharge zones that represent irrigation that commenced prior to 1st January 1988.
  b. Recharge rates for prediction (after 1988) reduce to 1995 irrigation rates at Berri and 2006 rates at Renmark, assuming an improvement from 70% to 85%+ irrigation efficiency.
  c. Caissons are activated.

- **Scenario-3C**, Pre-1988 irrigation with IIP and with RH:
  a. Used only recharge zones that represent irrigation that commenced prior to 1st January 1988.
  b. Recharge rates for prediction (after 1988) reduce to 2006 irrigation rates for all regions, assuming an improvement from 70% to 85% irrigation efficiency and RH, i.e. same as the calibration. (history match).
  c. Caissons are activated.

- **Scenario-4**, Current Irrigation:
  a. Used all recharge zones that represent irrigation that commenced prior to 1st January 2006
  b. All recharge decreases to 100 mm/yr (or less if indicated by calibration) due to IIP during the mid 1990s. The timing of this reduction depends upon lag times.
  c. Recharge that commenced after 2006 (but is due to pre 2006 irrigation) has rates indicative of the pre 2006 calibrated recharge rates i.e. adopted from a similar recharge zone.

- **Scenario-5**, Future Development Irrigation:
  a. Same recharge condition as Scenario-4 (current irrigation) with the addition of predicted future irrigation zones.

  b. Future development irrigation areas were adopted from Aquaterra and are based on the Renmark land and water management plan (Figure 31b). Irrigation expansion is modelled only at Renmark and these areas were assumed to simultaneously commence in 2014 with the recharge lagged between 20 to 70 years.

  c. A recharge rate of 100mm/year was assumed for future irrigation areas that exist on the highland area located west of the current Renmark footprint. Future irrigation areas that are located on the floodplain assume an irrigation rate of 37 mm/year, which is based on the calibrated rate.

3.7 MODEL CAISSONS

The Comprehensive Drainage Scheme (CDS) in the Berri – Renmark area comprises of a series of networked tile drains and caissons that are designed to intercept excess irrigation water for transport to the nearby disposal basins including the Berri, Disher Creek, Ral Ral Creek, Loveday and Cobdogla basins. The drainage water collected by the tile drains flows towards the caissons under gravity where it is collected and pumped to the disposal basins.

Actual operation of caisson pump rates is not recorded. However, after careful consideration of the observed hydrographs and salinity trends (J. Rolls 2006), it was decided that the inclusion of caisson operations was needed to improve the calibration to observed hydrograph responses, especially from the late 1990's onwards. Numerous hydrographs show a steep downward trend from the late 1990's, with the model indicating that the caissons could potentially be pumping groundwater. Investigative modelling by Aquaterra and DWLBC concluded that additional sinks were needed to model a similar response to that of observed hydrographs. All known "open bottom" caissons (as pers. comm. with John Rolls and Ken Smith) were included into the model as drain features. Since there exists no operational data, the model calibration process was used to replicate the effect of the operation specifications of the caissons, as summarised in Appendix A-2 and A-3. The locations of all known caissons are shown in Figure 32a and Figure 32b for the Berri and Renmark areas respectively. Note that only the "open bottom" caissons have been included in the model since they intersect the water table and have the potential to abstract groundwater. The model was calibrated with caissons operating between 1987 and 2006 with rates between 0.5 – 2 L/sec.

3.8 MODEL EVAPOTRANSPIRATION

Evapotranspiration was simulated using the ground surface as a control point. Evapotranspiration rates of 200–250 mm/year and 1.5 m extinction depth were used in the model (Holland et al., 2001). Evapotranspiration is most likely to occur on the larger floodplains and in some lowland areas where a shallow groundwater table exists.

3.9 MODEL GROUNDWATER ALLOCATION AND USE

There is no allocation of groundwater or known groundwater use in the Berri – Renmark area.

3.10 MODEL STRESS PERIOD

The transient model was used to simulate the historical period (1880–2006) using stress period lengths ranging between 5 and 26 years during the early periods of the model and stress periods of 2 years during late periods of the model. For predictions (1988–2106), 2-year stress periods were used.

4. MODEL CALIBRATION

4.1 STEADY STATE MODELS, TRANSIENT MODELS AND CALIBRATION

Steady state models are used to model equilibrium hydrologic conditions and/or conditions when changes in storage are insignificant. Transient models are used to model time dependent stresses and/or where water is released from, or taken into storage.

Calibration (“history matching”) of the model with existing data must be conducted in order to have confidence in predictive modelling. Calibration is necessary to demonstrate that the model can replicate the behaviour of the aquifer system for at least the historical set of conditions. A sensitivity analysis should also be undertaken to determine the relative importance of model parameters (i.e. the system drivers) in achieving calibration.

4.2 STEADY STATE MODEL CALIBRATION

Steady state calibration is undertaken to develop a broad-scale hydraulic conductivity distribution by matching modelled to observed potentiometric heads. Steady state calibration was performed by adjusting hydraulic conductivities (within reasonable limits) and model boundary conditions. Dynamic stresses and storage effects are excluded from steady state calibration.

Due to the absence of pre-irrigation development potentiometric head data, the steady state model was calibrated using a potentiometric surface developed by S. Barnett (DWLBC) that represents pre-irrigation development and pre river regulation conditions. This is believed to represent Pre-European equilibrium hydraulic conditions in the area (note that this is the only available data for this purpose).

A modelled potentiometric surface was achieved that matches the constructed potentiometric surface (Fig. 33). The modelled surface closely matched the estimated Loxton Sands regional surface on the east and south sides of the river and on the north side of the river in the Renmark area. However, in the Berri area, there is some discrepancy between the modelled and estimated surfaces around the lock 4 and lock 5 areas. That is thought to be due to uncertainties in the estimation of the historic (pre river regulation) surface.

4.3 TRANSIENT MODEL CALIBRATION

Transient calibration is undertaken on an iterative basis by adjusting hydraulic parameters, recharge rates and boundary conditions until a satisfactory match with observed data is obtained. The potentiometric surface output from the steady state model was used as the starting point for transient model runs up to 2006. Each time a change to the boundary conditions and aquifer hydraulic parameters was made in the transient model, the steady state model was altered and rerun, with the output being used as the starting point for further transient model calibration.

Model calibration was achieved by the following actions, in accordance with the Groundwater Flow Modelling Guideline (MDBC 2001):

1. Qualitative comparison between modelled and observed potentiometric heads (contours and hydrographs).
2. Quantitative assessments of the (scaled RMS) iteration residual error.
3. Quantitative confirmation that the Water Balance Criteria is < 1% for all times.
4. Confirmation (as a water balance cross check) using:
   a. Total 'Run of River' salt load into the River Murray.
   b. Comparison of Recharge Volumes.
   c. Comparison between Model Results and In-River Nanotem.

In the Berri – Renmark project area, salt loads in to the River Murray occur mainly from lateral groundwater flux through the Loxton Sands and Monoman Sands aquifers as a result of irrigation water mounding. Therefore matching observed trends in the Loxton sands aquifer was considered most important during calibration. The head level in the Murray Group Limestone aquifer has also been considered in the calibration exercise because of the potential for upward leakage from the underlying aquifers driven by these heads.

4.3.1 QUALITATIVE COMPARISON OF POTENTIOMETRIC HEADS (CONTOURS)

Initial qualitative calibration of the transient model was undertaken by trying to closely match the 2006 regional potentiometric heads. The modelled and observed potentiometric heads from 2006 were compared to determine the accuracy of the calibration.

4.3.1.1 Layer 1: Loxton Sands and Monoman Formation

Qualitative comparison between the modelled (Fig. 34) and observed potentiometric head contours of the Loxton Sands and Monoman Formation in the Berri – Renmark area indicates that the modelled distribution closely represents the shape and form of the observed distribution, particularly the groundwater mound in the Berri – Cobdogla area. Where data exists in the Renmark area, the modelled surface matches the level and distribution of the observed surface.

There is some discrepancy between the modelled and observed surfaces at the edges of the observed surface due to a lack of control points.

4.3.1.2 Murray Group Limestone

Calibration of potentiometric heads in the Pata Formation (layer 3), Glenforslan Formation (layer 4) and Mannum Formation (layer 5) was limited by the lack of observation data for each individual layer. The three layers have been calibrated using a single MGL surface that was interpreted from a hydrogeological map. Figure 35 shows a reasonable match between modelled and observed potentiometric contours in the eastern part of the model domain (model layer 5 is shown – Mannum Formation). Differences between modelled and observed surfaces in the Berri area are due to the observed surface being a combination of three layers. For example, the observed influence of the river (10m contour in the Berri area) can be seen in the modelled layer 3 Pata surface but not in the layer 5 Mannum surface.

4.3.2 QUALITATIVE COMPARISON OF POTENTIOMETRIC HEADS (HYDROGRAPHS)

Quantitative calibration focused on the Loxton Sands aquifer (layer 1), as it is the major aquifer that contributes salt load into the River Murray. The locations of hydrographs used in the calibration are shown in Figures 36a and 36b. These hydrographs were chosen as they contain reliable long-term historical observation data.

Comparison between modelled and observed (historical) potentiometric heads indicates a close match in most wells (Figs 37–44) in terms of actual levels and trends.

4.3.3 QUANTITATIVE ASSESSMENT OF THE ITERATION RESIDUAL ERROR

The iteration residual error between modelled and observed potentiometric heads of the Loxton Sands and Monoman Formation aquifers in the Berri – Renmark area was calculated using data from 1975, 1985, 1995, and 2004 (years for which more data was available). The calculations (Figs 45–48) indicate a scaled root mean square value (SRMS) for the whole project area of:

- 6.1% in 1975
- 4.1% in 1985
- 5.2% in 1995
- 5.7% in 2004

These values are within the 5 – 10% SRMS range recommended by the Groundwater Flow Modelling Guideline (MDBC 2001) and indicate a good fit between modelled and observation data over the time period considered in the analyses.

Note that outlying data from two bores (RMK288 and RMK012) has been omitted from the above calculations. Figure 38 shows that modelling at RMK012 does not match the observed water level or trend and RMK288 matches the trend but not the level. Removing the outliers can be justified for following reasons:

- The location of the bores (Fig 36a) is outside of the irrigation areas hence considered less important for calibration,
- The bores are located away from the river and have very little impact on modelled flux to the river and ultimately salt load.

4.4 QUANTITATIVE CONFIRMATION (WATER BALANCE)

The model water balance error is less than 0.15% for all time periods. This is within the criteria defined in the MDBC groundwater flow modelling guideline (<1%).

4.5 TRANSIENT MODEL CONFIRMATION

4.5.1 COMPARISON BETWEEN MODEL RESULTS AND RUN OF RIVER SALT LOAD

The salt load entering the River Murray in the Berri – Renmark area was calculated using the modelled groundwater flux and groundwater salinity in each model flow budget zone. The salinity for each zone is given in Figures 8a and 8b and the resulting calculations of the salt load are given in Appendix B-1 and B-2.

Figure 49 shows the average of Run of River surveys conducted between 1991 and 2004 (Aquaterrra et al. 2006).

Table 4 shows the comparison between modelled salt load and measured (Run of the River) results. Run of the River results show a range between 232 to 418 t/d salt load from Lock 6 to Lock 3 which is greater than modelled salt load (50 to 85 t/d) from Renmark–Berri area. The reason for the difference is that Run of the River surveys measure salt load from both sides of the river and the modelled salt load is only from the north side of the river.

Table 4 Comparison between modelled north–side salt load and Run of River Survey from Lock 6 to Lock 3 (River km from 422 to 604)

Location	Modelled (t/d) 1997	Modelled (t/d) 2004	ROR (t/d) both North and South (1997 to 2004)
Berri to Renmark (North side)	85	50	232 - 418

In the Lock 6 to Lock 3 area, it is believed that the majority of the salt load entering the Murray River is attributed to the groundwater mounds that have developed under the Loxton, Bookpurnong, Pike, Murtho, Kingston and Pyap irrigation areas. Previous reports (Yan et al. 2005, Yan et al. 2006 and Yan et al. 2007) have calculated the total modelled salt load from the south side of the river to be 513 t/d, in which 192 t/d (Yan et al. 2005) comes from Loxton–Bookpurnong area alone, 263 t/d (Yan et al. 2006) from Pike–Murtho and 58 t/d from Kingston–Pyap (Yan et al. 2007). This large salt load contribution is due to the high ground water gradients and smaller floodplain area that exists in these regions.

In the Berri – Renmark area (north side of the river), the modelled salt load entering the River is approximately 47 t/day, which is approximately 11 times smaller than the modelled salt load from the south side. Modelled salt loads are dramatically smaller from Berri – Renmark due to the following:

- More extensive floodplain areas which tend to decrease the groundwater gradients towards the main river
- CDS and caisson activity, which decrease the recharge rate to the water table and in some instances also pump groundwater as previously discussed in section 3.7.

4.5.2 COMPARISON OF RECHARGE VOLUMES

Aquaterra et al. (2006) calculated accession rates of irrigation drainage water (recharge) using irrigation area, irrigation application volume (based on crop type and water diversion records), average rainfall and estimated 15% root zone drainage. The lag times for irrigation drainage to reach the water table were calculated by DEH based on depth to water table, soil type and thickness of Blanchetown Clay. These recharge zones, recharge rates and lag times were used as initial values for the DWLBC model and then modified during the calibration process to achieve the best match with observed potentiometric heads in the water table aquifer. The total volume of recharge applied in the calibrated model was then compared with the Aquaterra calculated accession volumes (Fig. 50).

In the Renmark area, the majority of the irrigation area exists on the floodplain and thus the recharge lag time is negligible. The modelled recharge volume is generally smaller than the calculated volume since losses due to CDS and caisson activity have not been included in the calculated accession estimate. The model, however, does include features to represent CDS and caisson activity, which were varied accordingly to achieve a good calibration match to measured water levels. In the Berri area, calibrated recharge is also smaller than the calculated accession (Fig. 50) for the same reasons as discussed above. The differences between calculated accession and the calibrated recharge represent the changes made to the recharge model during calibration. Differences between the calculated and modelled recharge volumes can be explained by the following:

- CDS losses are not included in the calculated accession estimate
- Caisson pumping is not included in the calculated accession estimate
- Climate changes such as the recent drought is not being captured in the calculated accession volume estimate. However recharge rates are decreased in the model to match declining water levels which could be a combination of both IIP and drought related phenomena.
- Integrity of diversion volume estimates, especially for late time (i.e. RIT and CIT data).

Despite the above-mentioned discrepancies, the consistency in the magnitude of the calculated and modelled volumes helps to provide additional confidence that the total recharge applied in the model is a physically reasonable estimate.

4.5.3 COMPARISON BETWEEN MODEL RESULTS AND IN-RIVER NANOTEM

The modelling discussed in this report suggests that the majority of the salt-load entering the Murray River is from the south-side of the River, especially from the Loxton–Bookpurnong and Pike–Murtho areas. The In-River NanoTEM data presented in Figure 2 (Berens and Hatch in prep) and Figure 51 (Berens et al. 2004) supports the modelling, showing that fresher water (represented by blue colour – higher resistivity values) exists in the river sediments on the Berri – Renmark side.

5. MODEL SCENARIOS AND PREDICTIONS

The calibrated transient model provides a useful predictive tool to quantify future fluxes of saline groundwater, and the potential impacts of specific stresses on potentiometric heads, over periods that may range from tens to hundreds of years.

Note that all predictions for this project are salt loads from the northern side of the River Murray and anabranches.

5.1 SCENARIOS

The modelling scenarios are summarised in Table 5, and are discussed in detail below. The scenario structure has been developed progressively in response to requests by the State (DWLBC) and the MDBC to:

1. Evaluate the impact of various accountable actions, to be recorded on the MDBC salinity registers ‘A’ and ‘B’, including:
    a. Impact of the various pre and post–1988 actions on the groundwater flux and salt load entering the River Murray.
    b. Impact of improved irrigation practices (IIP), the rehabilitation (RH) of distribution systems and.
    c. Assess the decision about SIS.
2. Determine the State and Federal responsibility for cost sharing.
3. Satisfy the reporting requirements of:
    a. Schedule ‘C’ of the Murray–Darling Basin Agreement 1992.
    b. Basin Salinity Management Strategy Operational Protocols 2003.

The scenarios include the application of the following important conditions:

Pre-1988 irrigation	Irrigation development area and recharge that occurred prior to 01/01/1988
Post-1988 irrigation	Irrigation development area and recharge that occurred between 01/01/1988 and end of calendar year 2005.
Future Development	Future irrigation development area and recharge (assuming recharge of 100 mm/yr in the highland area and calibrated rates in Renmark Floodplain area of 37 mm/yr) resulting from activation of already allocated (prior commitment) water that is assumed to occur in 2014.
Mallee Clearance	Clearance of natural vegetation assumed to commence from the 1920s, resulting in increased recharge to the groundwater table in dry-land areas. It is assumed that no major clearing of native vegetation occurred after 1988.

Improved Irrigation

Practices (IIP)	Advancements in irrigation efficiency include the use of sprinkler and drip systems (replacing flood irrigation via earth channels) and the greatly improved technology, monitoring and management of irrigation systems (from circa1995). These measures have resulted in improvements in efficiency (from ~70% to ~85%) and reduced recharge to the groundwater table. Caissons are assumed to be a part of IIP.
Rehabilitation (RH)	Replacement of leaky concrete water distribution channels with pipelines (e.g. in Cobdogla area RH commenced in the mid 1990's) resulting in reduced conveyance losses, which are reflected by reduced recharge to the water table. Note: RH does not occur in the Renmark area.
SIS	Salt Interception Schemes designed to intercept the (maximum) groundwater flux and salt load resulting from the pre-1988, post-1988 and future development irrigation. There are no existing SIS or concept SIS in the Renmark and Berri areas.

Table 5. Summary of modelled scenarios and conditions undertaken for Berri-Renmark

Scenario	Name	Model Run	Irrigation development area	IIP	RH	SIS
S–1	Natural system	Steady State	None	–	–	–
S–2	Mallee clearance	1920–2106	None (but includes Mallee clearance area)	–	–	–
S–3A	Pre-1988, no IIP, no RH	1988–2106	Pre-1988	No	No	–
S–3B	Pre-1988, with IIP, no RH	1988–2106	Pre-1988	Yes	No	–
S–3C*	Pre-1988, with IIP and with RH	1988–2106	Pre-1988	Yes	Yes	–
S–4◊	Current irrigation	1880–2106	Pre-1988 + Post-1988	Yes	Yes	No
S–5	Current plus future irrigation	2006–2106	Pre-1988 + Post-1988 + Future development	Yes	Yes	No

* Scenario-3C is not applicable in the Renmark Area since no rehabilitation has occurred at Renmark

◊ Scenario-4 includes the historical calibration run.

5.2 SCENARIO-1: NATURAL SYSTEM

The Steady State Scenario-1 models the base groundwater flux and salt load entering the River Murray post-river regulation but prior to irrigation development.

5.2.1 SCENARIO-1: CONDITIONS

The following conditions are applied to the steady state model:

- Post-regulation of the River Murray. (i.e. with weir pool stage elevations modelled).
- Pre-irrigation development.
- Time period = steady state

5.2.2 SCENARIO-1: MODELLING RESULTS

The results given in Table 6 indicate the modelled flux and salt load entering the River Murray from the northern side of the river in the Berri – Renmark area for Scenario-1

Table 6. Modelled groundwater flux and salt load in the Berri – Renmark area (Scenario-1 Natural System)

	Renmark Area	Berri Area
Flux (ML/day)	0.96	0.37
Salt load (t/day)	10.6	10.1

5.3 SCENARIO-2: MALLEE CLEARANCE

Transient Scenario-2 models the hydrological changes, groundwater flux and salt load entering the River Murray that would be expected to occur due to the clearance of the native mallee vegetation (by comparison with Scenario-1) and the subsequent increase in recharge rates.

5.3.1 SCENARIO-2: CONDITIONS

The following conditions are applied to the transient model:

- Post-regulation of the River Murray.
- No irrigation development.
- Mallee clearance zones commencing in 1920
- Within the Mallee clearance zones, application of recharge rates >= 0.1 mm/year, increasing in some areas to ~11 mm/year after a period of 200 years, with changes (representing lag times) occurring every 10 years (data provided by DEH).
- Outside the Mallee clearance zones, application of a recharge rate of 0.1 mm/year Time period = 1920–2106.

5.3.2 SCENARIO-2: PREDICTION RESULTS

The results given in Tables 7a and 7b summarise the predicted flux and salt load entering the River Murray from the northern side of the river in the Berri – Renmark area. Complete results of the predicted flux of saline groundwater and salt load are given in Appendix B.

Table 7a. Predicted groundwater flux and salt load in the Renmark area (Scenario-2 Mallee clearance)

Renmark Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	1.00	1.02	1.03	1.16	1.53
Salt load (t/day)	11.0	11.2	11.3	13.5	19.7

Table 7b. Predicted groundwater flux and salt load in the Berri area (Scenario-2 Mallee clearance)

Berri Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	0.43	0.44	0.44	0.47	0.56
Salt load (t/day)	11.8	11.9	11.9	12.4	13.3

5.4 SCENARIO-3A: PRE-1988, NO IIP, NO RH

Transient Scenario-3A predicts the hydrological changes, groundwater flux and salt load entering the River Murray that would be expected to occur between 1988 and 2106 assuming pre-1988 irrigation development with no mitigation in terms of improvements to irrigation practices (IIP) and rehabilitation (RH).

5.4.1 SCENARIO-3A: CONDITIONS

The following conditions are applied to the transient model:

- The potentiometric head distribution output from the historical model at 1 January 1988 used as the starting point for the prediction run.
- Pre-1988 irrigation development area applied between 1988 and 2106.
- Pre-1988 recharge rates and lag times (from the historical model) applied between 1988 and 2106. This assumes irrigation efficiency of 70%.
- Caissons are deactivated.
- Time period is from 1988 to 2106.

5.4.2 SCENARIO-3A: PREDICTION RESULTS

The results given in Tables 8a and 8b summarise the predicted flux and salt load entering the River Murray from the northern side of the river in the Berri – Renmark area. Complete results of the predicted flux of saline groundwater and salt load are given in Appendix B.

Table 8a. Predicted groundwater flux and salt load in the Renmark area (Scenario-3A)

Renmark Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	5.03	5.06	5.07	5.08	5.09
Salt load (t/day)	68.1	68.1	68.1	68.4	68.5

Table 8b. Predicted groundwater flux and salt load in the Berri area (Scenario-3A)

Berri Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	0.75	0.79	0.81	0.85	0.91
Salt load (t/day)	13.5	13.9	14.0	14.9	15.5

5.5 SCENARIO-3B: PRE-1988, WITH IIP, NO RH

Transient Scenario-3B predicts the hydrological changes, groundwater flux and salt load entering the River Murray that would be expected to occur between 1988 and 2106 assuming pre-1988 irrigation development with improvements in irrigation practices (IIP). This scenario evaluates the reduction in salt load (by comparison with Scenario-3A) resulting from the implementation of IIP.

5.5.1 SCENARIO-3B: CONDITIONS

The following conditions are applied to the transient model:

- The potentiometric head distribution output from the historical model at 1 January 1988 used as the starting point for the prediction run until 2105.
- Pre-1988 irrigation development area applied between 1988 and 2106.
- IIP – Recharge rates decreasing from the mid 1990s to the early 2000's, in accordance with calibrated (history match) IIP. This assumes an increase in irrigation efficiency to 85%.
- Caissons are activated from 1988 to 2106
- Time period is from 1988 to 2106.

5.5.2 SCENARIO-3B: PREDICTION RESULTS

The results given in Tables 9a and 9b summarise the predicted flux and salt load entering the River Murray from the northern side of the river in the Berri – Renmark area. Complete results of the predicted flux of saline groundwater and salt load are given in Appendix B.

Table 9a. Predicted groundwater flux and salt load in the Renmark area (Scenario-3B)

Renmark Area	Year				
	1988	**2000**	**2006**	**2050**	**2106**
Flux (ML/day)	4.96	4.12	2.91	1.82	1.72
Salt load (t/day)	67.4	49.1	30.5	21.9	21.8

Table 9b. Predicted groundwater flux and salt load in the Berri area (Scenario-3B)

Berri Area	Year				
	1988	**2000**	**2006**	**2050**	**2106**
Flux (ML/day)	0.74	0.78	0.79	0.83	0.89
Salt load (t/day)	13.4	13.8	14.0	14.8	15.3

5.6 SCENARIO-3C: PRE-1988, WITH IIP AND WITH RH

This scenario tests the reduction in salt load (by comparison with Scenario-3B) resulting from the implementation of rehabilitation (RH). No rehabilitation has occurred in the Renmark area hence Scenario-3C results are identical to Scenario-3B for the Renmark area.

5.6.1 SCENARIO-3C: CONDITIONS

The following conditions are applied to the transient model:

- The potentiometric head distribution output from the historical model at 1 January 1988 used as the starting point for the prediction run until 2106.
- Pre-1988 irrigation development area applied between 1988 and 2106.

- IIP – Recharge rates decreasing from the mid 1990s to the early 2000's, in accordance with calibrated (history match) IIP. This assumes an increase in irrigation efficiency to 85%.
- RH – Recharge rates decreasing from the late 1990's, in accordance with calibrated (history match) RH.
- Caissons are activated from 1988 to 2106.
- Time period is from 1988 to 2106.

5.6.2 SCENARIO-3C: PREDICTION RESULTS

The results given in Tables 10a and 10b summarise the predicted flux and salt load entering the River Murray from the northern side of the river in the Berri - Renmark area. Complete results of the predicted flux of saline groundwater and salt load are given in Appendix B.

Table 10a. Predicted groundwater flux and salt load in the Renmark area (Scenario-3C)

Renmark Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	4.96	4.12	2.91	1.82	1.72
Salt load (t/day)	67.4	49.1	30.5	21.9	21.7

Table 10b. Predicted groundwater flux and salt load in the Berri area (Scenario-3C)

Berri Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	0.74	0.78	0.79	0.85	0.87
Salt load (t/day)	13.4	13.8	13.9	14.7	15.2

5.7 SCENARIO-4: CURRENT IRRIGATION

Transient Scenario-4 predicts the hydrological changes, groundwater flux and salt load entering the River Murray that would be expected to occur between 2006–2106 assuming the current irrigation condition (pre-1988 plus post-1988 irrigation development with IIP and RH). This scenario predicts the likely future salt load if the current conditions remain unchanged in the future, based on the historical events up until the end of calendar 2005.

5.7.1 SCENARIO-4: CONDITIONS

The following conditions are applied to the transient model:

- The potentiometric head distribution output from the historical model used as the starting point for the prediction run from 2006 until 2106.
- Pre-1988 + post-1988 development area applied up to 2005 and then the areas held constant until 2106.
- IIP - Recharge rates decreasing from the mid 1990s to the early 2000's, in accordance with calibrated IIP. This assumes an increase in irrigation efficiency to 85%.

- RH - Recharge rates decrease further from the late 1990's / early 2000's, in accordance with calibrated RH.
- Caissons are activated from 1988 to 2106.
- Time period is from irrigation commencement to 2106.

5.7.2 SCENARIO-4: PREDICTION RESULTS

The results given in Tables 11a and 11b summarise the predicted flux and salt load entering the River Murray from the northern side of the river in the Berri - Renmark area. Complete results of the predicted flux of saline groundwater and salt load are given in Appendix B. Figure 52a and 52b show the modelled 'current' salt load for each river reach in 2006 in the Berri and Renmark areas respectively.

Table 11a. Predicted groundwater flux and salt load in the Renmark area (Scenario–4 Current Irrigation)

Renmark Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	4.96	3.75	2.43	1.85	1.85
Salt load (t/day)	67.4	50.6	31.9	23.4	23.4

Table 11b. Predicted groundwater flux and salt load in the Berri area (Scenario–4 Current Irrigation)

Berri Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	0.74	0.83	0.84	0.91	0.94
Salt load (t/day)	13.4	13.9	14.1	14.9	15.5

5.8 SCENARIO-5: CURRENT PLUS FUTURE IRRIGATION

Transient Scenario-5 predicts the hydrological changes, and the (maximum) groundwater flux and salt load entering the River Murray that would be expected to occur between 2006–2106 assuming the current irrigation (pre-1988 plus post-1988 irrigation development with IIP and RH) plus future irrigation growth. This scenario tests the increases in salt load (by comparison with Scenario-4) resulting from future irrigation development. No future development area exist in the Berri area hence Scenario-5 results are identical to Scenario-4 for the Berri area.

5.8.1 SCENARIO-5: CONDITIONS

The following conditions are applied to the transient model:

- The potentiometric head distribution output from the historical model at 2006 used as the starting point for the prediction run until 2106.
- Pre-1988 + post-1988 + future irrigation development area applied between 2006 – 2106.
- IIP – Recharge rates decreasing from the mid 1990s to the early 2000's, in accordance with calibrated IIP. This assumes an increase in irrigation efficiency of 85%.

- RH – Recharge rates decrease even further from the late 1990's/early 2000's, in accordance with calibrated RH.
- Recharge from future irrigation development areas operating from 2014 (with DEH estimated lag time) to 2106, assuming ~85% efficiency. Future irrigation development exists at Renmark only and the rates are fixed at 100mm/yr on the highland area and 37 mm/yr on the floodplain area which is consistent with the calibrated rates of Scenario S4.
- Caissons are activated between 1988 and 2106.
- Time period is from 2006 to 2106.

5.8.2 SCENARIO-5: PREDICTION RESULTS

The results given in Tables 12a and 12b summarise the predicted maximum flux and salt load entering the River Murray from the northern side of the river in the Berri – Renmark area. Complete results of the predicted flux of saline groundwater and salt load are given in Appendix B.

Table 12a. Predicted groundwater flux and salt load in the Renmark area (Scenario-5 Current Plus Future Irrigation)

Renmark Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	4.96	3.75	2.43	2.65	2.79
Salt load (t/day)	67.4	50.6	31.9	33.4	35.5

Table 12b. Predicted groundwater flux and salt load in the Berri area (Scenario-5 Current Plus Future Irrigation)

Berri Area	Year				
	1988	2000	2006	2050	2106
Flux (ML/day)	0.74	0.83	0.84	0.91	0.96
Salt load (t/day)	13.4	13.9	14.1	14.9	15.5

5.9 COMPARISON OF SALT LOADS ENTERING THE RIVER MURRAY FOR ALL SCENARIOS

The graphs of predicted salt loads entering the River Murray for all scenarios for Berri and Renmark (Fig. 53) indicate the trends for each scenario.

6. SENSITIVITY ANALYSIS

6.1 PREDICTIVE UNCERTAINTY

Predictive uncertainty is evaluated by running a sensitivity analysis to quantify the impact of an incremental variation in aquifer hydraulic parameters, or a stress, on the modelled aquifer response. The purpose of the sensitivity analysis is to quantify the change in the predicted salt load at 2106 due to the uncertainty involved in applying selected parameter values in the model.

The transient model has been calibrated for aquifer hydraulic parameters and recharge, and requires sensitivity testing for issues of major concern and to comply with the Murray-Darling Basin Modelling Guideline, MDBC (2001).

Scenario-5 was selected for all sensitivity tests, as it is a worst-case (full development) scenario of existing irrigation area plus full future irrigation development in the Berri – Renmark area.

6.1.1 SENSITIVITY TEST-1: VARIATION OF LOXTON SANDS AQUIFER HYDRAULIC PARAMETERS INCREASING/ DECREASING BY 15%

This test evaluates the impact of variations in the aquifer hydraulic parameters of the Loxton Sands (specific yield Sy and horizontal conductivity Kh) on the magnitude of salt load from the Loxton Sands to the River Murray or to the Monoman Formation (floodplain) then to the river at the modelled year of 2106 (i.e. by running the model 100 years into the future).

6.1.1.1 Sensitivity test-1: Conditions

Testing was conducted by varying the Loxton Sands component of layer 1 aquifer hydraulic parameters by ±15% from the calibrated hydraulic conductivity and specific yield.

6.1.1.2 Sensitivity test-1: Results

Test results (Table 13) indicate that:

1. Changes of ±15% to the calibrated Loxton Sands hydraulic conductivity results in a predicted maximum 4.2 t/day change in the salt load entering the River Murray 100 years into the future, which is considered small in comparison to the predicted total salt load of 51.0 t/day (a 8.1% change). Figure 54 shows the model sensitivity to changes in horizontal conductivity.
2. Changes of ±15% to the calibrated Loxton Sands specific yield results in a predicted maximum 0.3 t/day change in the salt load entering the Monoman Formation and River Murray 100 years into the future, which is considered insignificant in comparison to the predicted total salt load of 51.0 t/day (a 0.5% change). Figure 55 shows the model sensitivity to changes in specific yield.

The results given in Table 13 indicate that the salt load into the River Murray is only slightly affected by changes in aquifer hydraulic parameters, and this provides confidence in using the calibrated values.

6.1.2 SENSITIVITY TEST-2: VARIATION OF BOOKPURNONG FORMATION VERTICAL HYDRAULIC CONDUCTIVITY INCREASING / DECREASING BY 15%

In the Berri – Renmark project area, vertical flux from the Murray Group Limestone aquifer to the river is considered only minor (see note below) compared to the lateral flux from the Loxton Sands aquifer. However, in order to comply with the MDBC Guideline (2001), the sensitivity to upward leakage by varying Kv in the Bookpurnong Formation (layer 2) was tested and the results included in this report.

Note: Vertical flux contributes a maximum salt load of 3.5 t/day at 2106 (for the worst case scenario – Scenario 5) in the entire Berri – Renmark area, and represents only 6.4% of the total salt load (54.5 t/day). This is based on a groundwater salinity of 20,000 mg/L for the Pata Formation.

6.1.2.1 Sensitivity test-2: Conditions

This sensitivity testing was conducted by varying the vertical hydraulic conductivity of the Bookpurnong Formation (layer 2) by ±15% of the calibrated value of $2x10^{-3}$ m/day and running the model 100 years into the future.

6.1.2.2 Sensitivity test-2: Results

Test results (Table 13) indicate that:

Changes of ±15% to the calibrated vertical hydraulic conductivity (Kv) for Bookpurnong Formation results in a predicted maximum of 1.4 t/day change in the salt load entering the River Murray 100 years into the future in Berri – Renmark area, which is insignificant when compared to the predicted salt load of 54.5 t/day. Figure 56 shows the model sensitivity to changes in Bookpurnong Formation vertical conductivity.

Figure 57 shows the comparative model sensitivity of the three parameters tested above in the Berri – Renmark area.

Table 13. Results of sensitivity testing of variation in aquifer and aquitard hydraulic parameters - predicted salt load entering River Murray 100 years into the future

	Kh (m/day) Loxton Sands			Sy Loxton Sands			Kv (m/day) Bookpurnong Formation		
Parameter value	**-15%**	**Calibrated**	**+15%**	**-15%**	**Calibrated**	**+15%**	**-15%**	**Calibrated**	**+15%**
Renmark Area									
Predicted salt load (t/day)	34.2	35.5	36.8	35.7	35.5	35.4	35.9	37.3	37.3
Difference (t/day)	1.4	–	1.3	0.1	–	0.1	1.4	–	0.0
Berri Area									
Predicted salt load (t/day)	12.7	15.5	18.3	15.6	15.5	15.4	17.2	17.2	17.2
Difference (t/day)	2.8	–	2.8	0.1	–	0.1	0.0	–	0.0
Combined Berri – Renmark Area									
Predicted salt load (t/day)	46.9	51.0	55.1	51.3	51.0	50.8	53.1	54.5	54.6
Difference (t/day)	4.2	-	4.1	0.3	-	0.2	1.4	-	0.1

6.1.3 SENSITIVITY TEST-3: VARIATION OF SALINITY APPLIED TO MODELLED FLUXES

This test is designed to investigate the sensitivity of the model results (salt loads) to changes in salinity values applied to the model flux zones (Figs 8a & 8b). The test is done outside of the modelling interface, that is, the model conditions and fluxes do not change, only the applied salinity values are altered.

All available field salinity values from the Loxton Sands and Monoman Formation aquifers in a zone extending approximately 4km to the west of Ral Ral Creek and the Murray in the Renmark Reach and a similar distance from the north/west bank of the Murray in the Berri Reach were analysed. Mean and median salinity was determined for each flow budget zone (for details see Appendix C).

The salinity values for the individual budget zones reported in 2006 (Aquaterra et al. 2006), ranging between 10,000–40,000 mg/L for the Berri area and a uniform 20,000 mg/L for the Renmark area have been used as a comparison.

6.1.3.1 Sensitivity Test-3: Conditions

Testing consists of applying 3 different salinities to each of the designated zones:

- Median salinity
- Mean salinity
- 2006 reported salinity

6.1.3.2 Sensitivity Test-3: Results

Table 14. Model salt load (t/day) for 2106 calculated using various salinity values (TDS mg/L)

	Salinity Input			Calculated 2106 Salt load		
Zone #	**Median**	**Mean**	**2006 Report**	**Median**	**Mean**	**2006 Report**
Berri area						
11	2,729	9,506	10,000	1.3	4.4	4.6
12	29,037	29,427	40,000	10.4	10.6	14.3
13	N/A	N/A	25,000	No Flux	No Flux	No Flux
14	28,117	26,728	27,000	3.8	3.6	3.7
Total				**15.5**	**18.6**	**22.6**
Renmark area						
6	18,364	20,677	20,000	27.1	30.5	29.5
8	N/A	N/A	20,000	No Flux	No Flux	No Flux
9	5,931	12,375	20,000	7.3	15.2	24.5
10	13,638	19,662	20,000	1.1	1.6	1.7
Total				**35.5**	**47.3**	**55.7**

Table 14 shows the various salinities applied to the model fluxes and the salt loads calculated for each budget zone. It should be noted that median salinity values have been used to calculate salt loads presented in this report (see section 7.2).

Results show that if the original salinities reported in 2006 were used to predict 2106 salt loads, they would have been overestimated by ~7 t/day (46%) in the Berri area and ~20 t/day (57%) in the Renmark area.

If the mean salinity values were applied to predict 2106 salt loads, they would have been overestimated by ~3 t/day (20%) in the Berri area and ~12 t/day (33%) in the Renmark area.

This test highlights the sensitivity of the salt load results to changes in salinity.

7. MODEL UNCERTAINTY

The following factors are considered to be the most important in terms of model accuracy and uncertainty in results (salt loads).

7.1 FLOODPLAIN PROCESS

The hydrogeology of the highland and floodplain areas is considered to be reasonably well understood and well represented in the model, which gives confidence to the estimates of fluxes passing from the highland irrigation areas to the edge of the floodplain. However, the detailed salt movement processes through the floodplains are less well known and were not modelled. Although there is high confidence regarding the model representation of the floodplain hydrogeology, the transmission of salt loads from the floodplain to the river is not considered to be modelled with a high level of confidence. This is because salt is intercepted and accumulated in floodplains between floods, making discharge of salt from floodplains to the River Murray on a daily basis difficult to predict.

7.2 GROUNDWATER SALINITY

The groundwater salinity values, and zones to which they have been applied in the model, represent the current understanding (as explained in section 2.6) of the groundwater salinity distribution and existing available data.

All available field salinity values from a zone extending approximately 4km to the west of Ral Ral Creek and the Murray in the Renmark Reach and a similar distance from the north/west bank of the Murray in the Berri Reach were analysed to determine the frequency distribution of salinities.

The median value for the Renmark reach was 11,430 mg/L and the mean was 18,630 mg/L calculated from a total of 75 samples. The wide difference between median and mean values is due to the highly skewed distribution of salinities, in fact the presence of two distinct populations.

- Irrigation return seepage water with TDS less than 10,000 mg/L and
- Native groundwater ranging up to in excess of 60,000 mg/L TDS.

In the Berri reach the overall median value of salinity is 20,287 mg/L TDS and the mean is 21,654 mg/L (from a total of 90 samples). Whilst this data set looks relatively unskewed, compared with the Renmark data, there is one salinity zone, Zone 11, which is highly skewed in salinity distribution with a high percentage of lower values associated with return seepage of irrigation water.

The frequency distribution of salinity values from the two reaches is illustrated in Figure 58. Renmark has ~45% of values under 10,000 mg/L TDS and Berri has ~27%. The proportions are expected to increase with time leading to reducing salt loads in the future

Figure 59 clearly shows in histogram format, the bimodal (two population) nature of salinities in the study area. It is interesting to note that where there is a skew towards lower values, the median value is smaller than the mean and if a bias towards fewer higher values is to be avoided, the median value should be used in calculating the salt load.

Zone salinity median and mean values derived from the analysis of available salinity data are listed in Table 15.

Table 15. Salinity Zone Values from Statistical Analysis

	Median TDS (mg/L)	Mean TDS (mg/L)
BERRI Zones		
Zone 11	2729	9505
Zone 12	29037	29427
Zone 13	No flux	No flux
Zone 14	28117	26728
RENMARK Zones		
Zone 6	18364	20677
Zone 8	No flux	No flux
Zone 9	5931	12375
Zone 10	13638	19662

If predicted salt loads entering the River Murray in 2006 in the Renmark area had been calculated using the overall median salinity value of 11,430 mg/L, the salt load would have been 27.8 t/day compared with 31.9 t/day using the calculated zone salinities, an error of minus 13%. .

Using the Berri overall median salinity of 20,287 mg/L TDS to calculate salt load would have given 17.1 t/day compared with the zone salinity based value of 14.1 t/day, an error of plus 21%.

7.3 RECHARGE DUE TO IRRIGATION

Model recharge rates and irrigation areas in the future are considered to be key contributors to model uncertainty.

There is reasonably high confidence in the recharge rates used for the historical modelling. The recharge rates applied took account of Aquaterra's calculated accession volumes (i.e. based on district diversion) but were adjusted to achieve improved calibrations of observed hydrographs.

There is less confidence in the recharge values used in the predictive modelling beyond 2006. The SIMPACT predicted recharge rate of 100 mm/yr was used for the 'future development' predictions in the highland areas at Renmark. However, a lower predicted rate of 37 mm/yr was adopted for the prior commitment areas on the floodplain since this is the rate adopted during the calibration process. It is highly likely that there will be changes in irrigation efficiency (that will affect recharge–accession) and irrigated area and therefore deviations from the assumed development sequence in the future.

7.4 HYDRAULIC PARAMETERS

As an attempt to quantify the uncertainty associated with the Loxton Sands and Bookpurnong Formation hydraulic parameters, the sensitivity analyses in section 6 were conducted. The percentage change in the model salt loads that is attributable to variations in aquifer and aquitard hydraulic parameters, are shown graphically in Figures 54–56. The comparative sensitivity to the parameters is shown in Figure 57.

It should be noted that the aquifer and aquitard hydraulic parameters are considered to be reasonable, and considered as high confidence parameters in comparison to the other parameters discussed above.

8. MODEL LIMITATIONS

Hugh Middlemis (lead author Murray-Darling Basin Commission 2001 Groundwater Modelling Guideline) stated in 2004 that: *It is important to recognise that there is no such thing as a perfect model, and all models should be regarded as works in progress of continuous improvement as hydrogeological understanding and data availability improves. By definition, model limitations comprise relatively negative statements, and they should not necessarily be viewed as serious flaws that affect the fitness for purpose of the model, but rather as a guide to where improvements should be made during work.*

The above model limitations are not considered to seriously affect the function of the model for predictive purposes. They serve as a guide for where improvements could be made in the future with the availability of additional data or with the improvement of hydrogeological understanding.

The following limitations may introduce a component of error associated with the predictive modelling results:

1. The model layers are a simplified representation of the natural aquifer and aquitard thickness and hydraulic parameters, and may not reflect the natural conditions with sufficient accuracy.
2. According to MDBC requirements, daily pool level fluctuations were not simulated in the model, which results in average values of salt load entering the River Murray.
3. Flood events were not required by the MDBC to be simulated in the model.
4. Floodplain processes of salt storage and release process were not modelled.
5. Groundwater salinities are assumed to remain constant when predicting future salt loads entering the river. However, groundwater salinity will most likely change in the future in response to accessions from brackish irrigation drainage
6. Model recharge zones and rates are likely to be different in the future to those used in predictive modelling.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 MODEL IMPROVEMENTS

DWLBC and Aquaterra have significantly revised and further calibrated the Border to Lock 3 numerical groundwater flow model reported in Aquaterra et al. (2006). This model is an 'impact assessment model of moderate complexity' in the terminology of the MDBC (2001). The model accommodates the Berri – Renmark area within a broad regional context, notably including the aquifer parameters (but not irrigation recharge processes) for the Loxton–Bookpurnong and Pike–Murtho areas. There is a need for further model refinements in other areas including Kingston, Moorook, New Residence and Pyap. The model has been accurately calibrated for the Berri – Renmark area using observed (historical) potentiometric heads. Sensitivity/uncertainty analysis, as specified by the Guideline (MDBC 2001), has been undertaken for transient conditions.

The Berri – Renmark model has been significantly improved by the following actions:

1. The Ral Ral creek system in the Renmark irrigation area has been simulated and treated as a path for salt into the River Murray.
2. Berri evaporation basin has been simulated in the model.
3. Salinity zones have been reviewed and further discretised.
4. Conductivity values and zones have been changed during the calibration process.
5. Recharge zones and rates have been adjusted to achieve better calibration results (matching observed hydrographs).
6. Caissons have been included in the model in the Berri and Renmark area.
7. Potential seepage has been simulated in the model at the edge of floodplain.

The net result has been a significant improvement of calibration results in the Berri - Renmark areas.

9.2 MODELLING RESULTS

The modelling work has resulted in an improved understanding of the hydrogeology of the aquifer system in the Berri – Renmark area. The model has been used to predict the flux of saline groundwater (salt load) entering the River Murray under different irrigation practices and development scenarios. Model results (salt loads) can be seen in Figure 53 and Tables 16 and 17.

The prediction results for salt loads entering the River Murray are different to those reported in Aquaterra et al. (2006). The reasons for the differences are listed above in Section 9.1.

Table 16. Summary of predicted salt load (t/day) entering the River Murray (Renmark Area)

	Year				
	1988	**2000**	**2006**	**2050**	**2106**
S–1	10.6	10.6	10.6	10.6	10.6
S–2	11.0	11.2	11.3	13.5	19.7
S–3A	68.1	68.1	68.1	68.4	68.5
S–3B	67.4	49.1	30.5	21.9	21.8
S–3C	67.4	49.1	30.5	21.9	21.7
S–4	67.4	50.6	31.9	23.4	23.4
S–5	67.4	50.6	31.9	33.4	35.5

Table 17. Summary of predicted salt load (t/day) entering the River Murray (Berri Area)

	Year				
	1988	**2000**	**2006**	**2050**	**2106**
S–1	10.1	10.1	10.1	10.1	10.1
S–2	11.8	11.9	11.9	12.4	13.3
S–3A	13.5	13.9	14.0	14.9	15.5
S–3B	13.4	13.8	14.0	14.8	15.3
S–3C	13.4	13.8	13.9	14.7	15.2
S–4	13.4	13.9	14.1	14.9	15.5
S–5	13.4	13.9	14.1	14.9	15.5

9.3 GROUNDWATER MANAGEMENT SCHEMES

At the time of writing, the Berri – Renmark SIS is still at an investigation stage and will undergo further investigation to advance to a preliminary conceptual design stage. In general terms, the scheme may involve using existing caissons and the construction of production wells completed within the Loxton Sands and Monoman Formation to control the flux of saline groundwater from irrigation areas.

9.4 RECOMMENDATIONS

The following work is recommended to address some of the model limitations:

1. Further refine salinity zones applied in the model – review existing data and obtain new data.
2. Install more observation wells to obtain groundwater level data where data is absent or sparse.
3. Improve the understanding of the conceptual hydrogeological model.
4. Further field investigations to resolve conceptual data gaps in key areas.

FIGURES

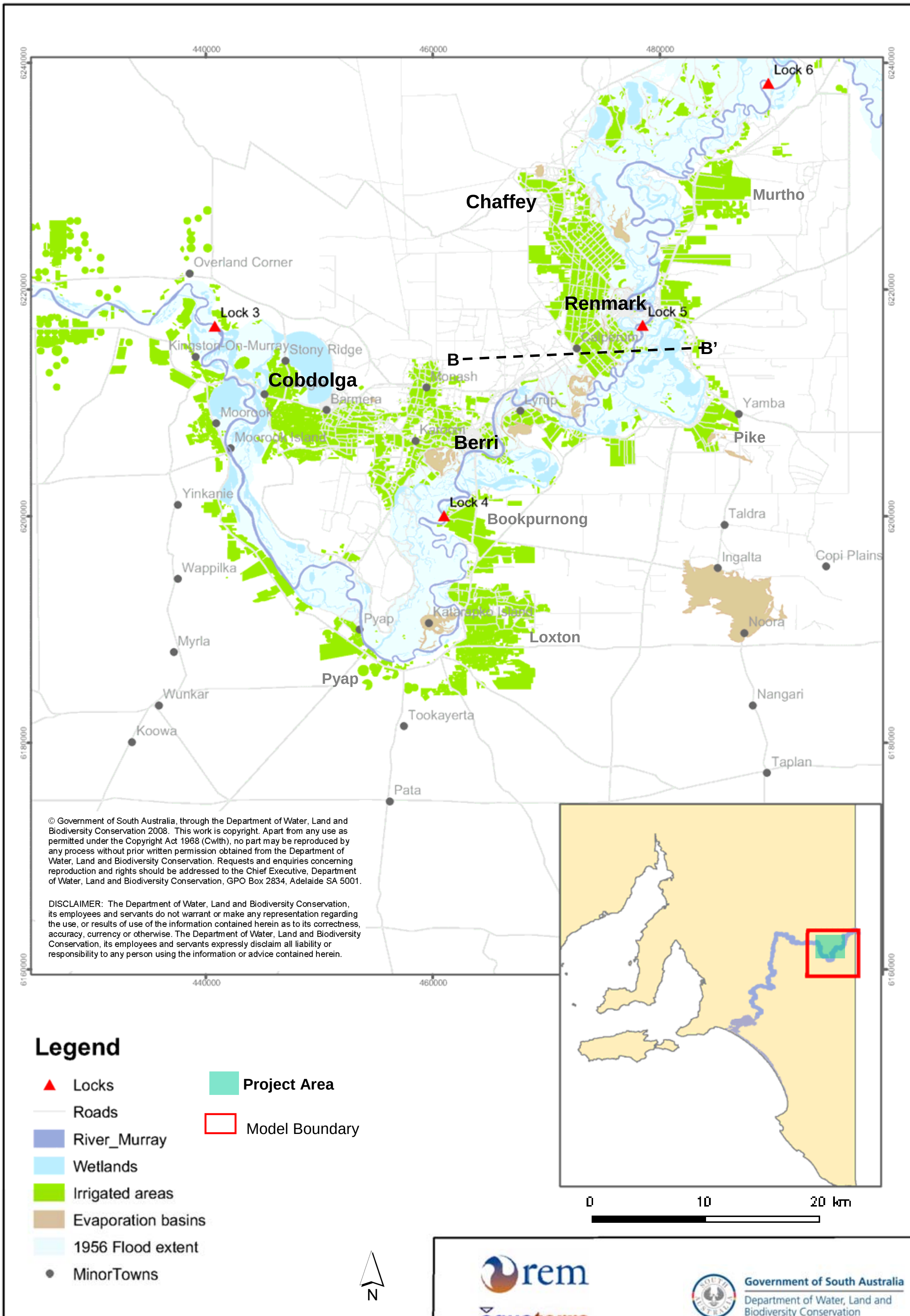


Figure 1: Project site map and model Domain (after Aquaterra et al. 2006)

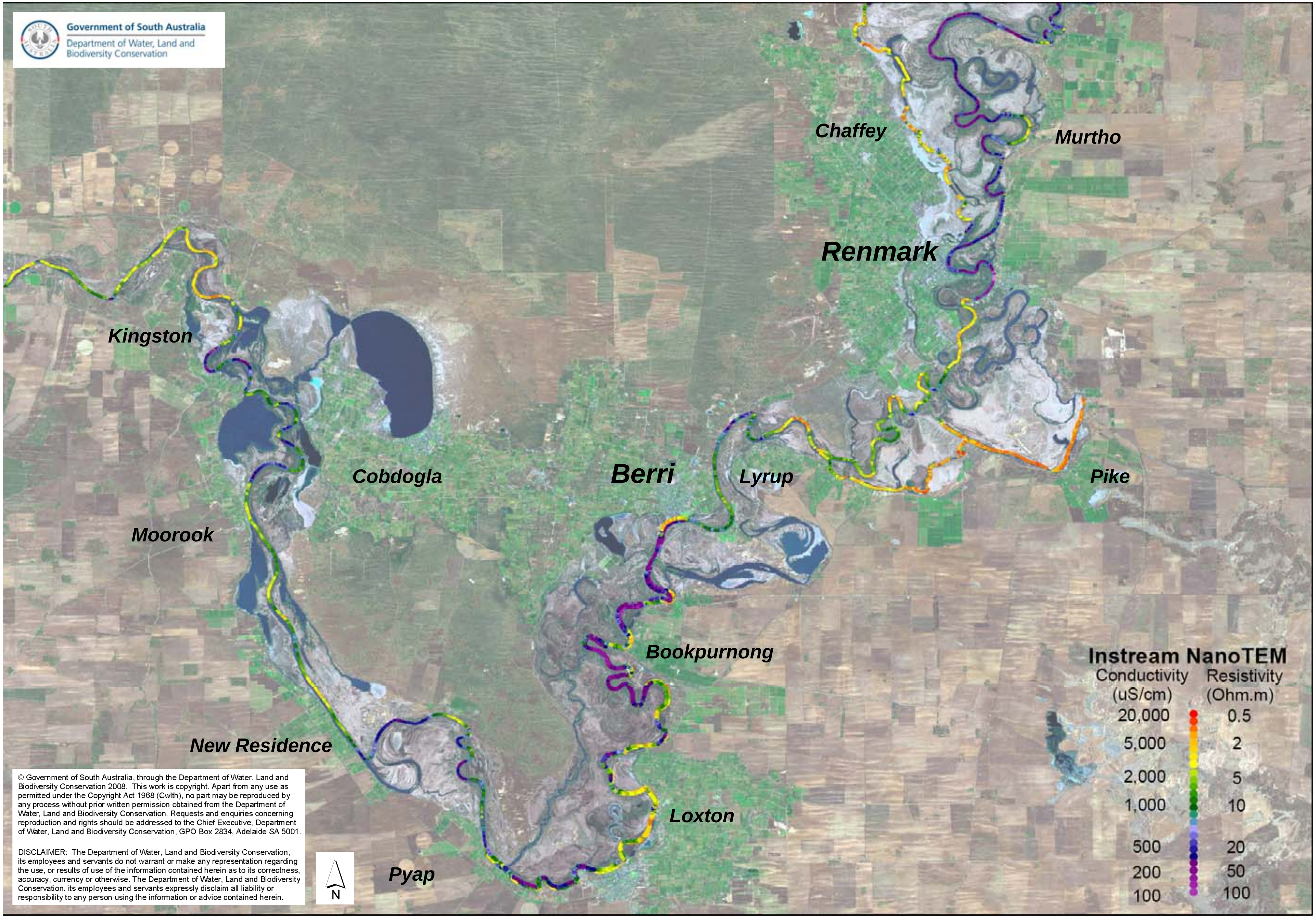


Figure 2: Aerial photography and NanoTEM results from Lock 6 to Lock 3 (2005 survey)

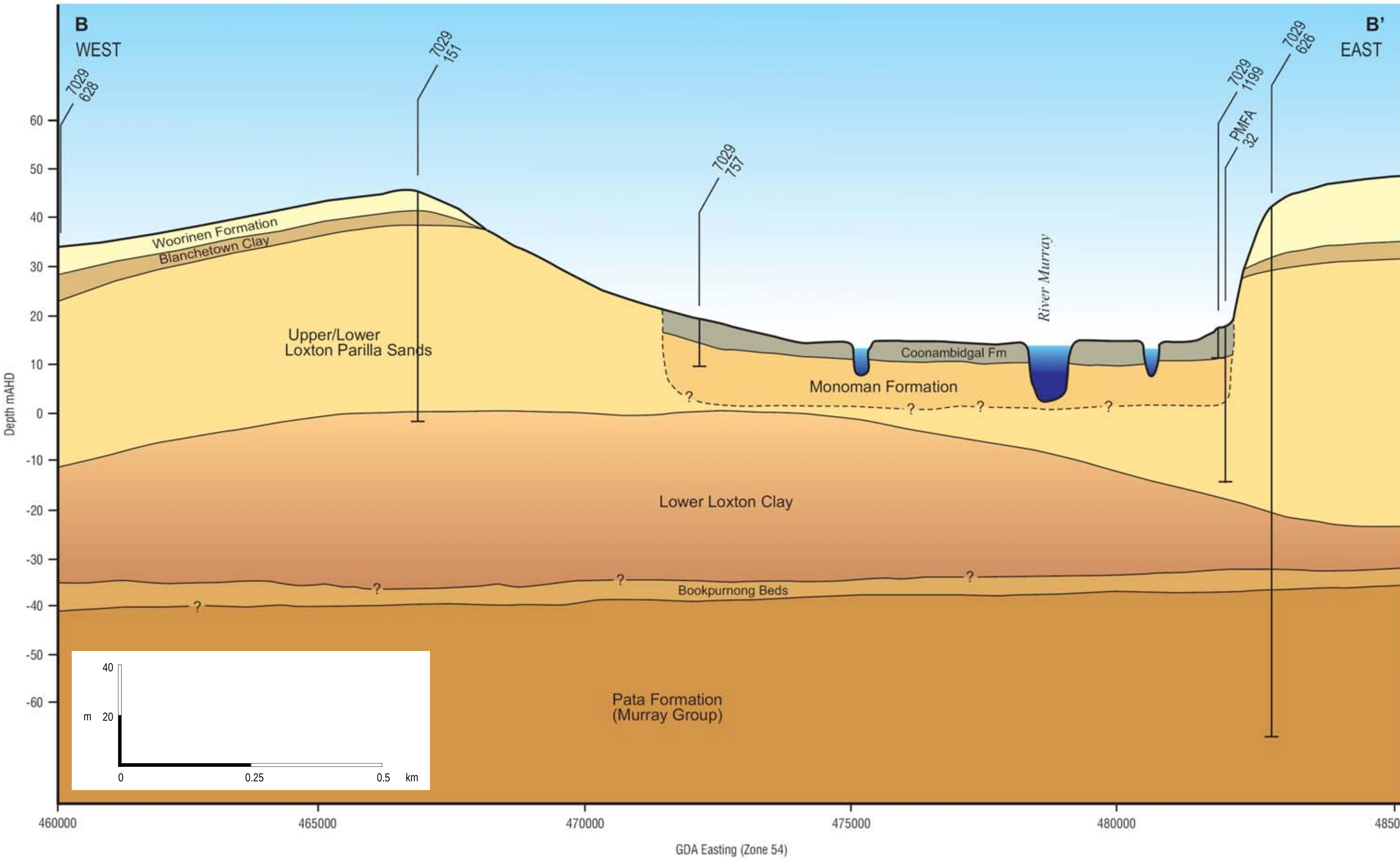


Figure 3: Hydrogeological cross-section (see Figure 1 for line of section) (REM-Aquaterra 2005)

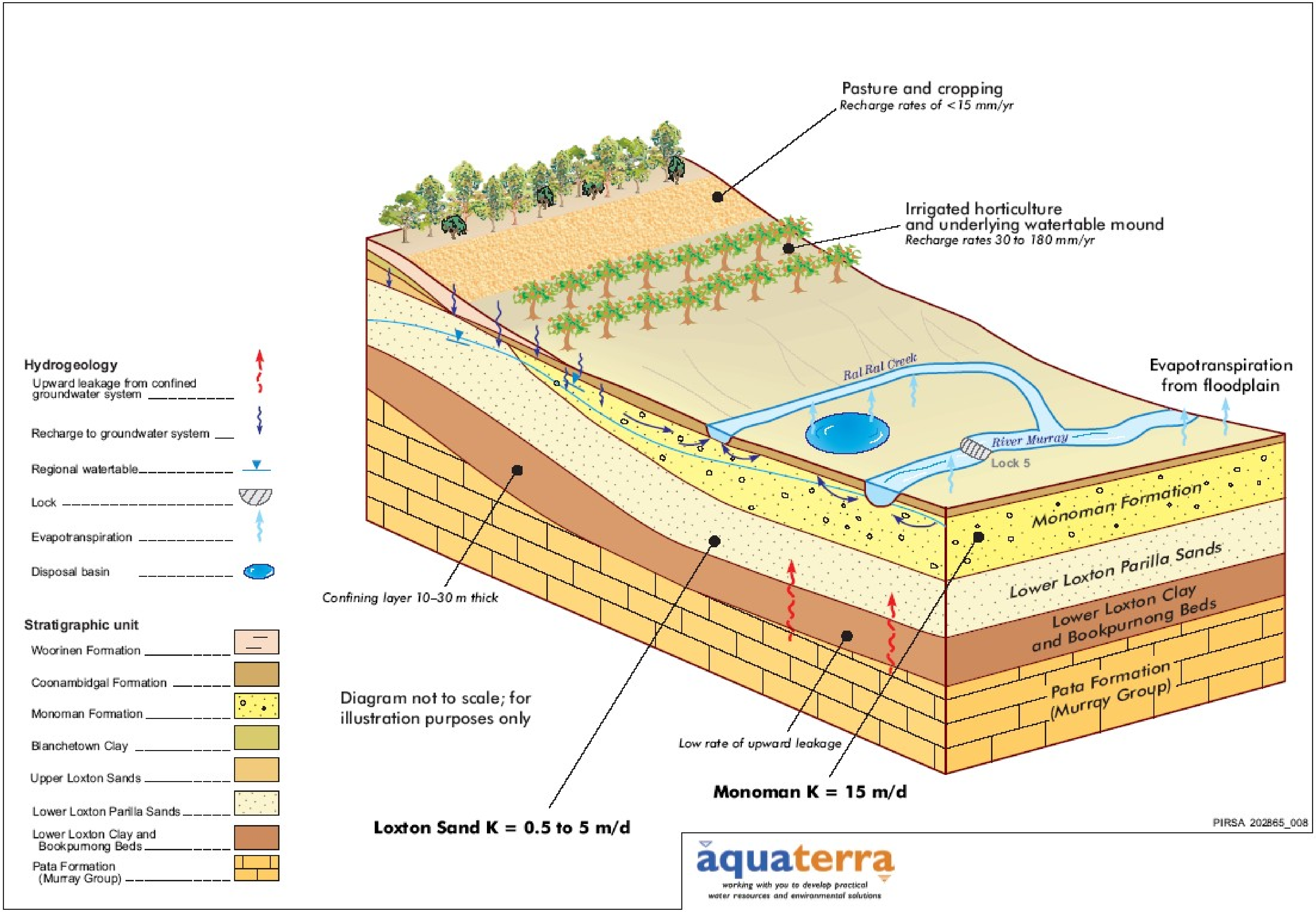


Figure 4: Elementary conceptual hydrogeological model

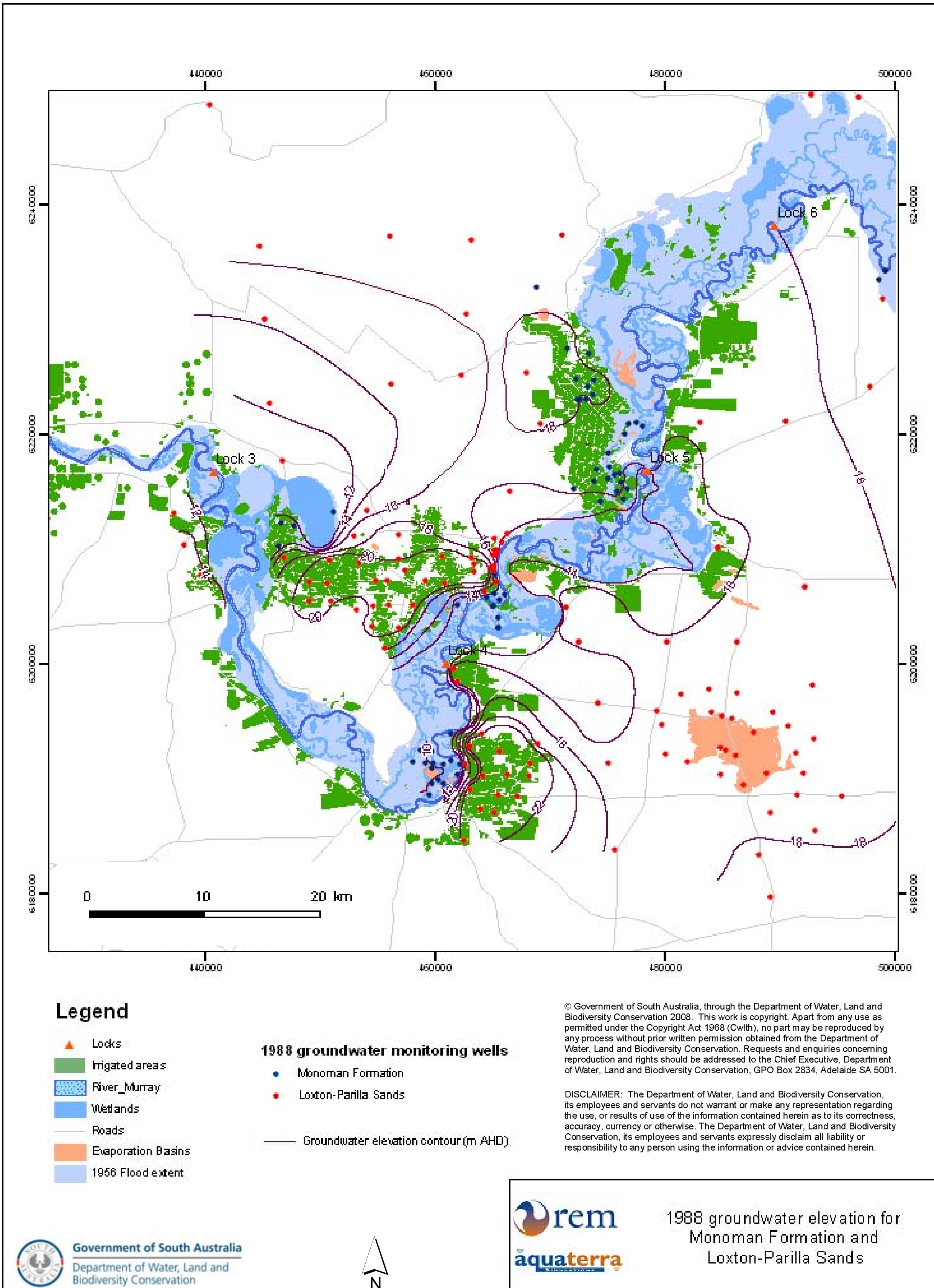


Figure 5a: Loxton Sands and Monoman Formation potentiometric surface, 1988 (after Aquaterra et al. 2006)

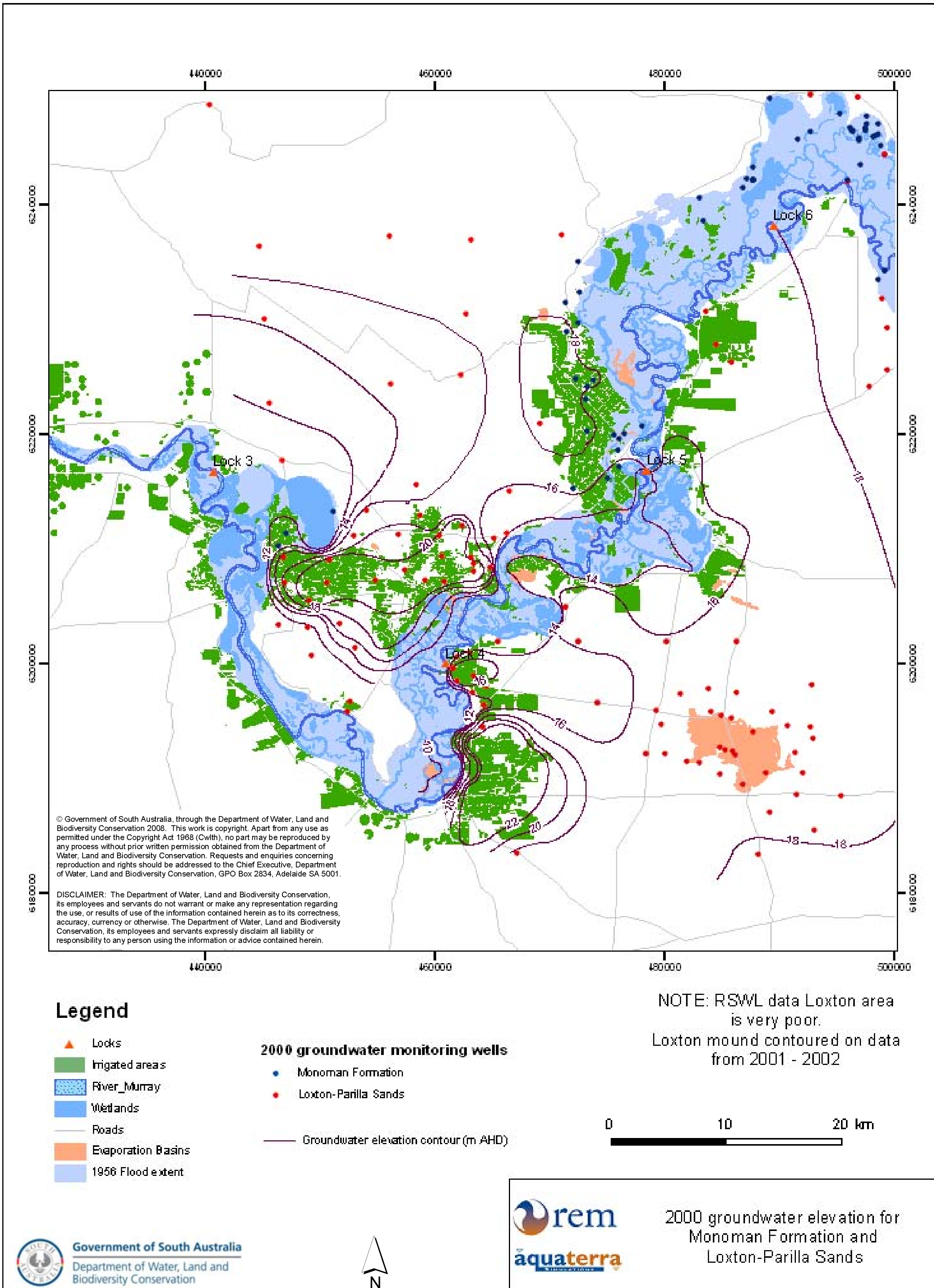


Figure 5b: Loxton Sands and Monoman Formation potentiometric surface, 2000 (after Aquaterra et al. 2006)

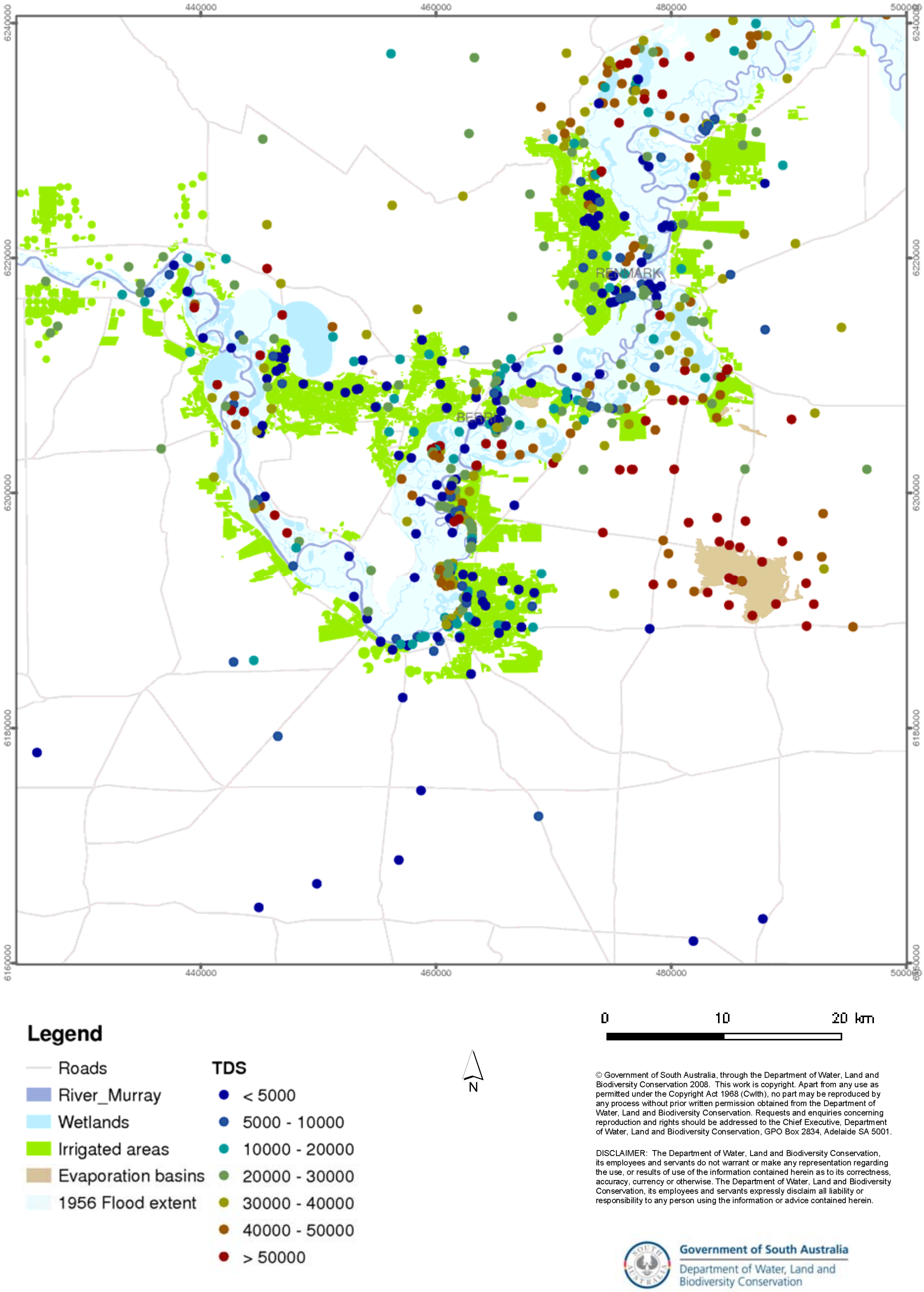
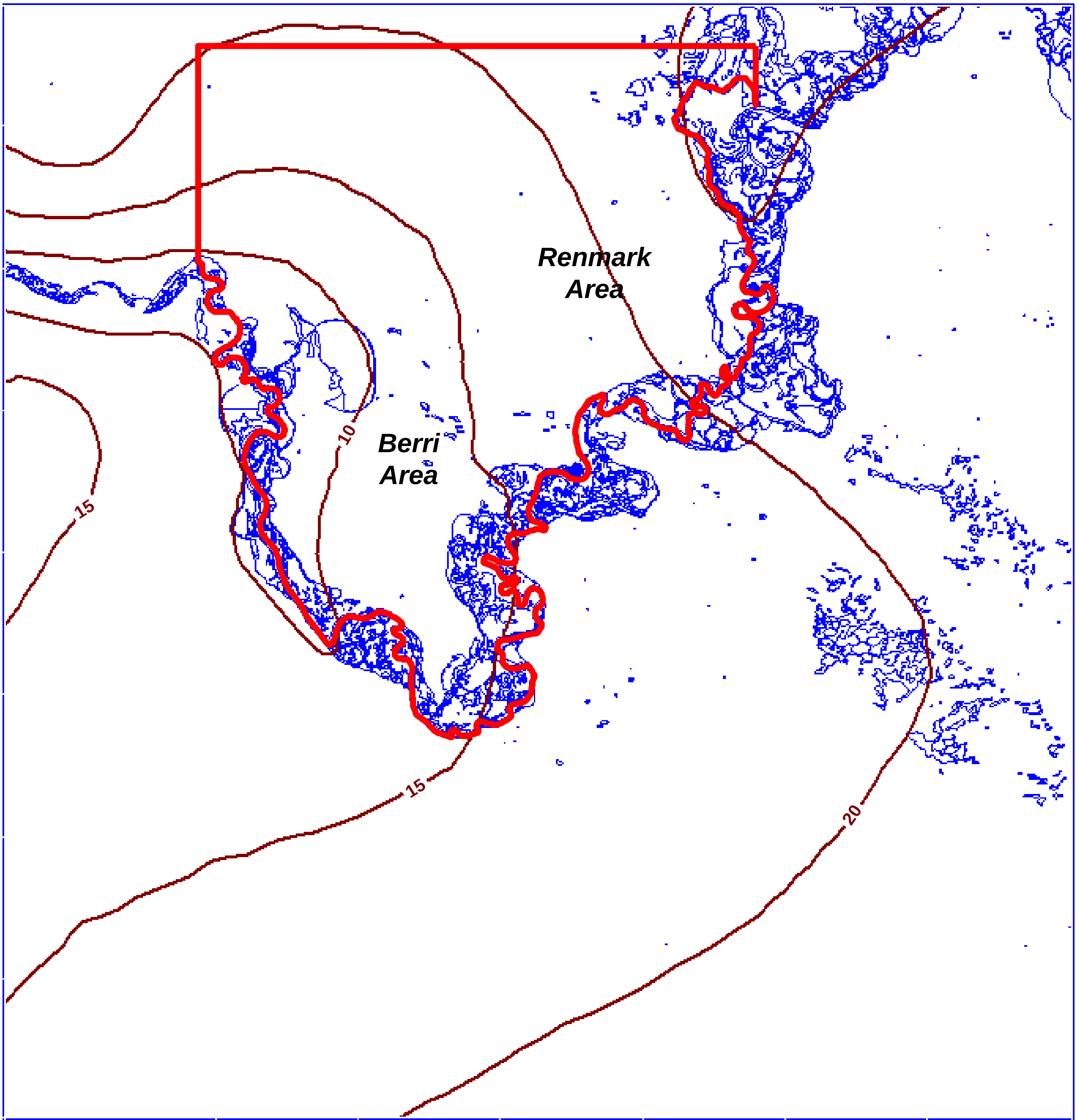


Figure 6: Groundwater salinity values for the Loxton Sands and Monoman Formation aquifers (after Aquaterra et al. 2006)



Anabranch, Backwater or Waterbody

Modelled Potentiometric Head Contour (m AHD)

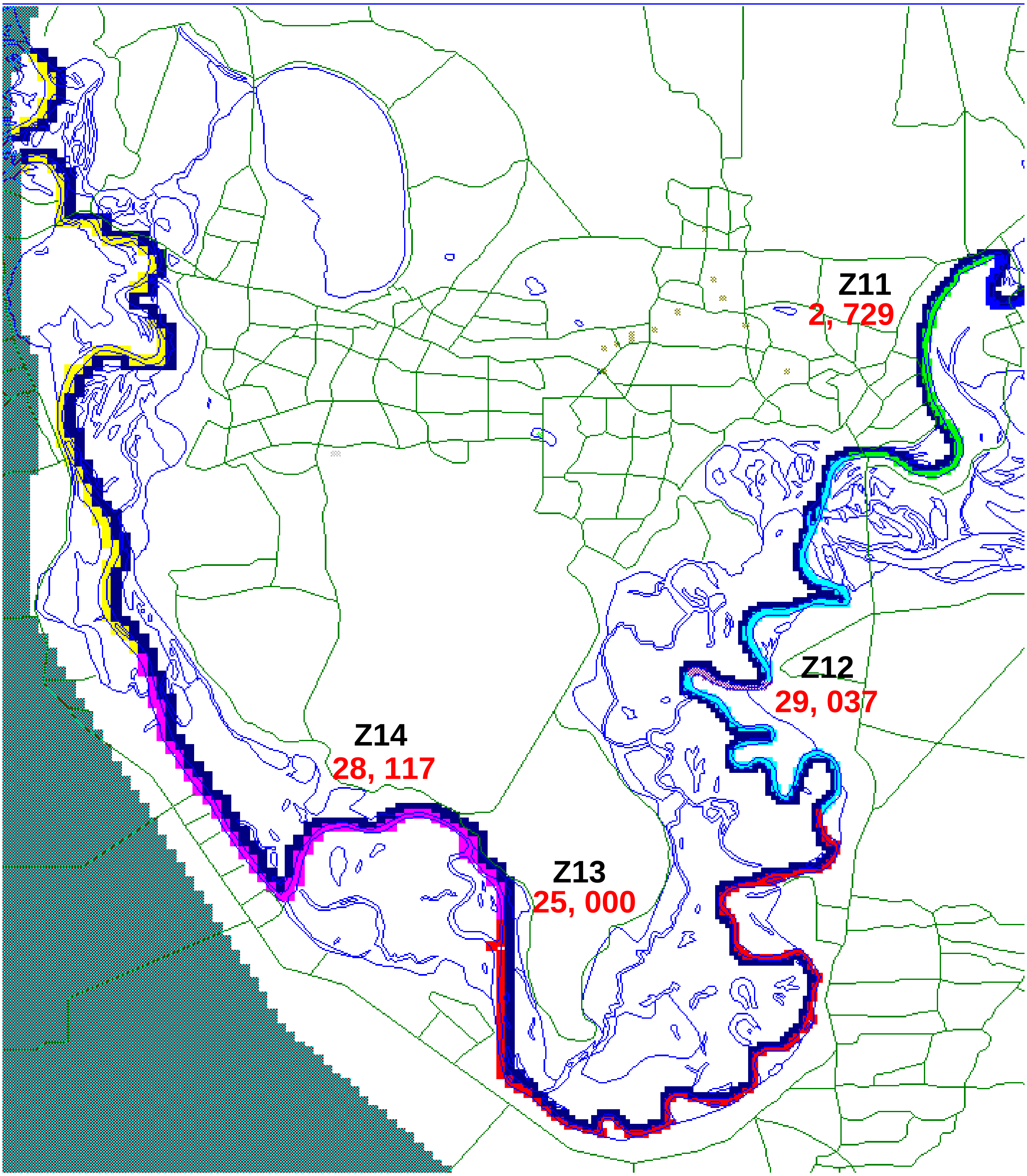
Project Area

N

0 5 10 km

Government of South Australia
Department of Water, Land and Biodiversity Conservation

Figure 7: Murray Group Limestone potentiometric surface 1990 (Hydrogeological map)



Anabranch, Backwater or Waterbody

Budget Zone

Z11 Zone Number

40,000 Salinity (TDS mg/L)

N

0 3 6 km

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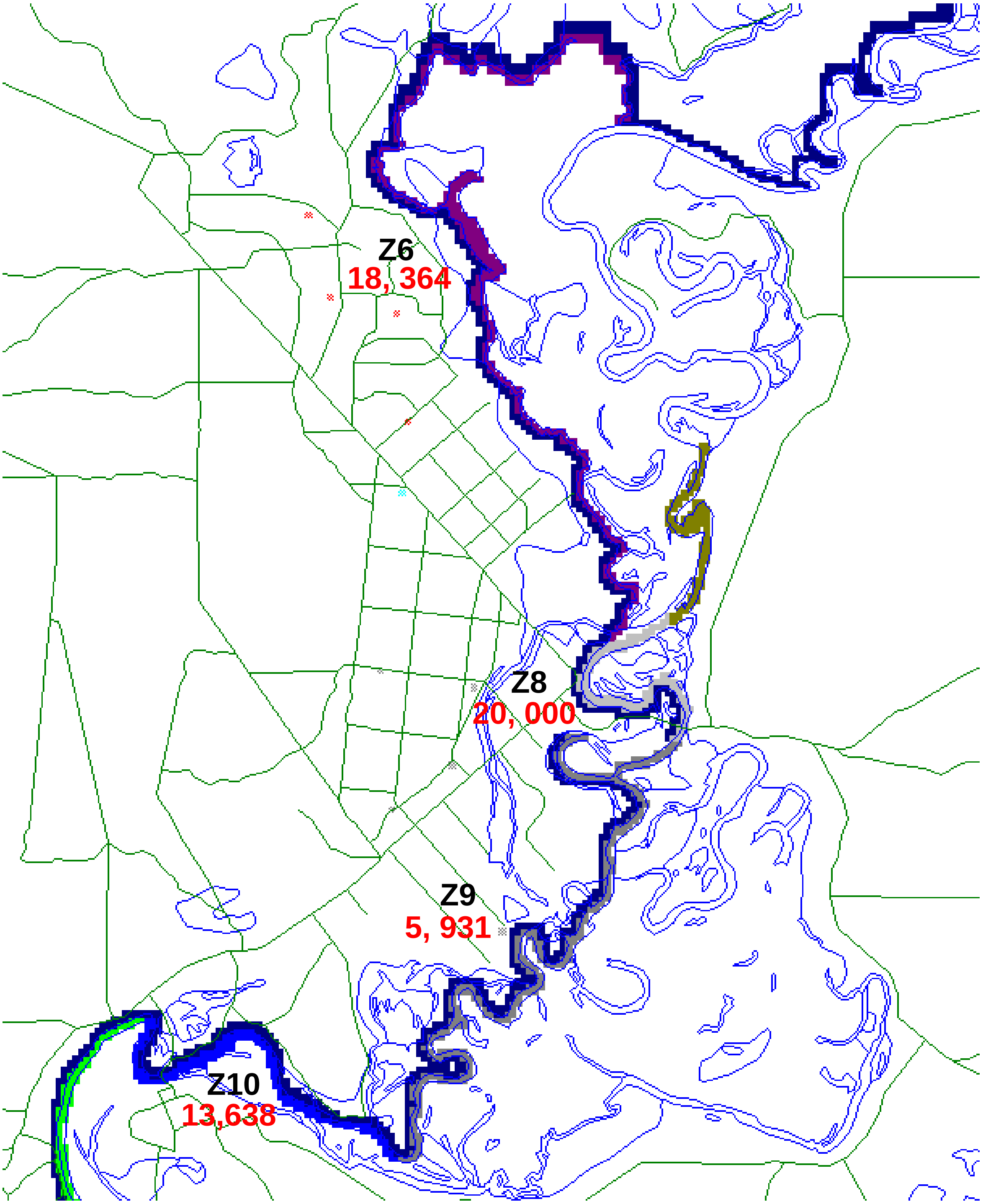
Figure 8a: Flow budget zones (model layer 1) and adopted groundwater salinity values (TDS mg/L) in the Berri area



Anabranch, Backwater or Waterbody

Budget Zone

Z9 Zone Number

20,000 Salinity (TDS mg/L)

N

0 3 6 km

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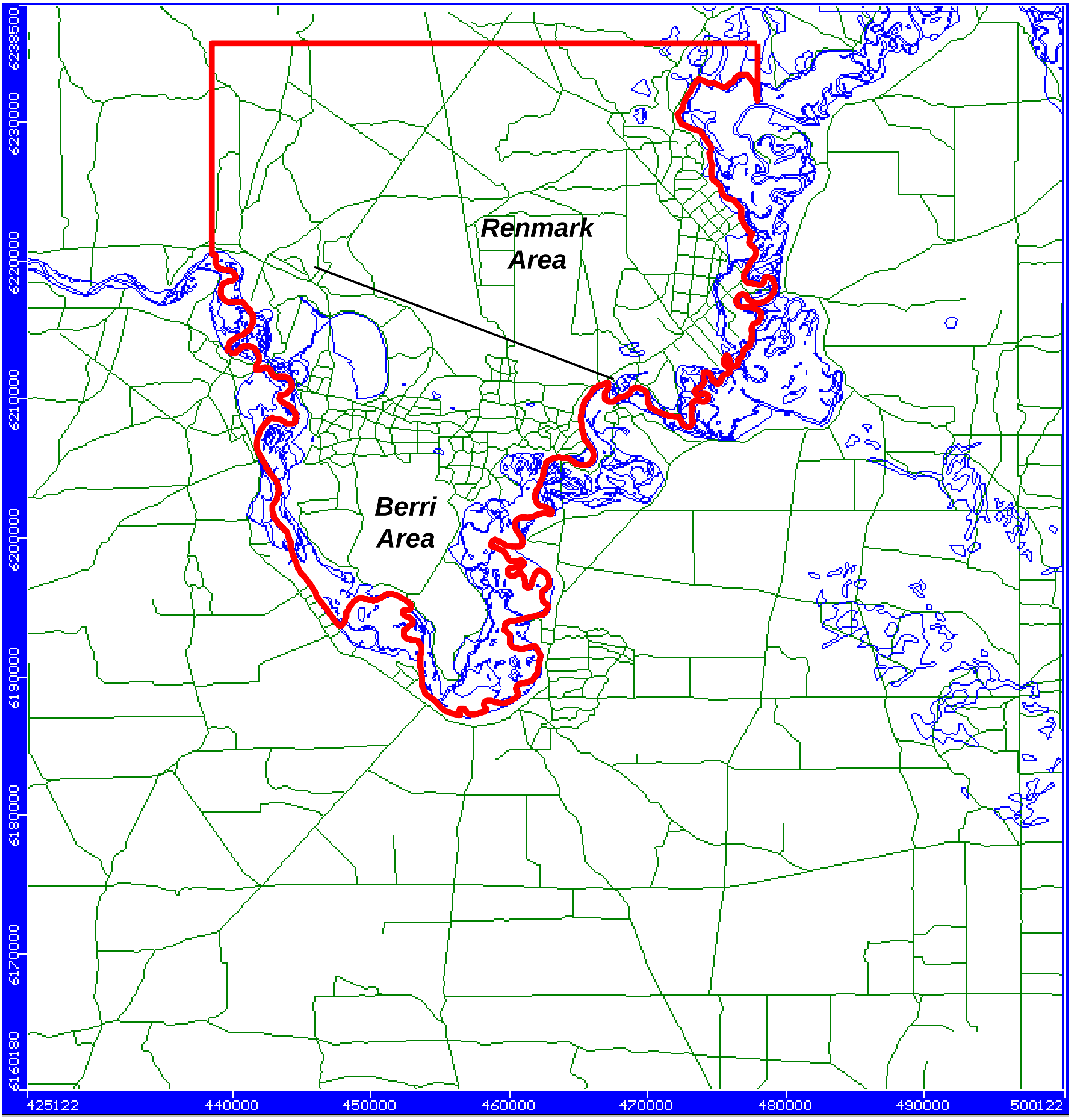
Department of Water, Land and Biodiversity Conservation

Figure 8b: Flow budget zones (model layer 1) and adopted groundwater salinity values (TDS mg/L) in the Renmark area



Anabranch, Backwater or Waterbody

Road

Project Area

N

0 5 10 km

Government of South Australia
Department of Water, Land and Biodiversity Conservation

Figure 9: Border to Lock 3 model domain and project area

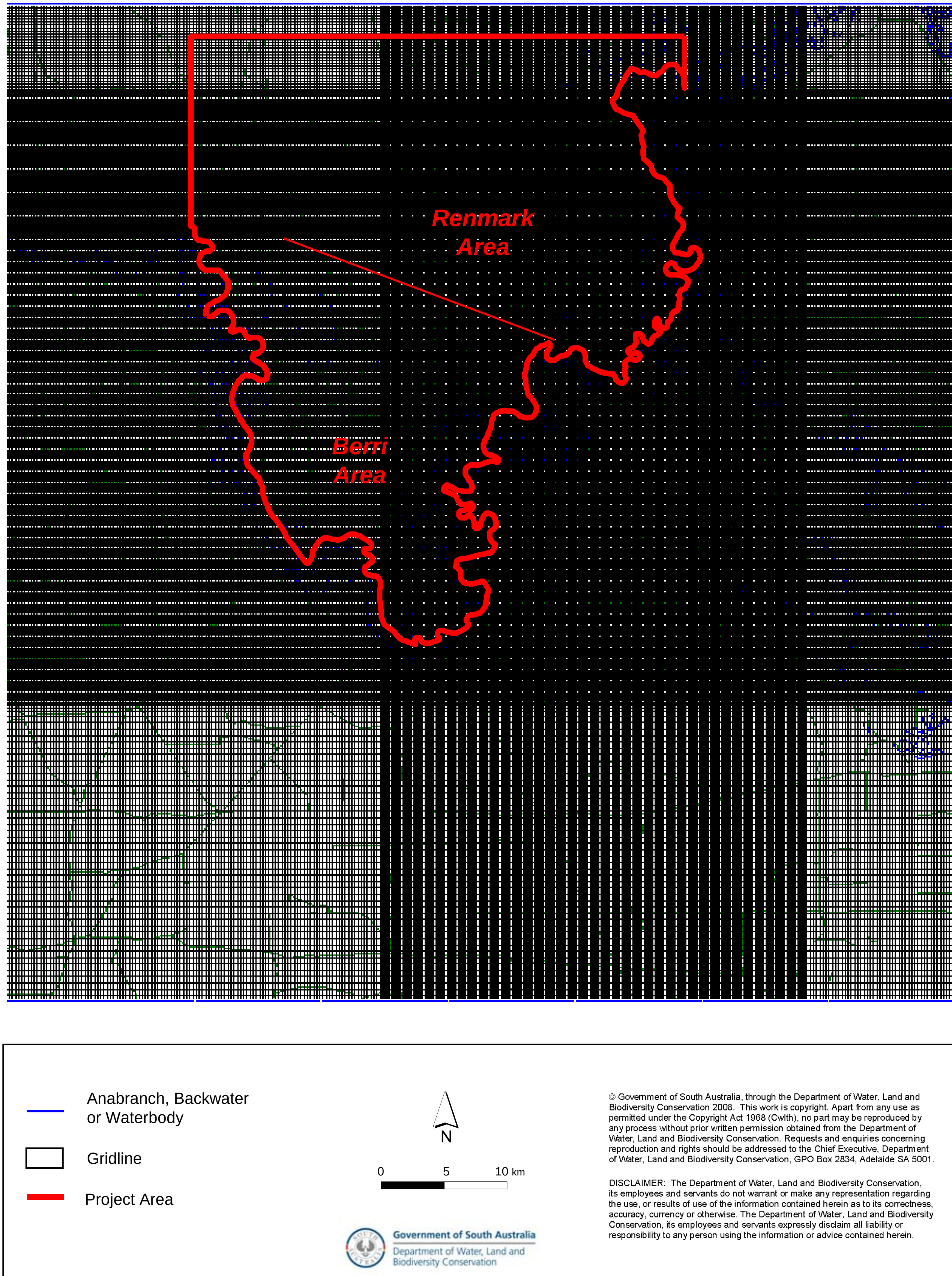


Figure 10: Border to Lock 3 model grid

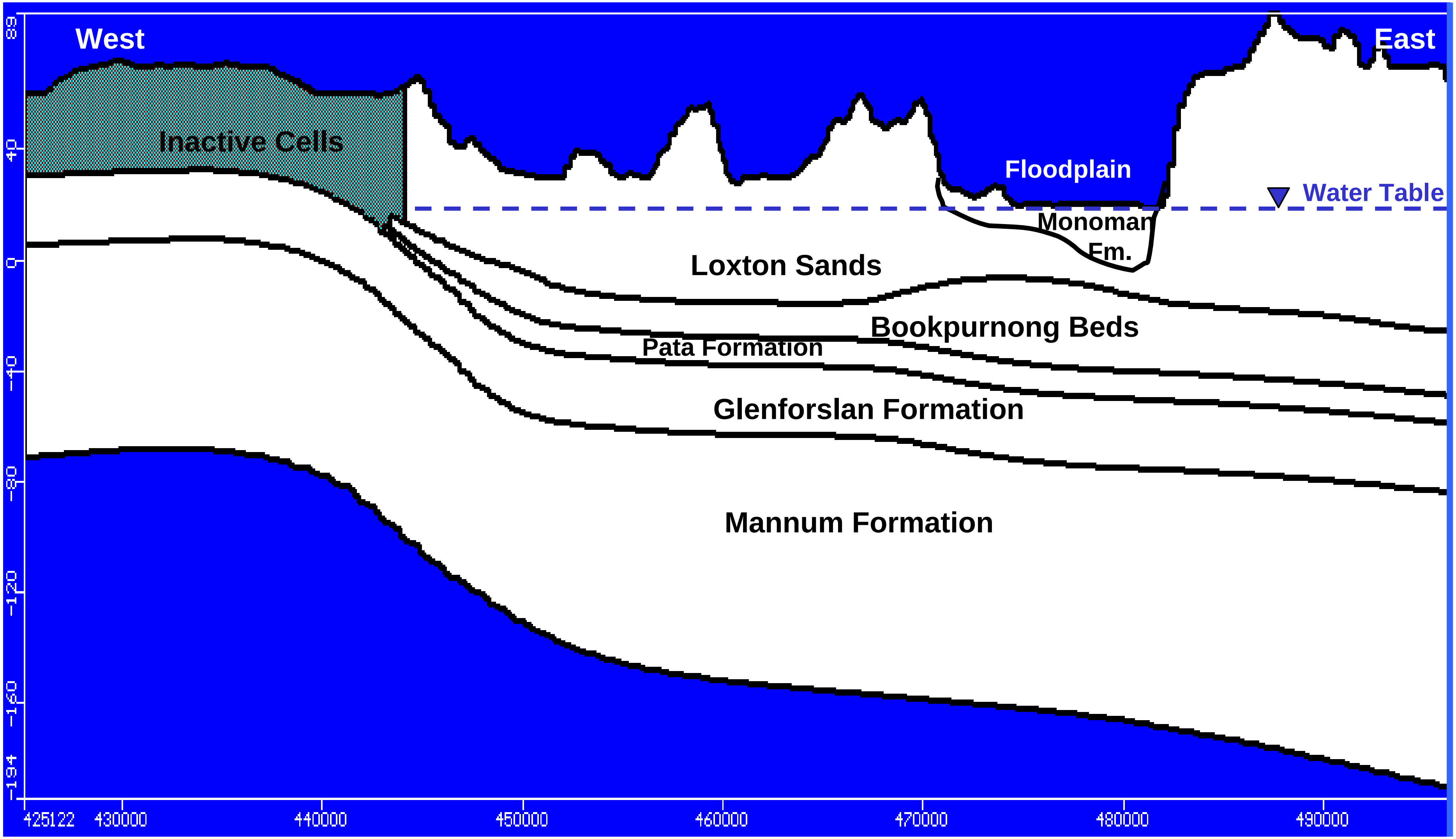
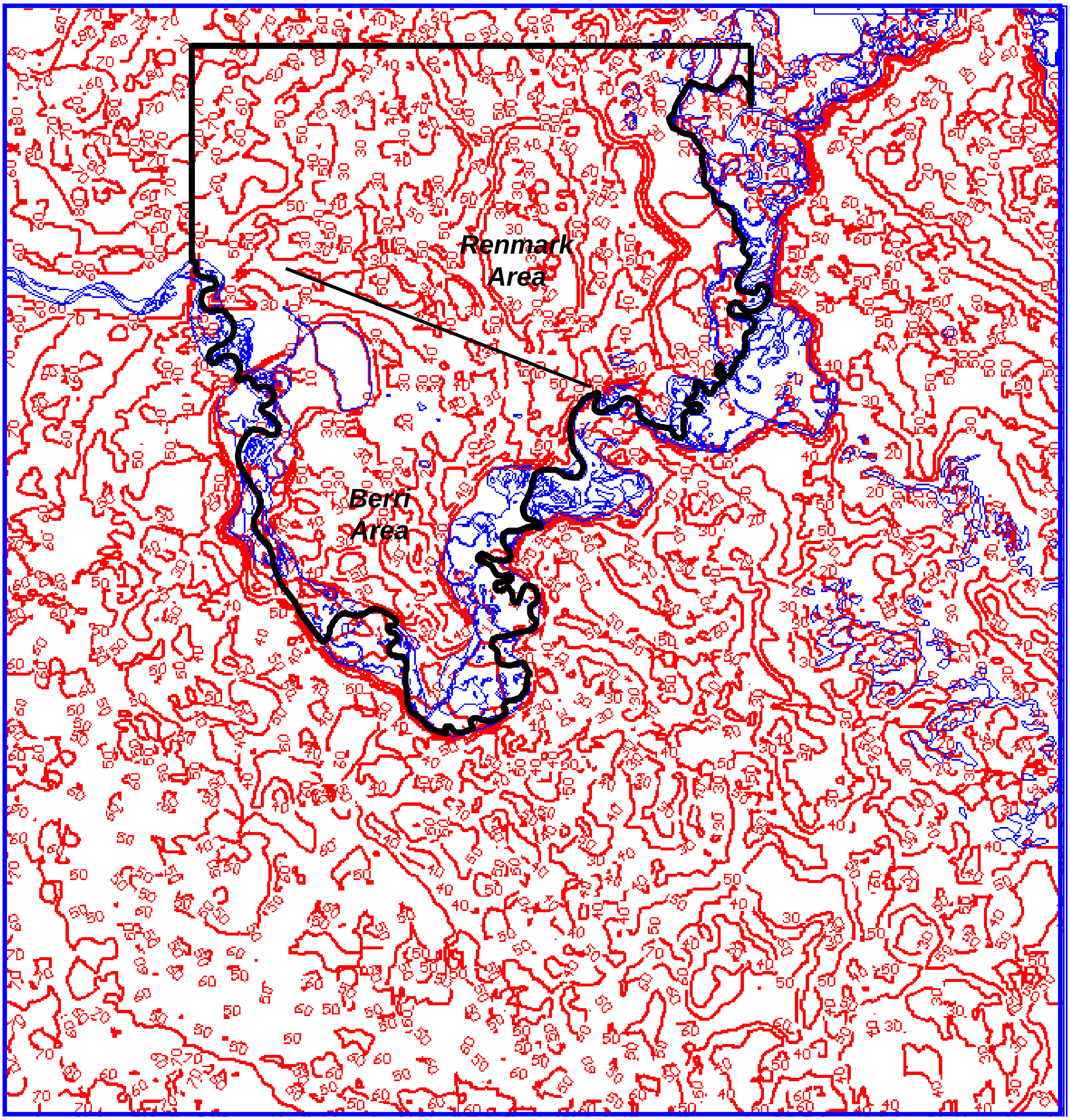


Figure 11: Border to Lock 3 model layers (Cross-section through model row 76, approx. N6226370)



Anabranch, Backwater or Waterbody

Elevation Contour (m AHD)

Project Area

N

0 5 10 km

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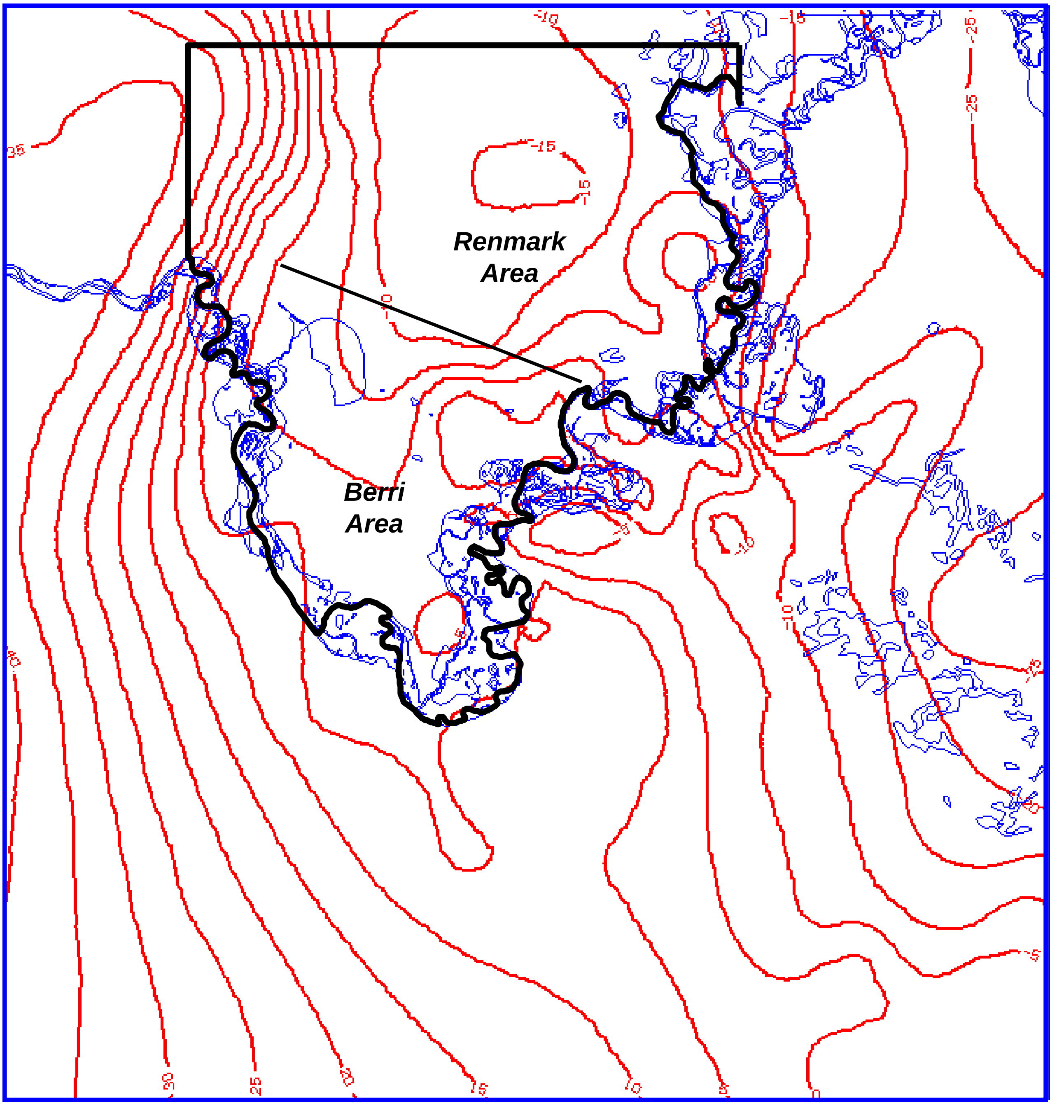
Figure 12: Ground surface elevation contours (m AHD)



Anabranch, Backwater or Waterbody

Elevation Contour (m AHD)

Project Area

N

0 5 10 km

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Figure 13: Top of model layer 2 elevation contours (m AHD)

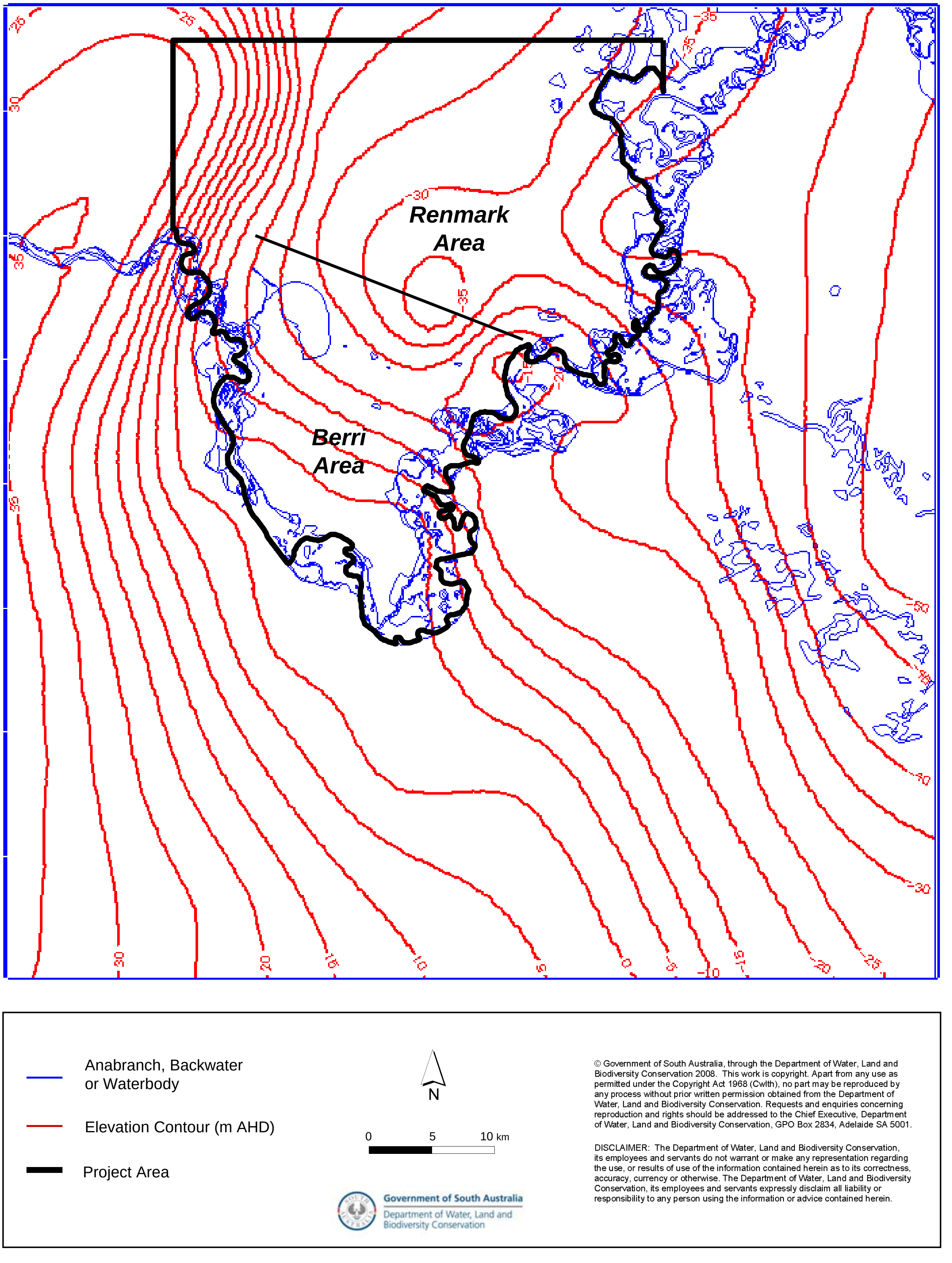


Figure 14: Top of model layer 3 elevation contours (m AHD)

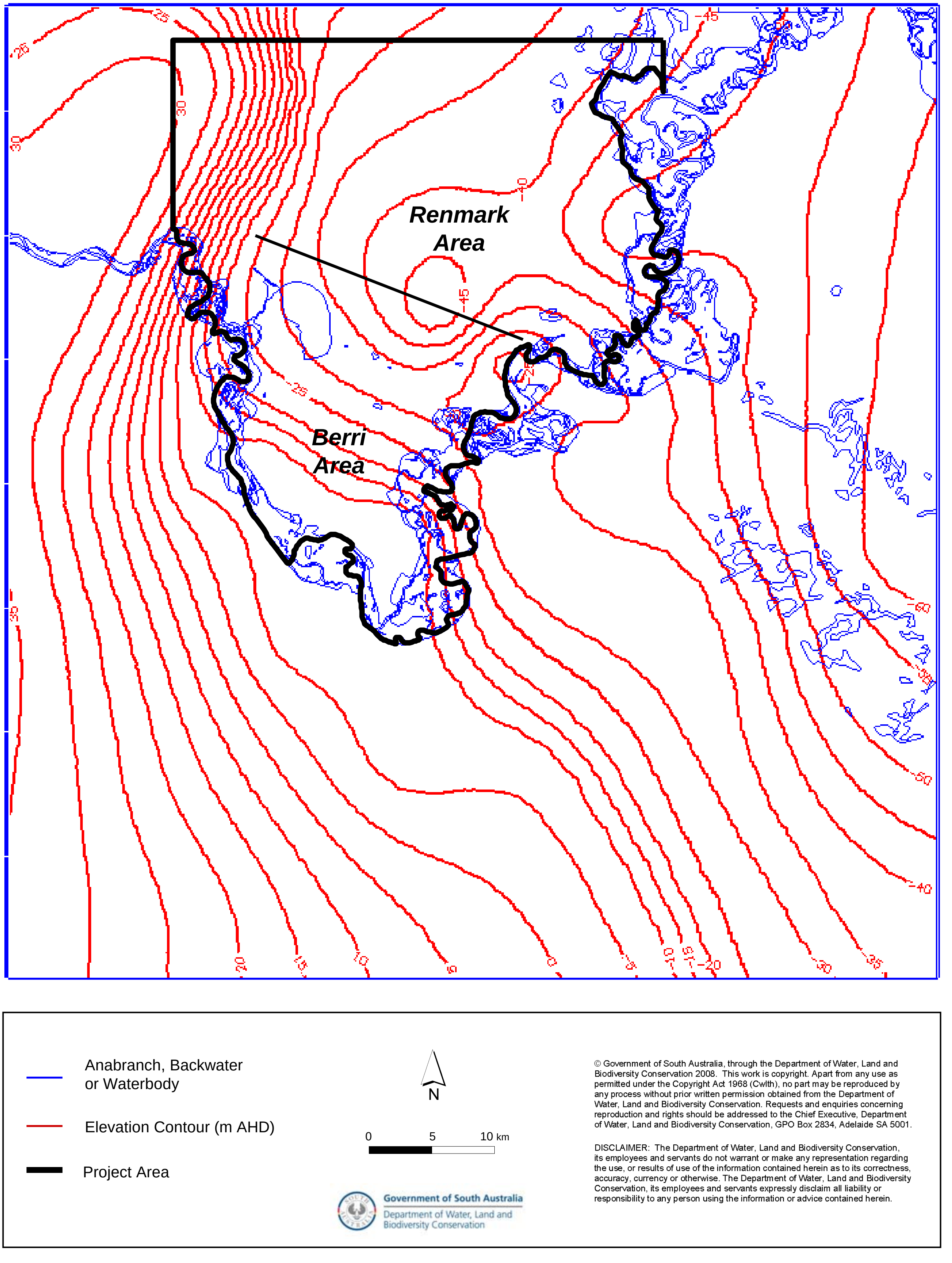
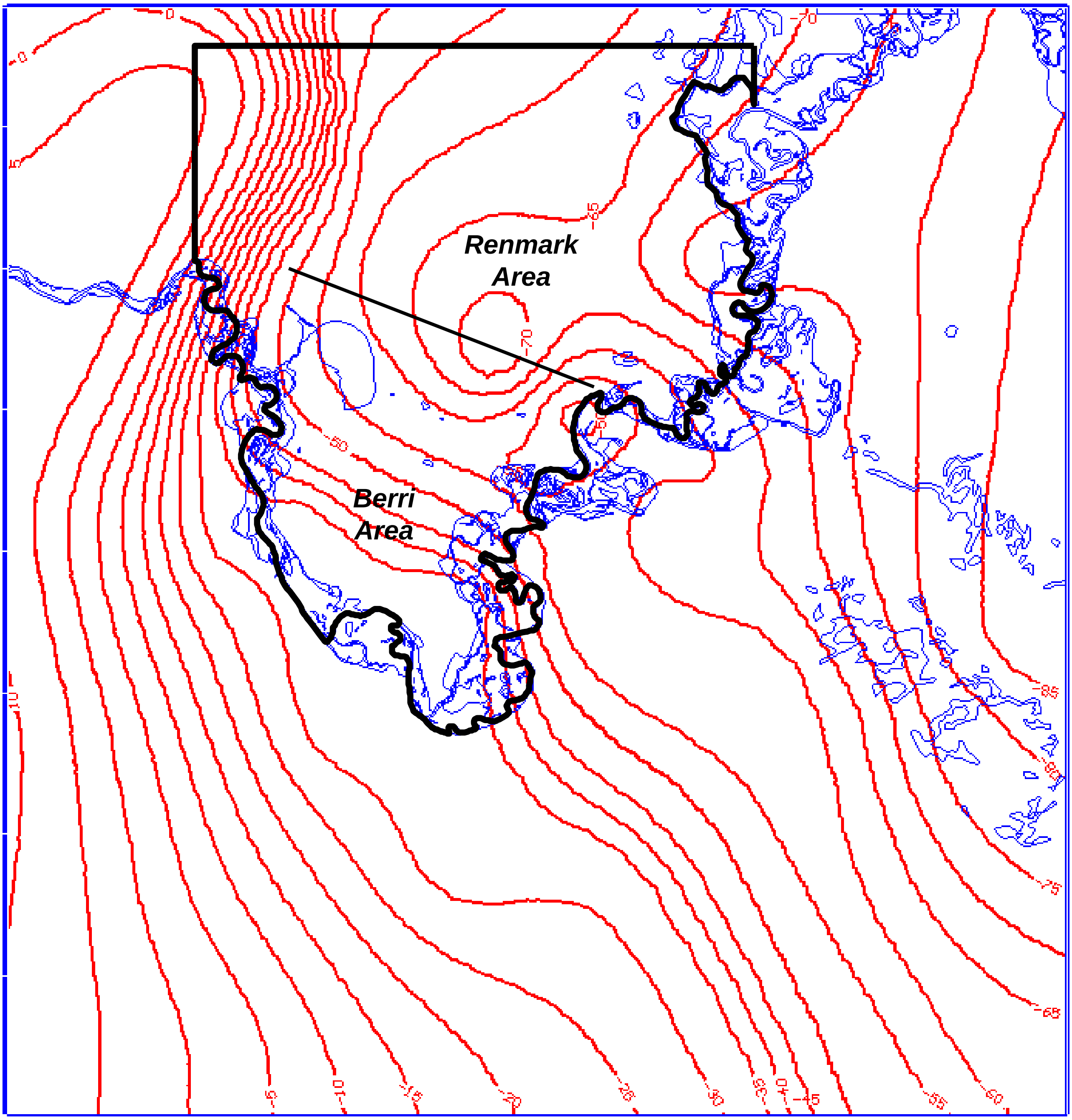


Figure 15: Top of model layer 4 elevation contours (m AHD)



Anabranch, Backwater or Waterbody

Elevation Contour (m AHD)

Project Area

N

0 5 10 km

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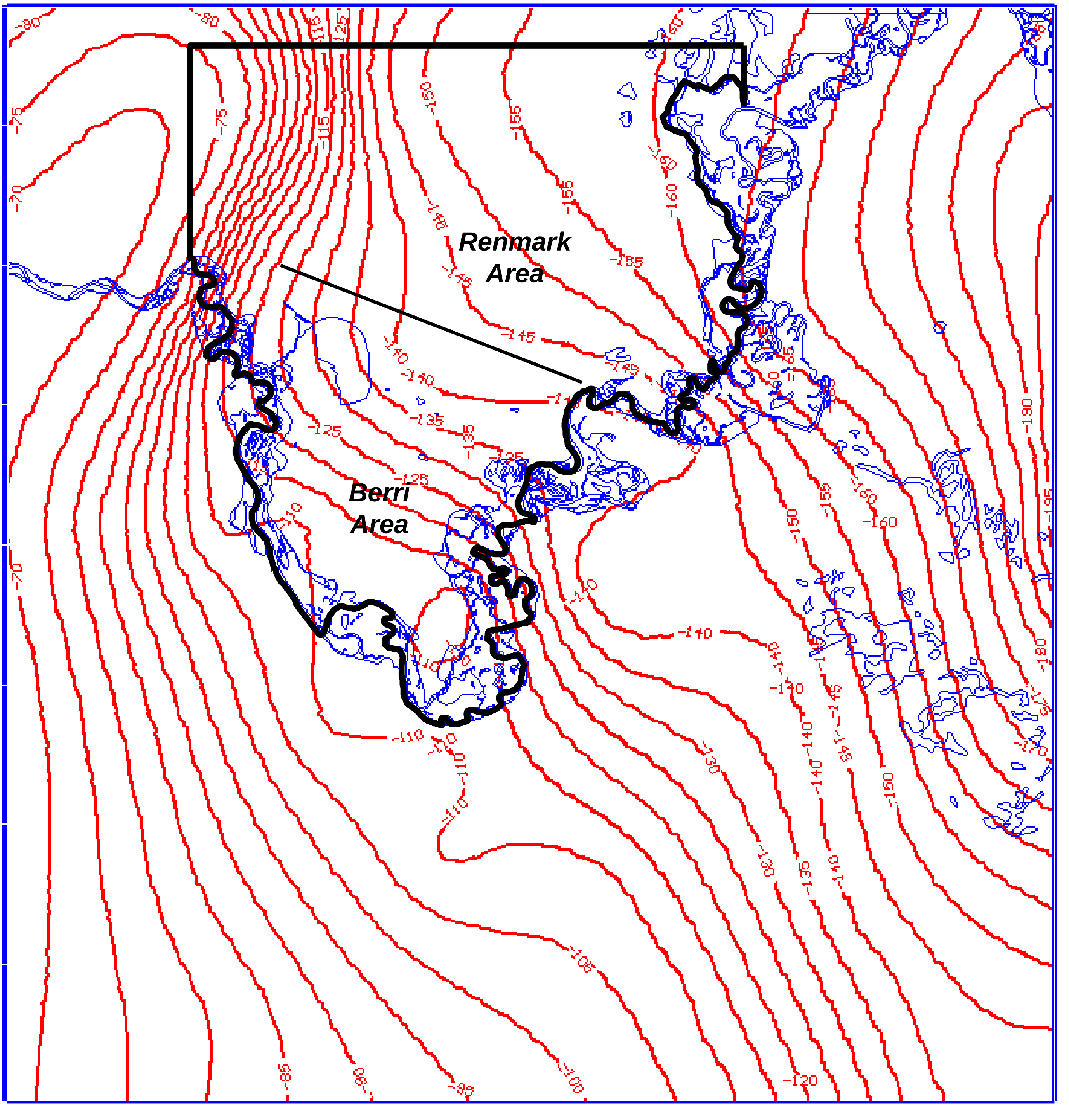
Figure 16: Top of model layer 5 elevation contours (m AHD)



Anabranch, Backwater or Waterbody

Elevation Contour (m AHD)

Project Area

N

0 5 10 km

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Figure 17: Base of model layer 5 elevation contours (m AHD)

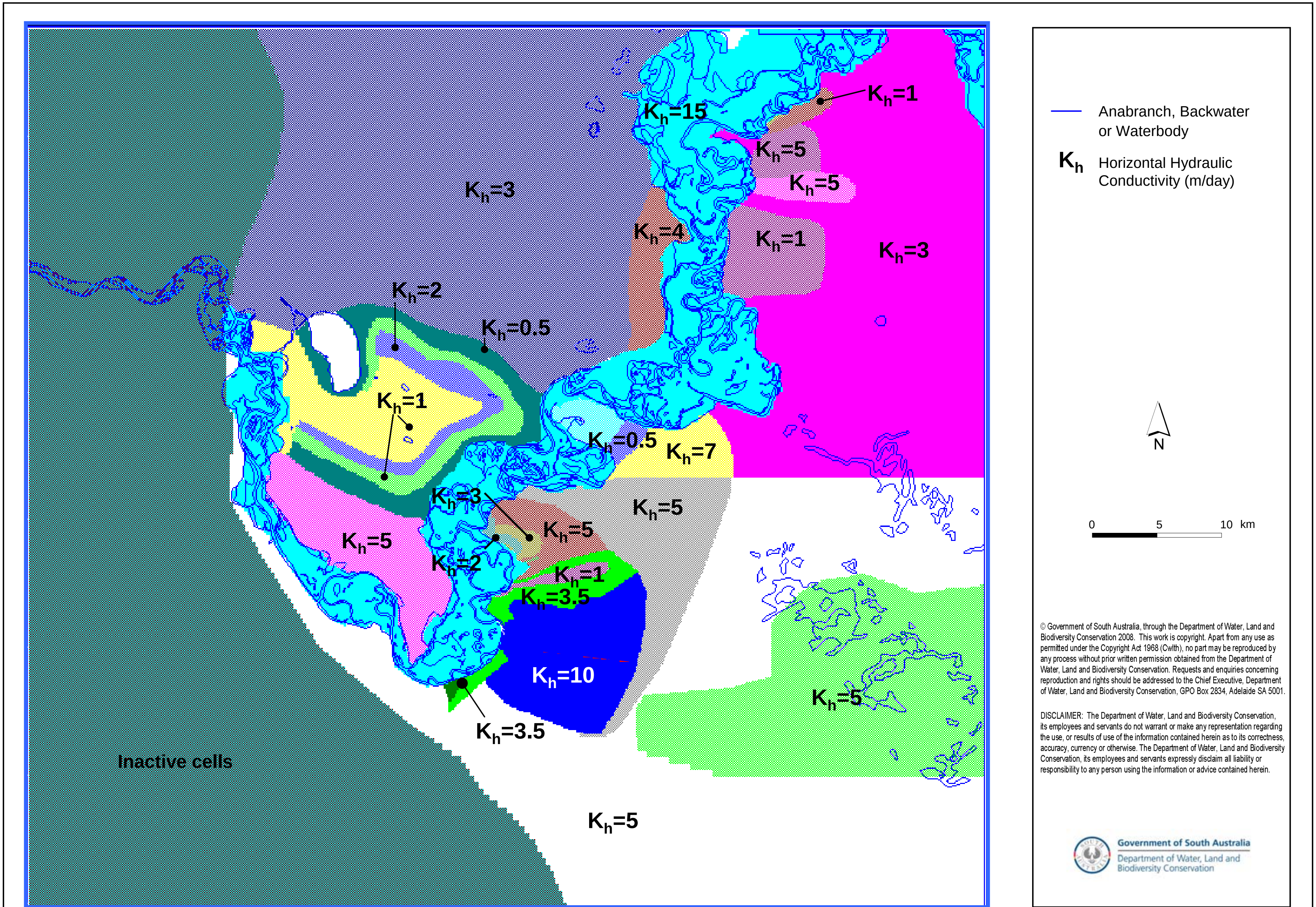


Figure 18: Model hydraulic conductivity zones and values (layer 1)

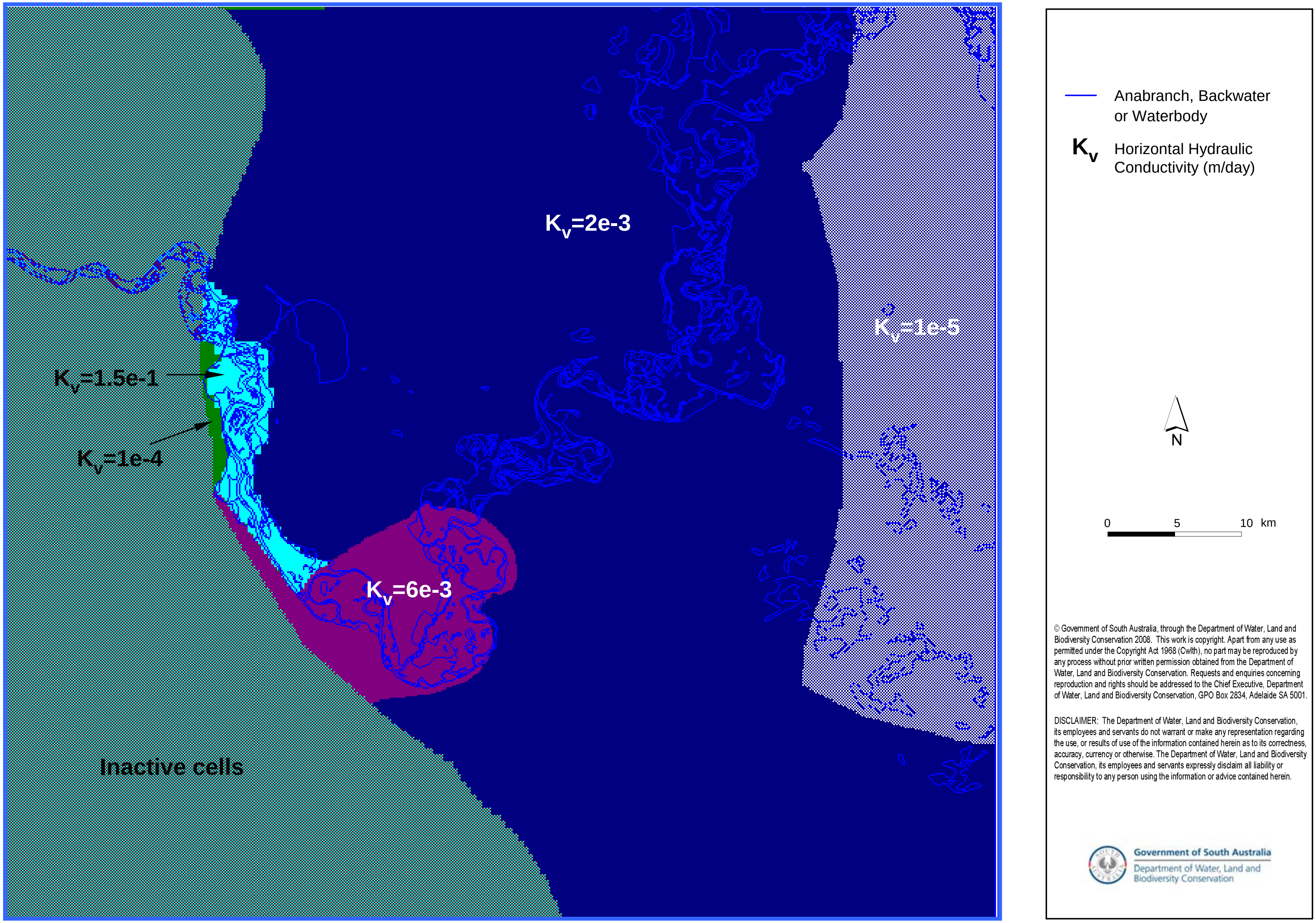


Figure 19: Model hydraulic conductivity zones and values (layer 2)

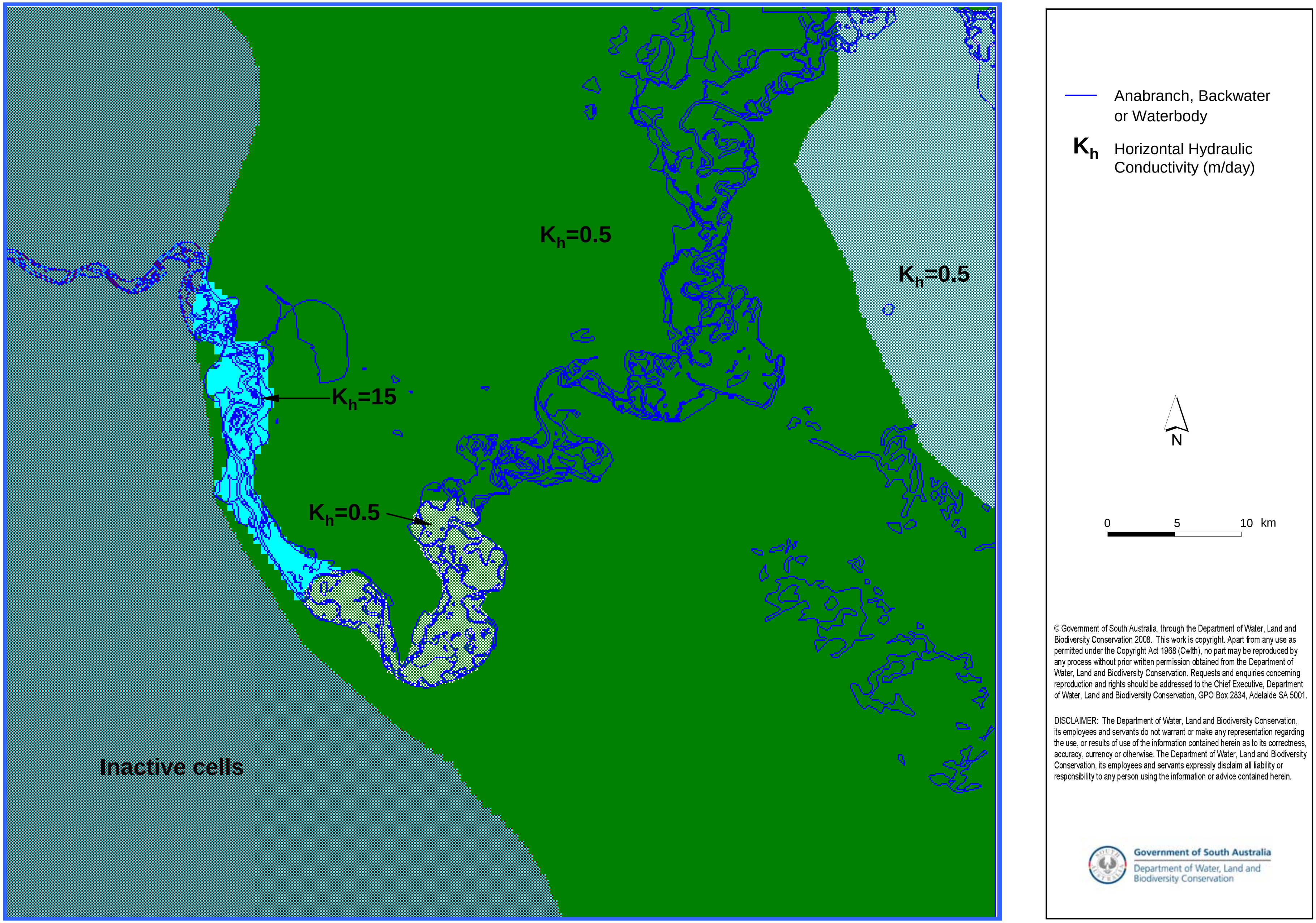


Figure 20: Model hydraulic conductivity zones and values (layer 3)

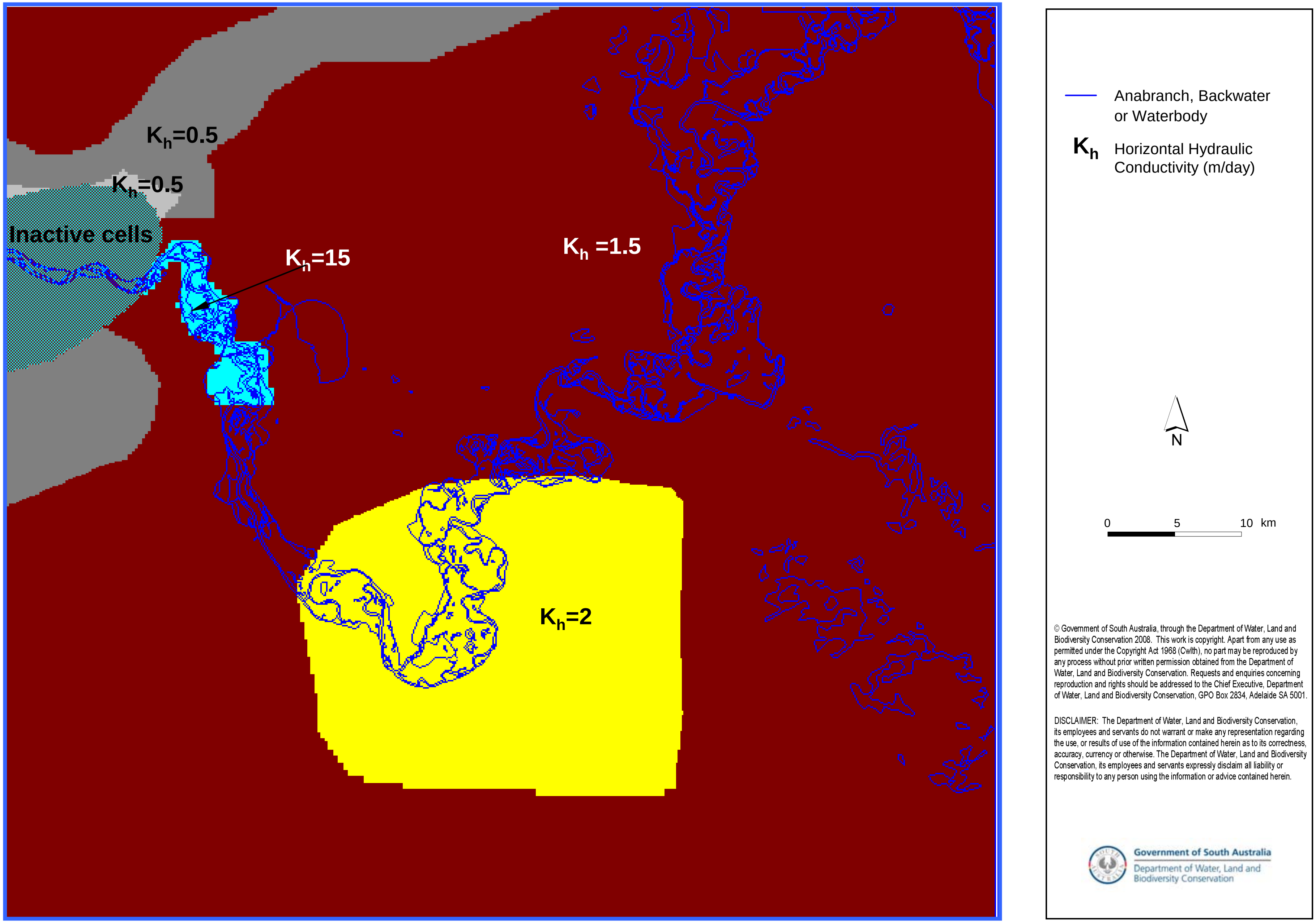


Figure 21: Model hydraulic conductivity zones and values (layer 4)

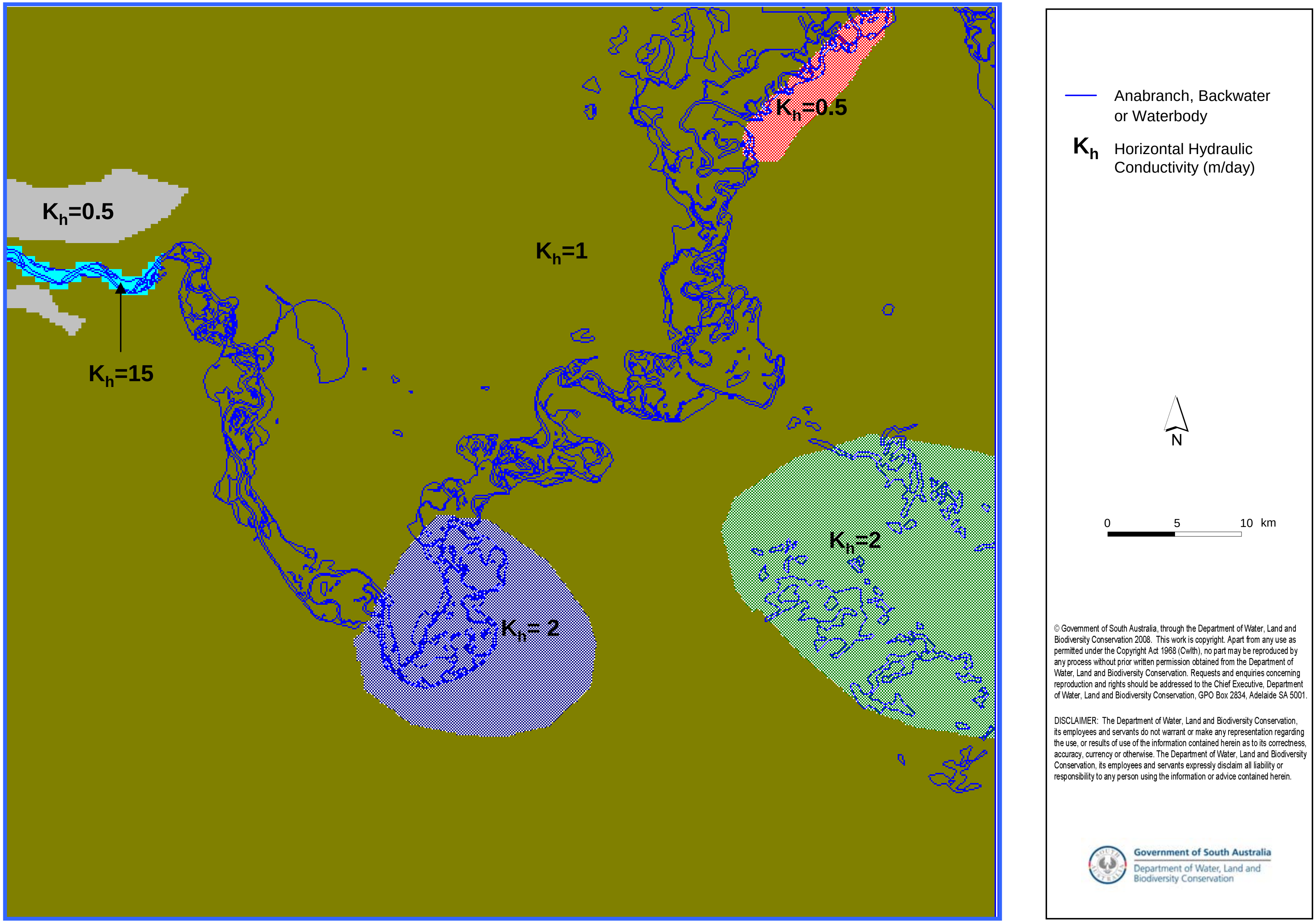
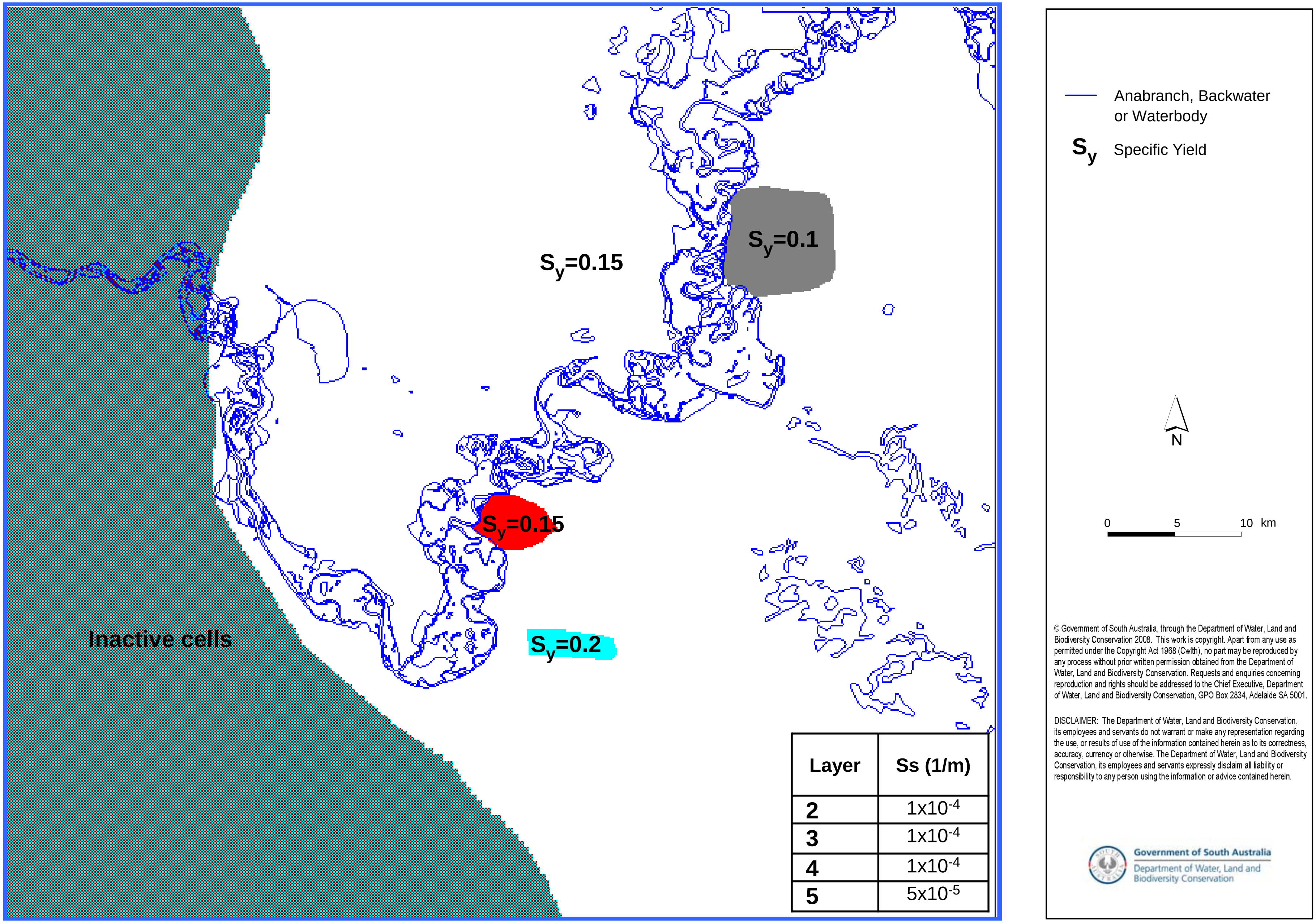


Figure 22: Model hydraulic conductivity zones and values (layer 5)



Layer	Ss (1/m)
2	$1x10^{-4}$
3	$1x10^{-4}$
4	$1x10^{-4}$
5	$5x10^{-5}$

Figure 23: Model specific yield zones and values (layer 1) (Table gives Specific Storage [S_S] in lower layers)

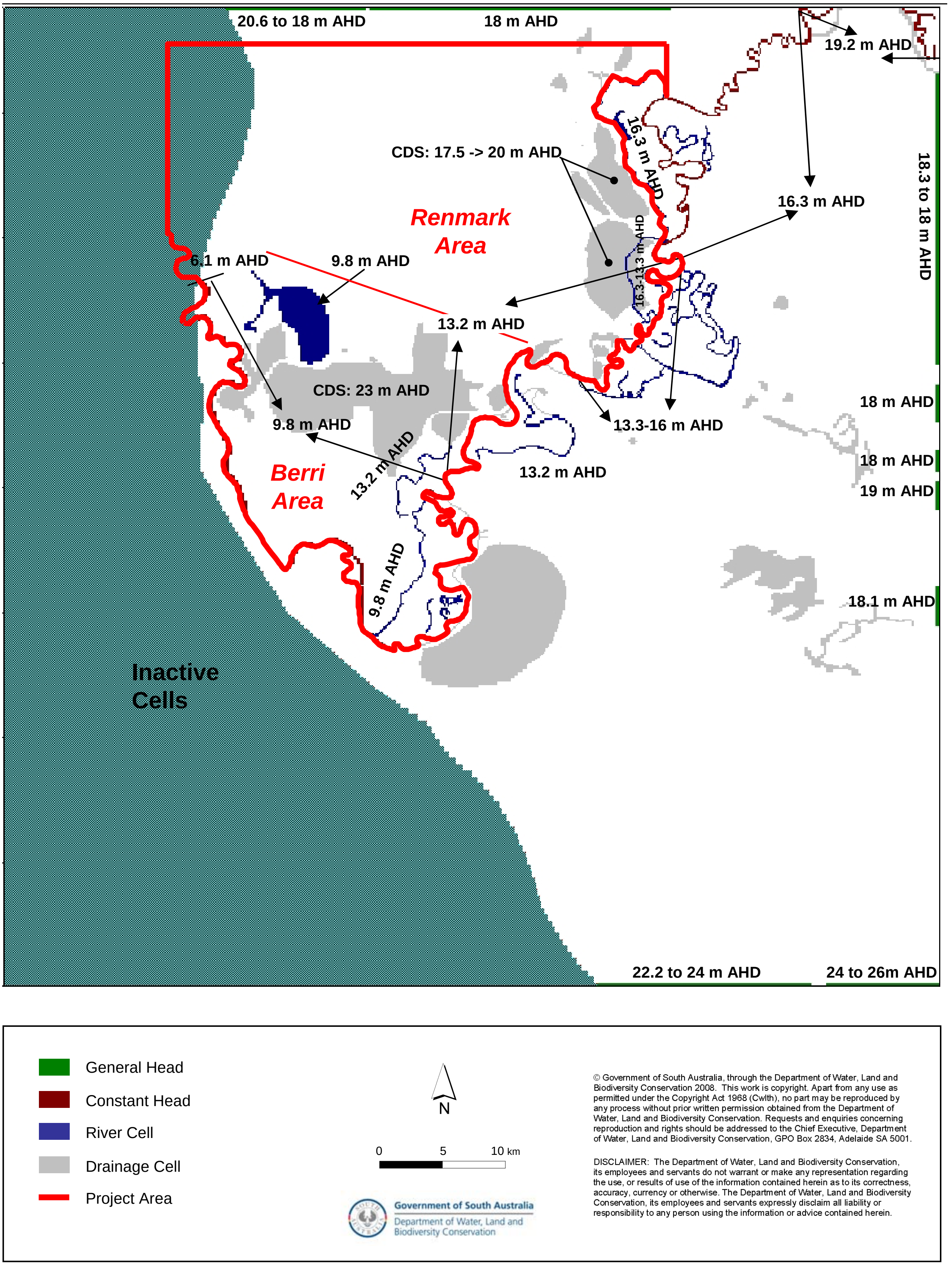


Figure 24: Model boundary conditions (layer 1)

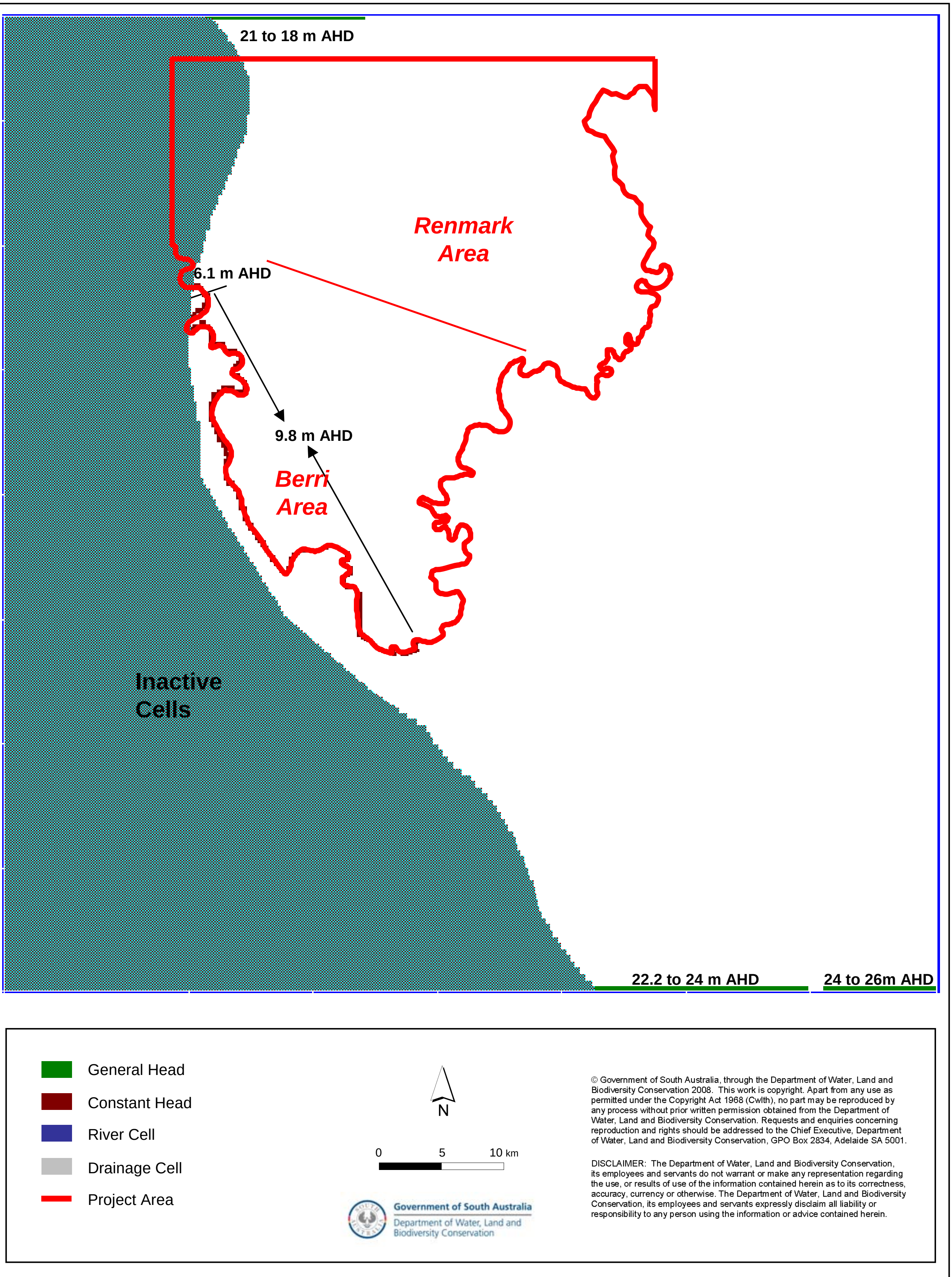


Figure 25: Model boundary conditions (layer 2)

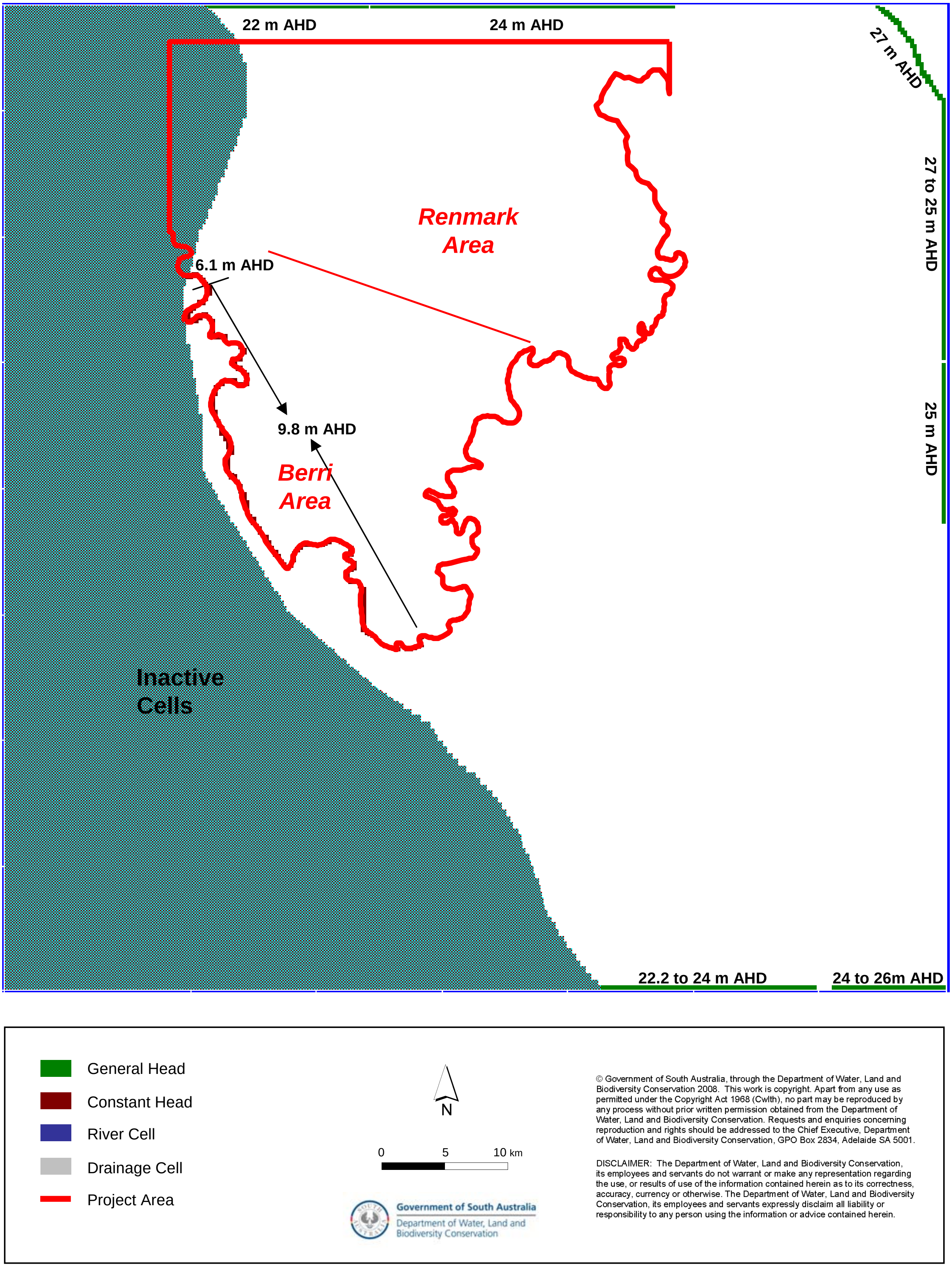


Figure 26: Model boundary conditions (layer 3)

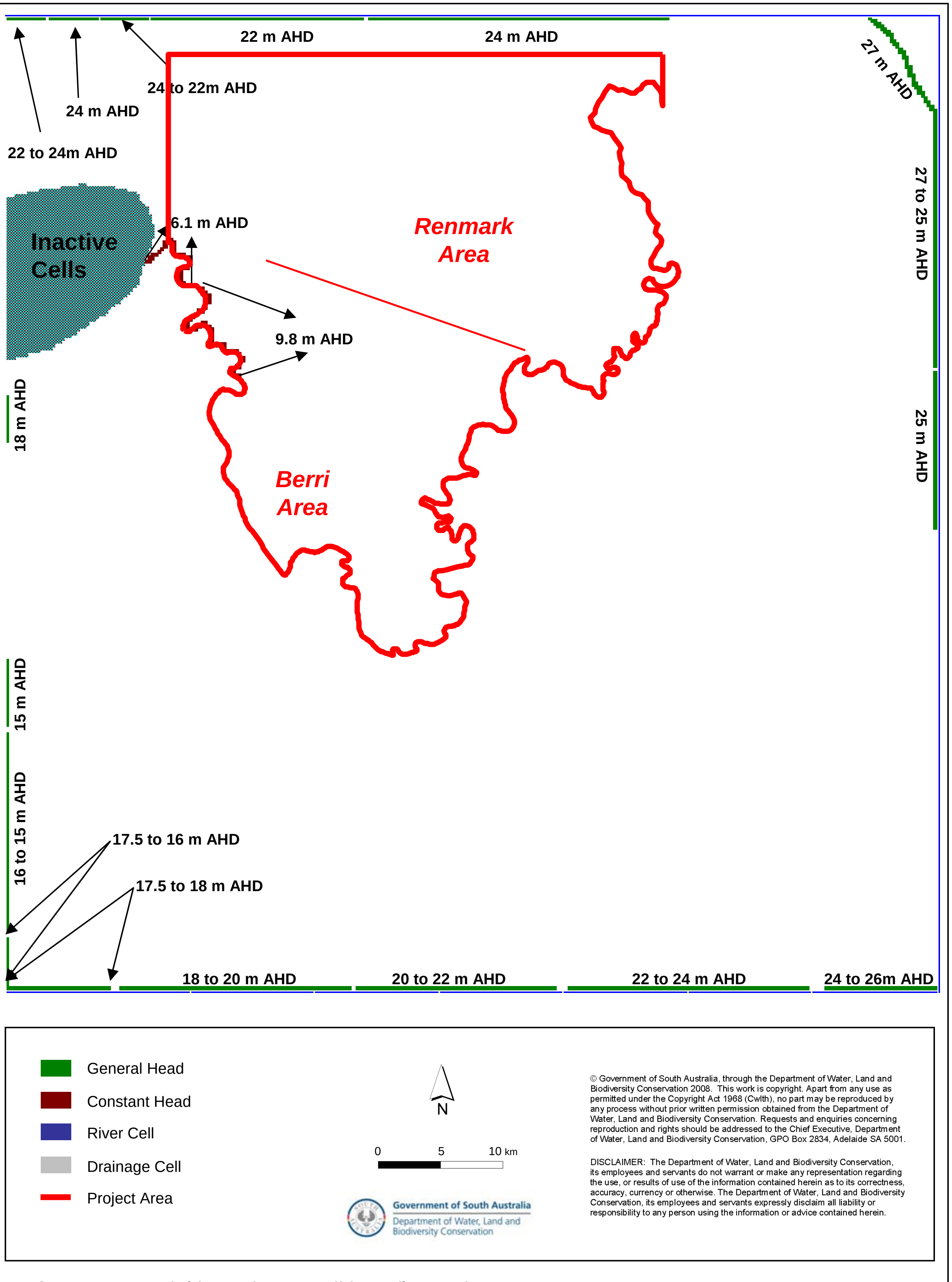


Figure 27: Model boundary conditions (layer 4)

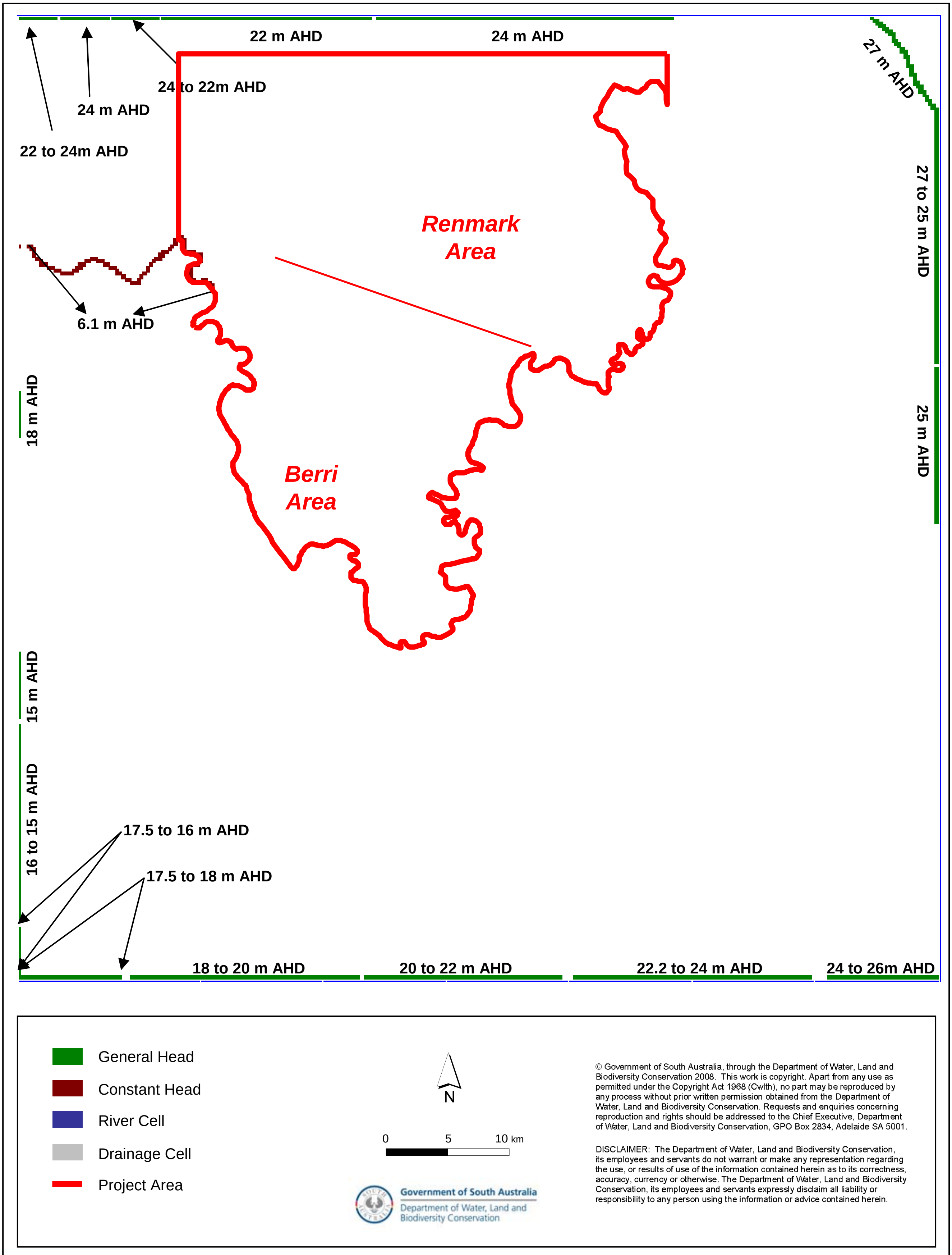


Figure 28: Model boundary conditions (layer 5)

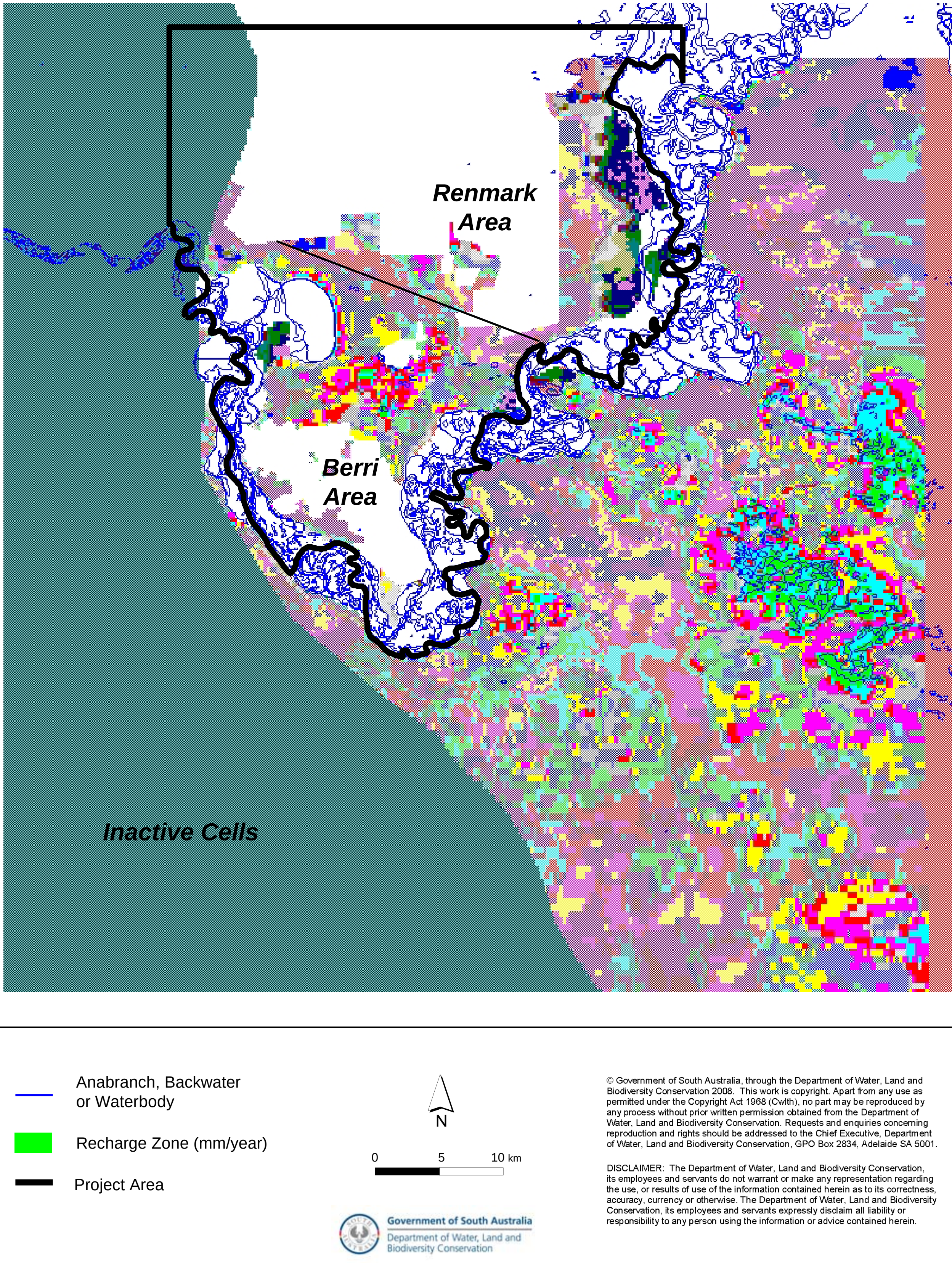


Figure 29: Mallee Clearance recharge zones (41 zones). Recharge rates given in Appendix A-1.

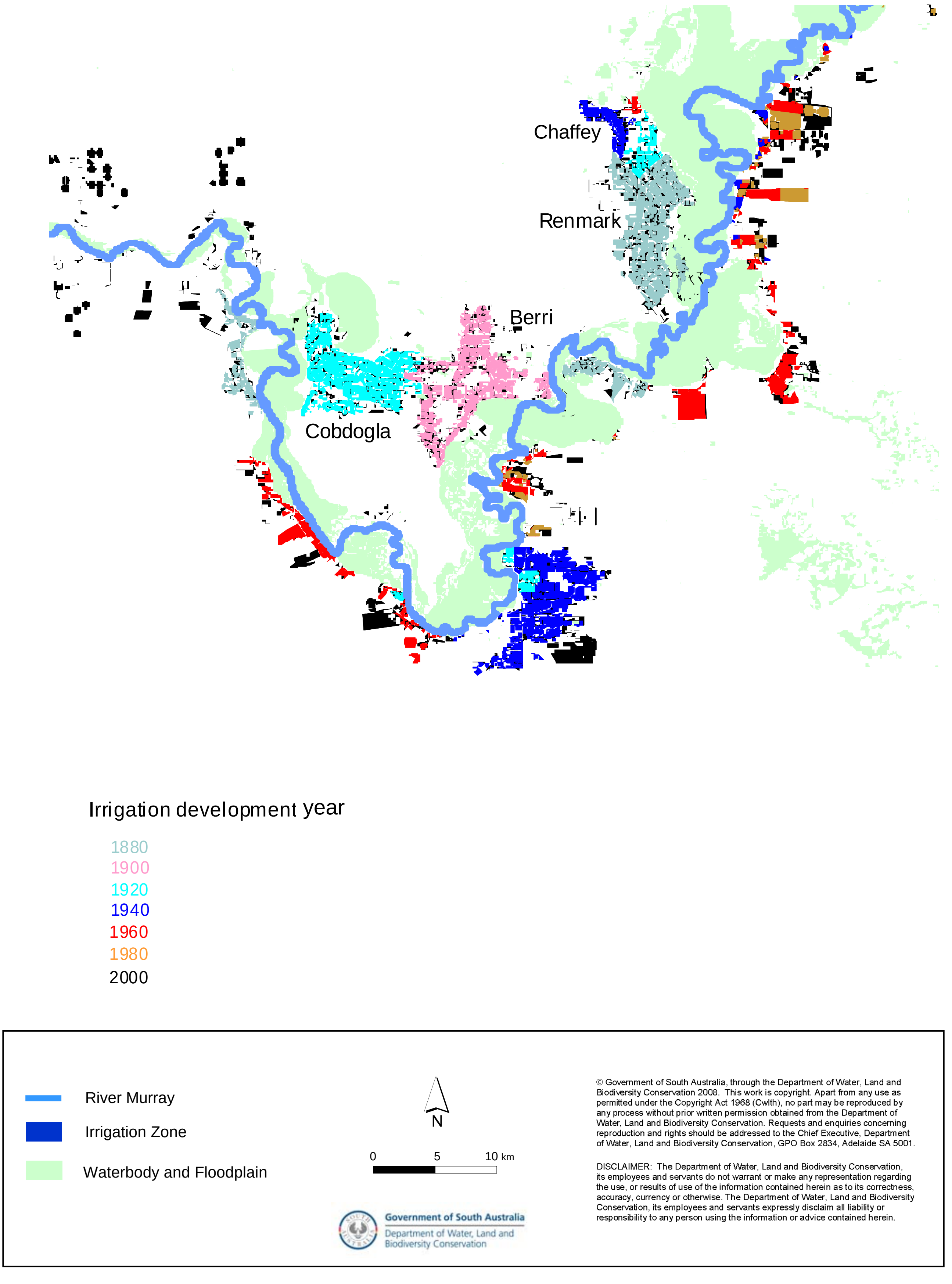
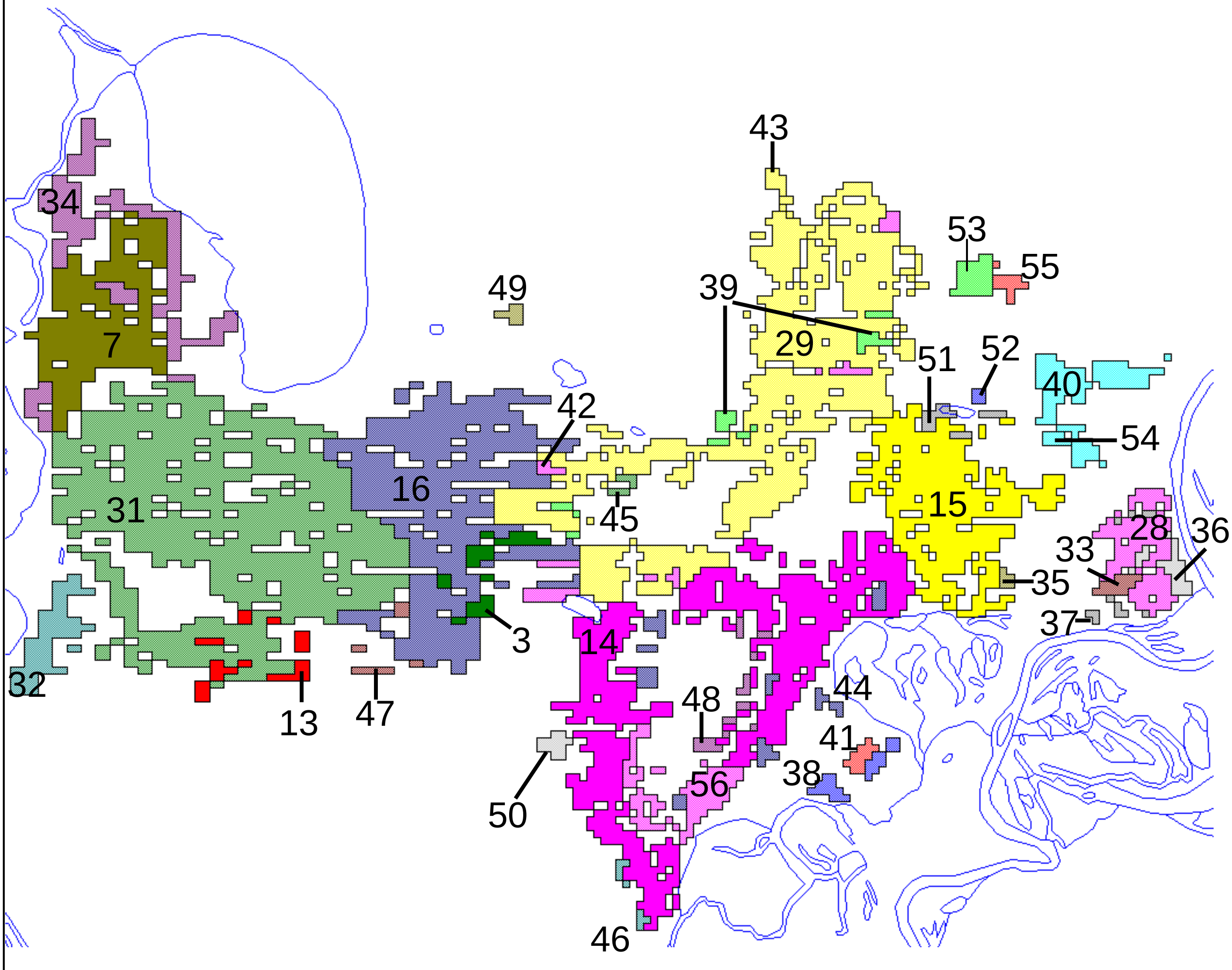


Figure 30: Extent of Irrigation area over time based on GIS coverages (after Aquaterra et al. 2006)



Anabranch, Backwater or Waterbody

Recharge Zone

7 Zone Number

N

0 2 4 km

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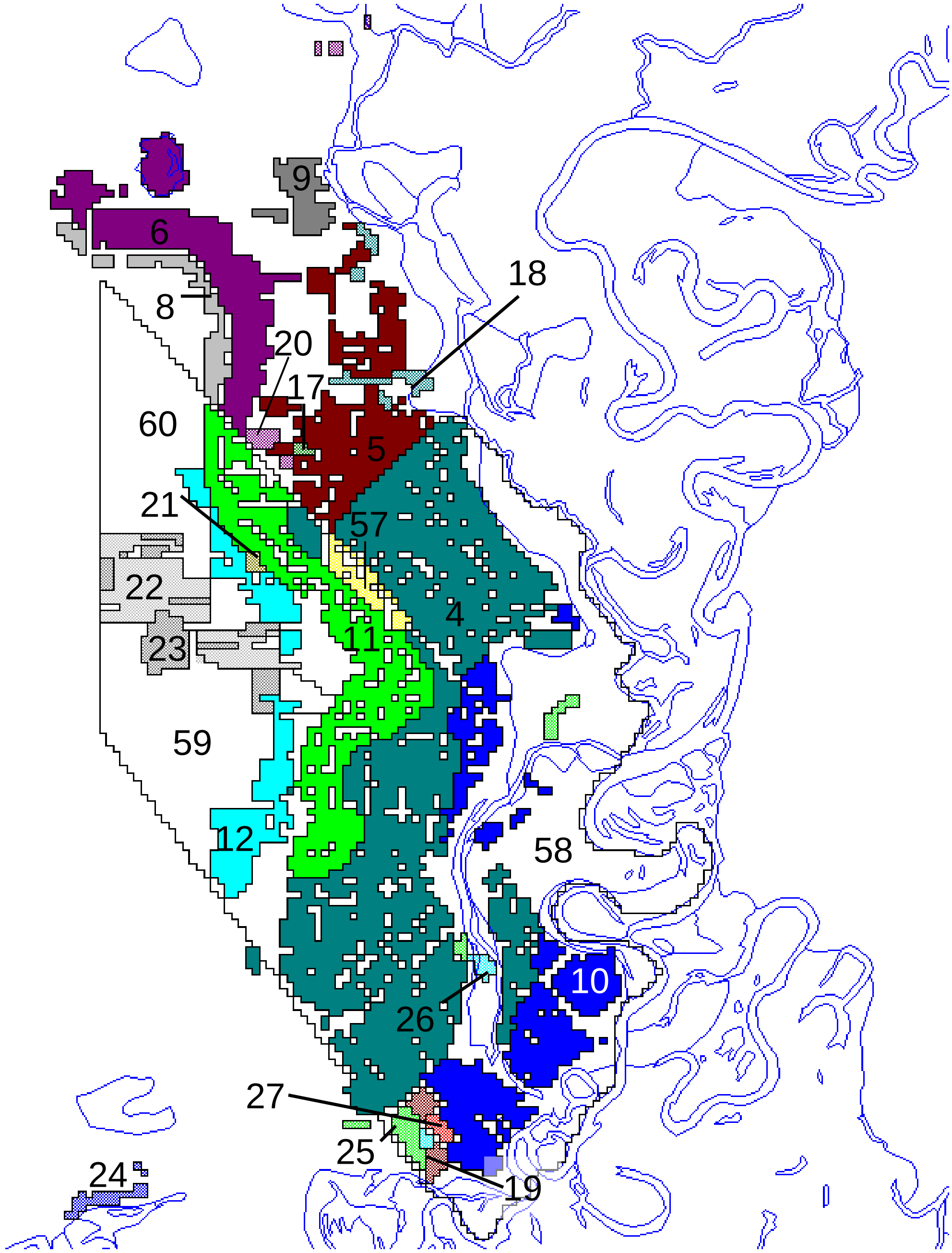
Figure 31a: Model recharge zones in the Berri area
(recharge rates for each zone versus time are listed in Appendix A-2)



Anabranch, Backwater or Waterbody

Recharge Zone

11 Zone Number

Future Recharge Zones (Zones 58, 59, 60)

N

0 2 4 km

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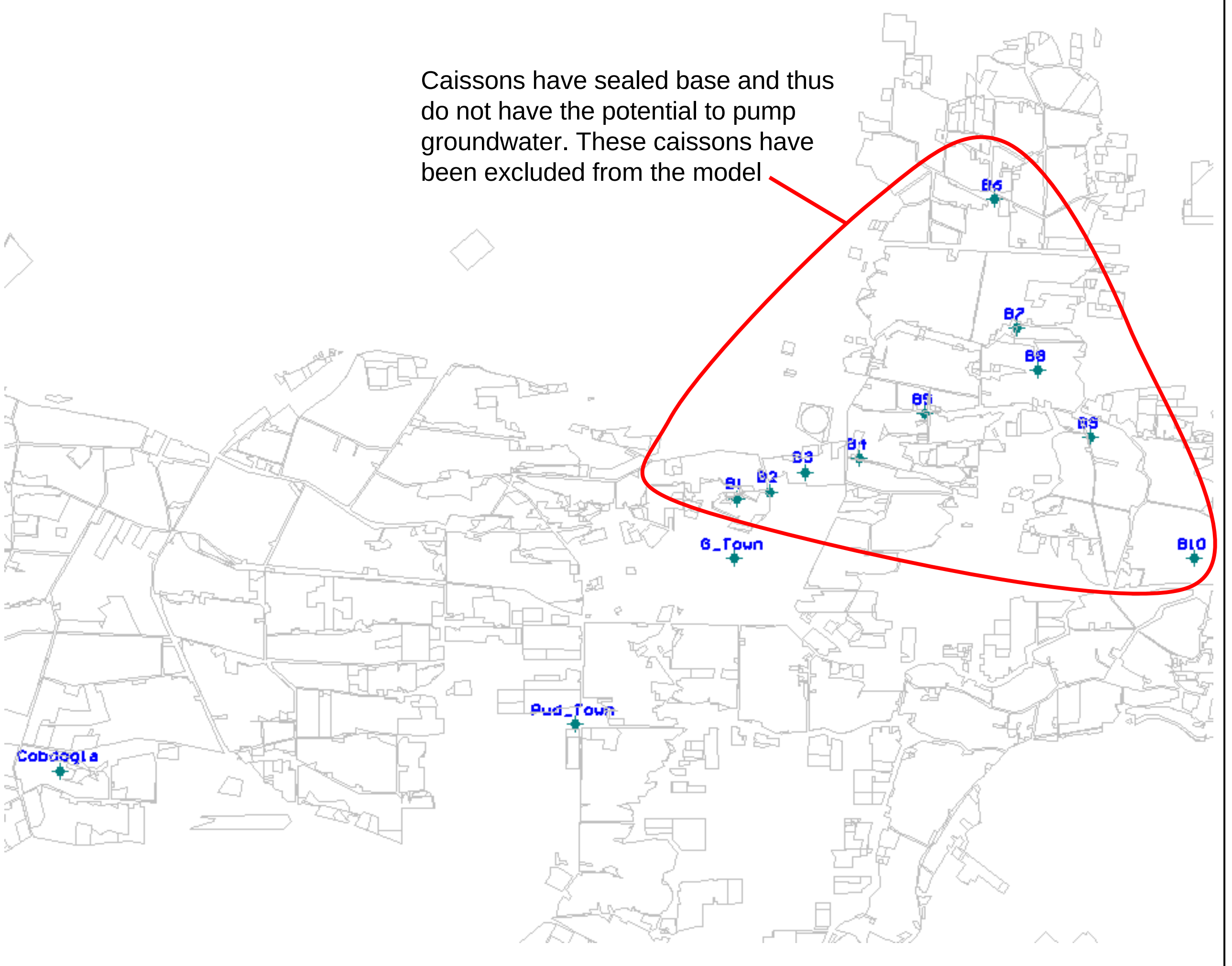
Figure 31b: Model recharge zones in the Renmark area (recharge rates in each zone against time are listed in Appendix A-3)



Irrigation Area Boundary

Caisson

N

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Figure 32a: Caisson locations in the Berri area
(Modelled caisson specifications are shown in detail in Appendix A-2)

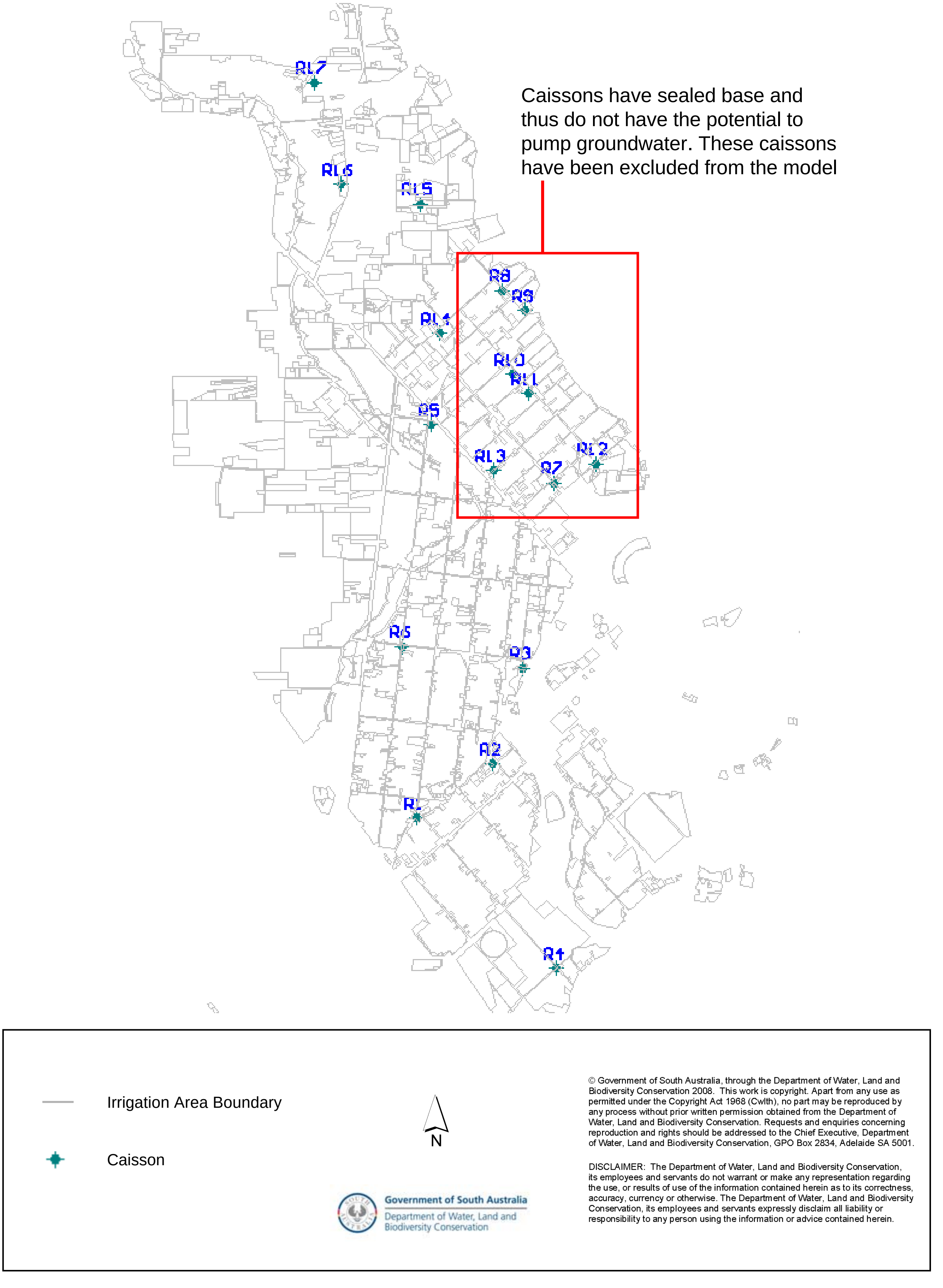


Figure 32b: Caisson locations in the Renmark area
(Modelled caisson specifications are shown in detail in Appendix A-3)

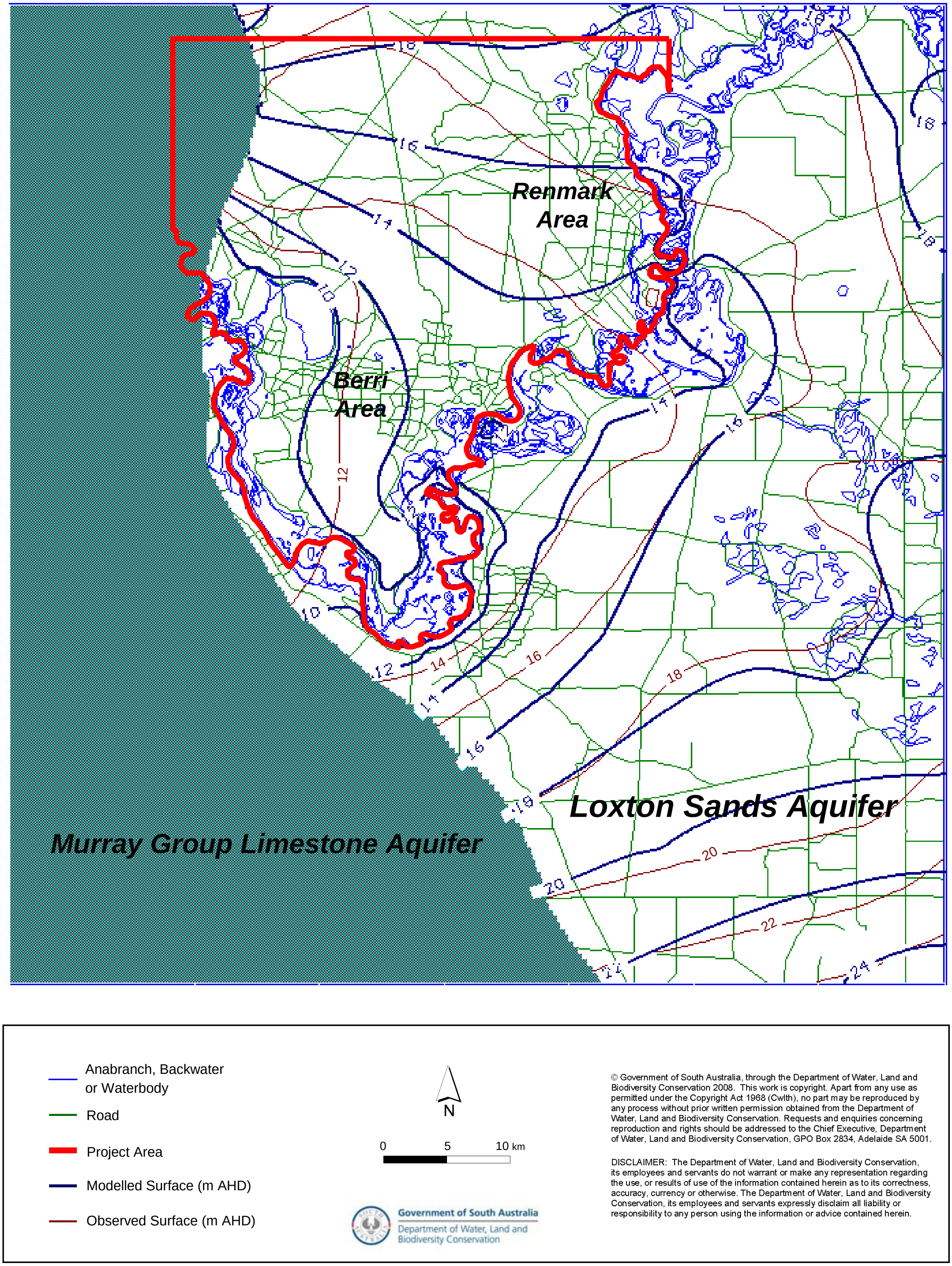
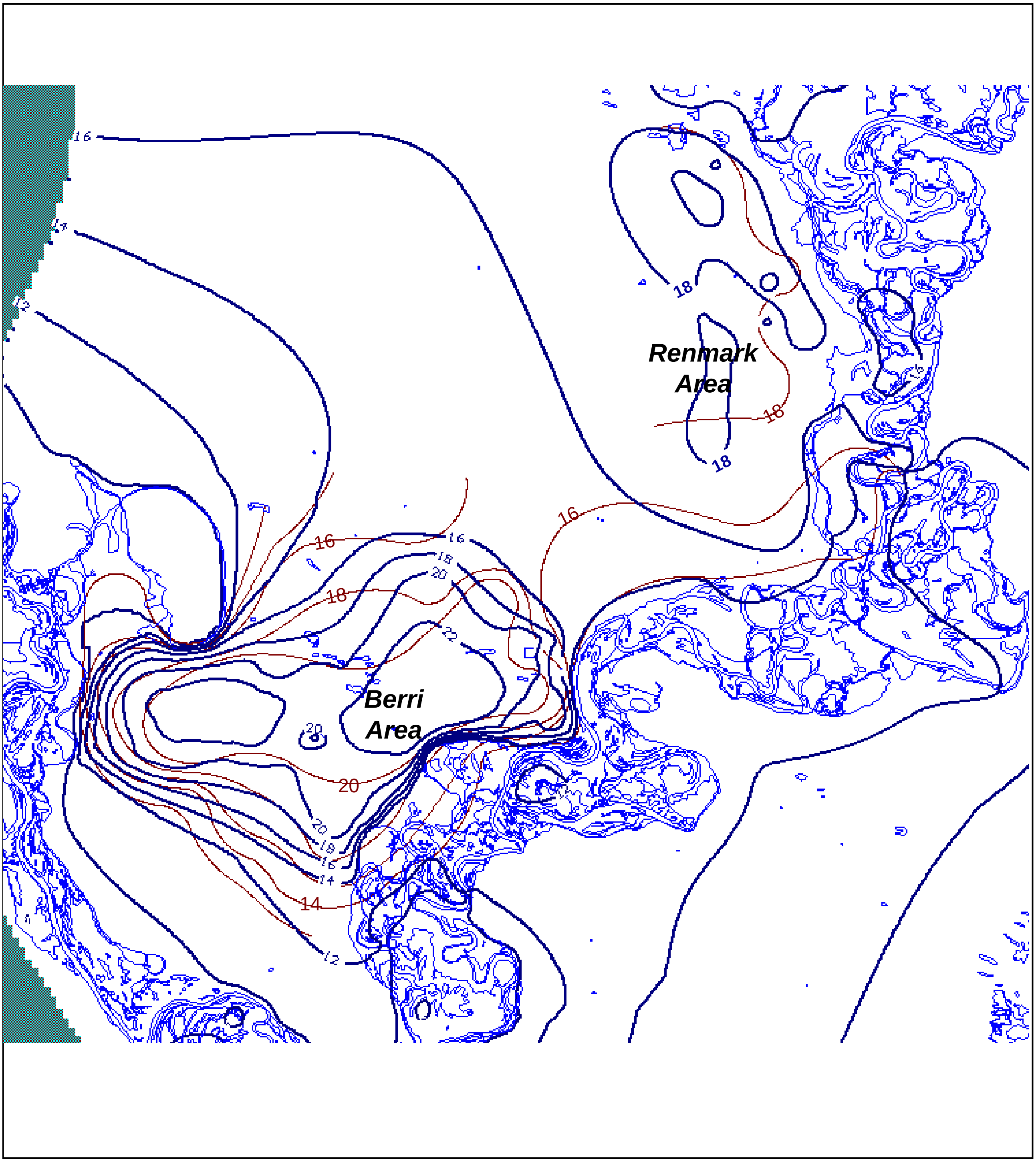


Figure 33: Comparison pre-irrigation development potentiometric surface (S. Barnett, DWLBC) and modelled post-regulation of the River Murray and pre-irrigation development potentiometric surface, layer 1.



Anabranch, Backwater or Waterbody

Modelled Potentiometric Head Contour (m AHD)

Observed Surface (m AHD)

N

0 5 10 km

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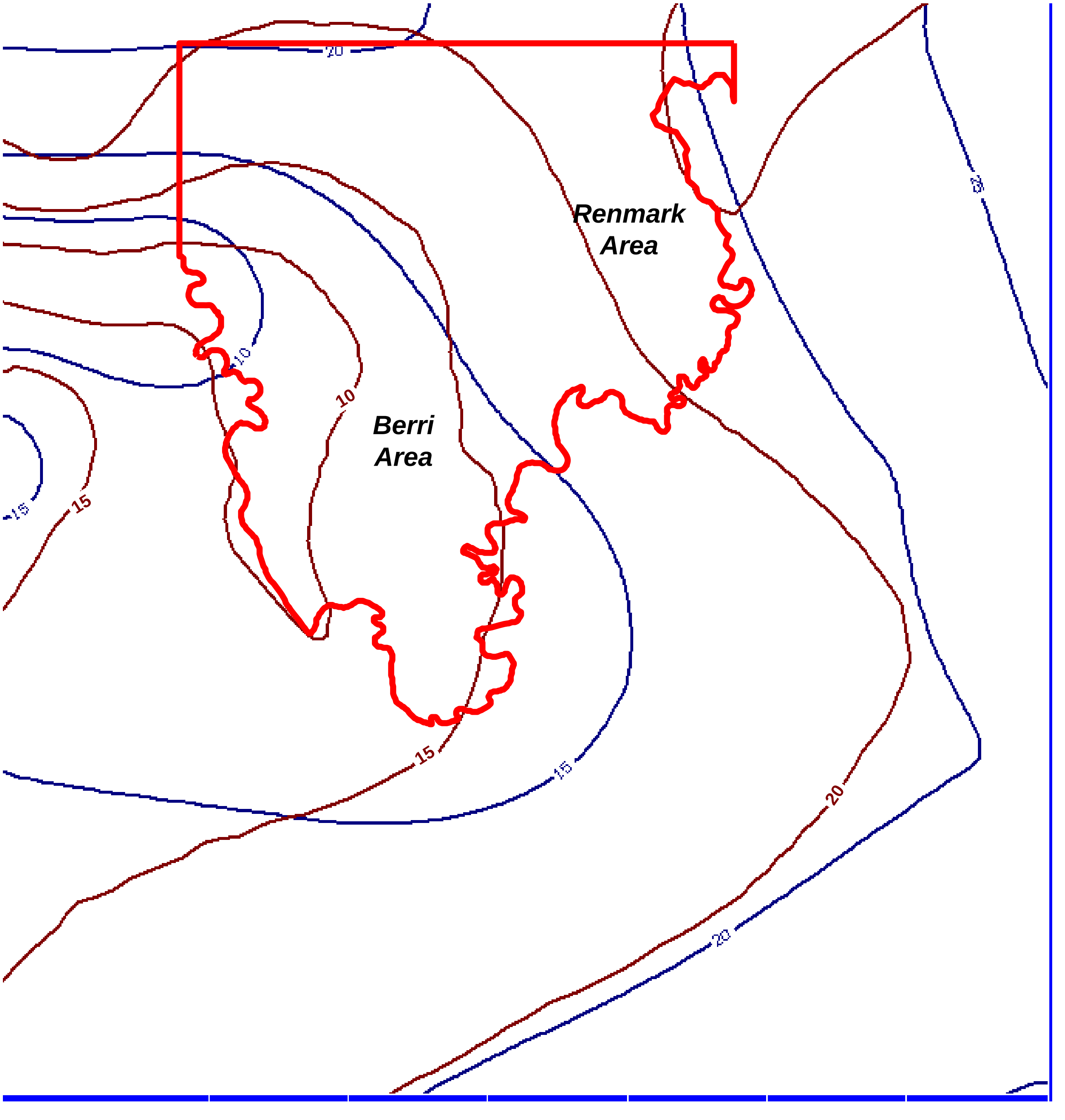
Figure 34: Comparison observed (after Aquaterra et al. 2006) and modelled 2000 potentiometric surface in the project area (layer 1 Loxton Sands and Monoman Formation)



Modelled Potentiometric Head Contour (m AHD)

Observed Surface (m AHD)

Project Area

N

0 5 10 km

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Figure 35: Comparison observed and modelled 1990 potentiometric surface (layer 5 Mannum Formation - Murray Group Limestone)

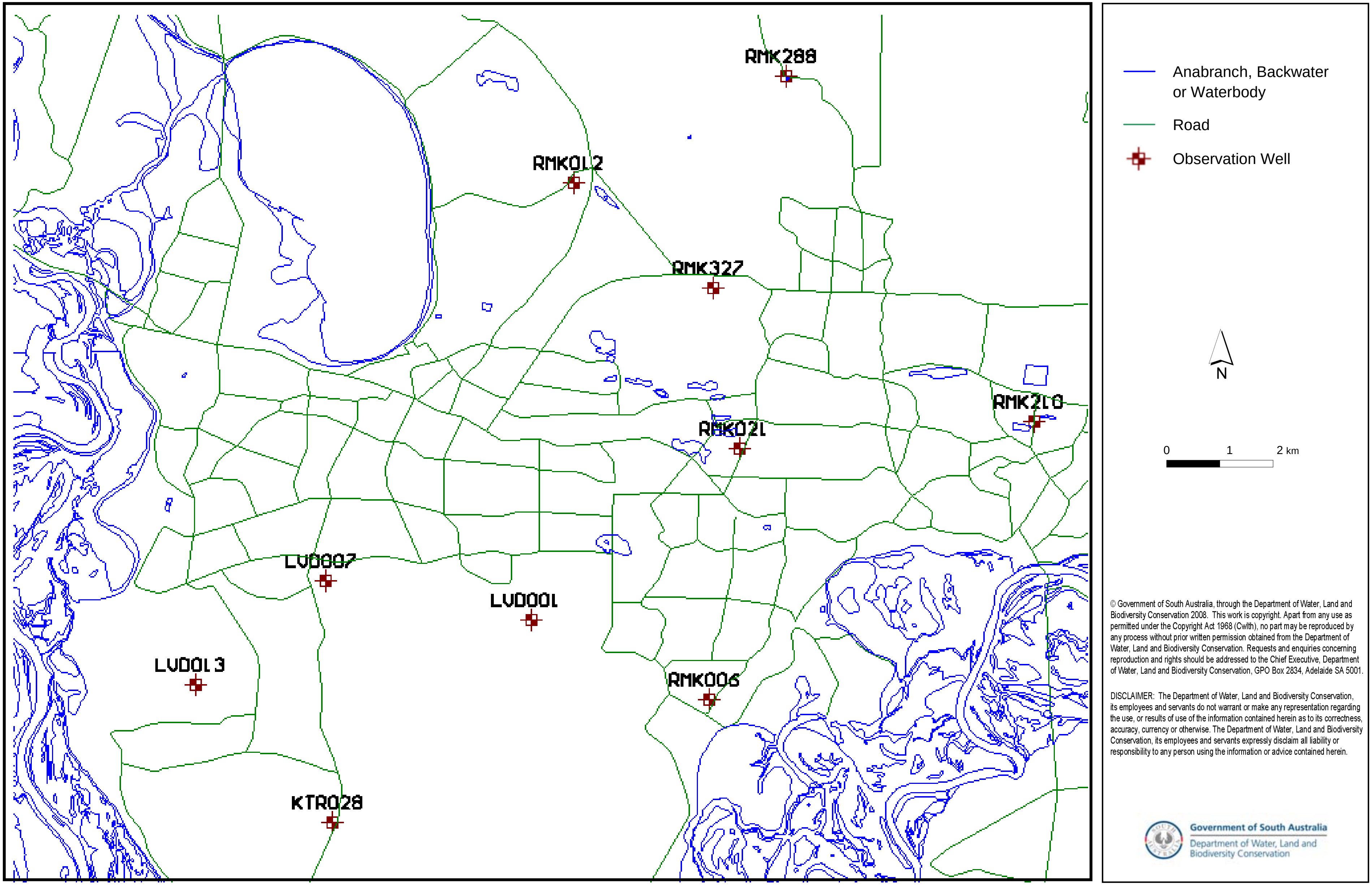


Figure 36a: Location of monitored observation wells in the Berri project area.

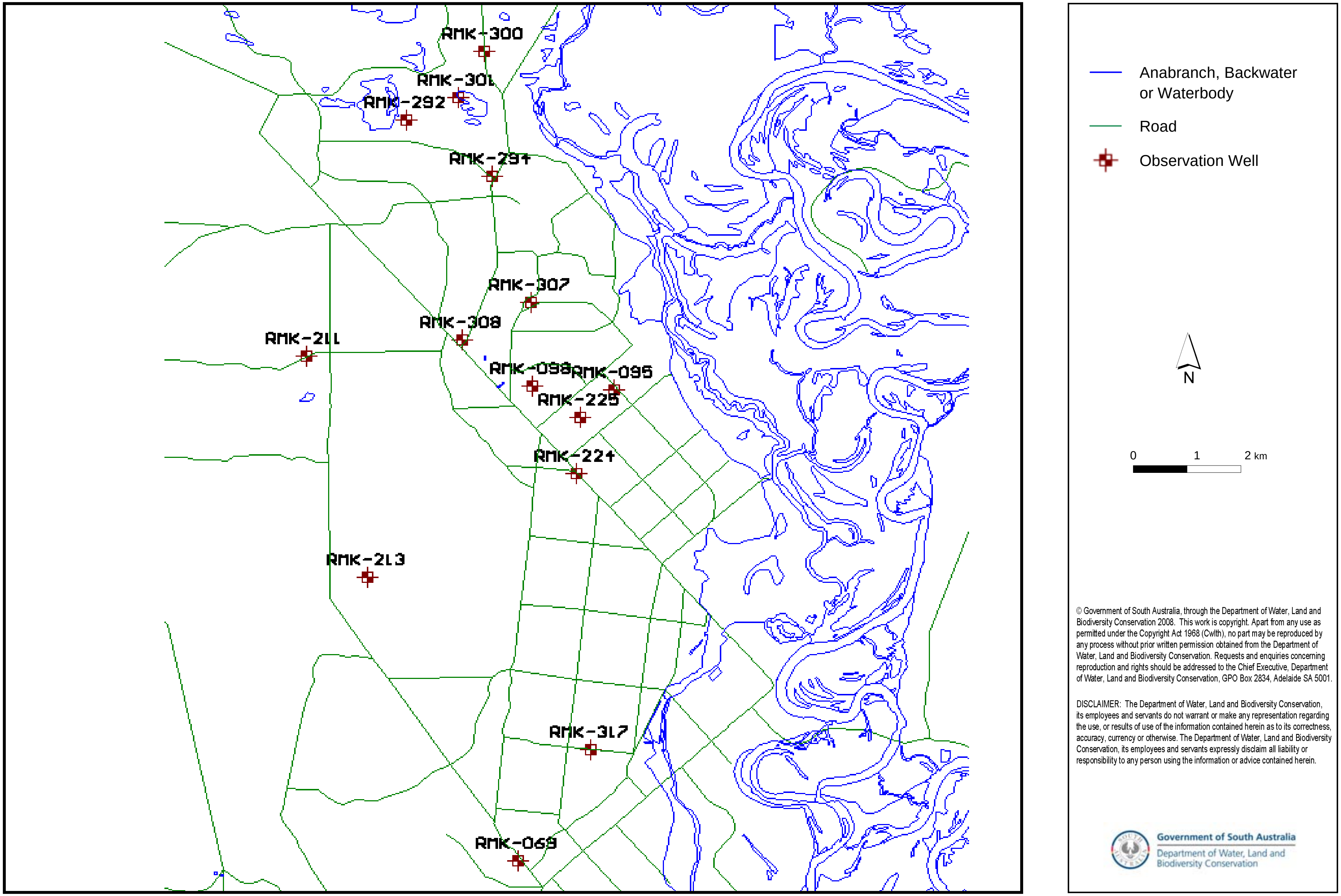


Figure 36b: Location of monitored observation wells in the Renmark project area.

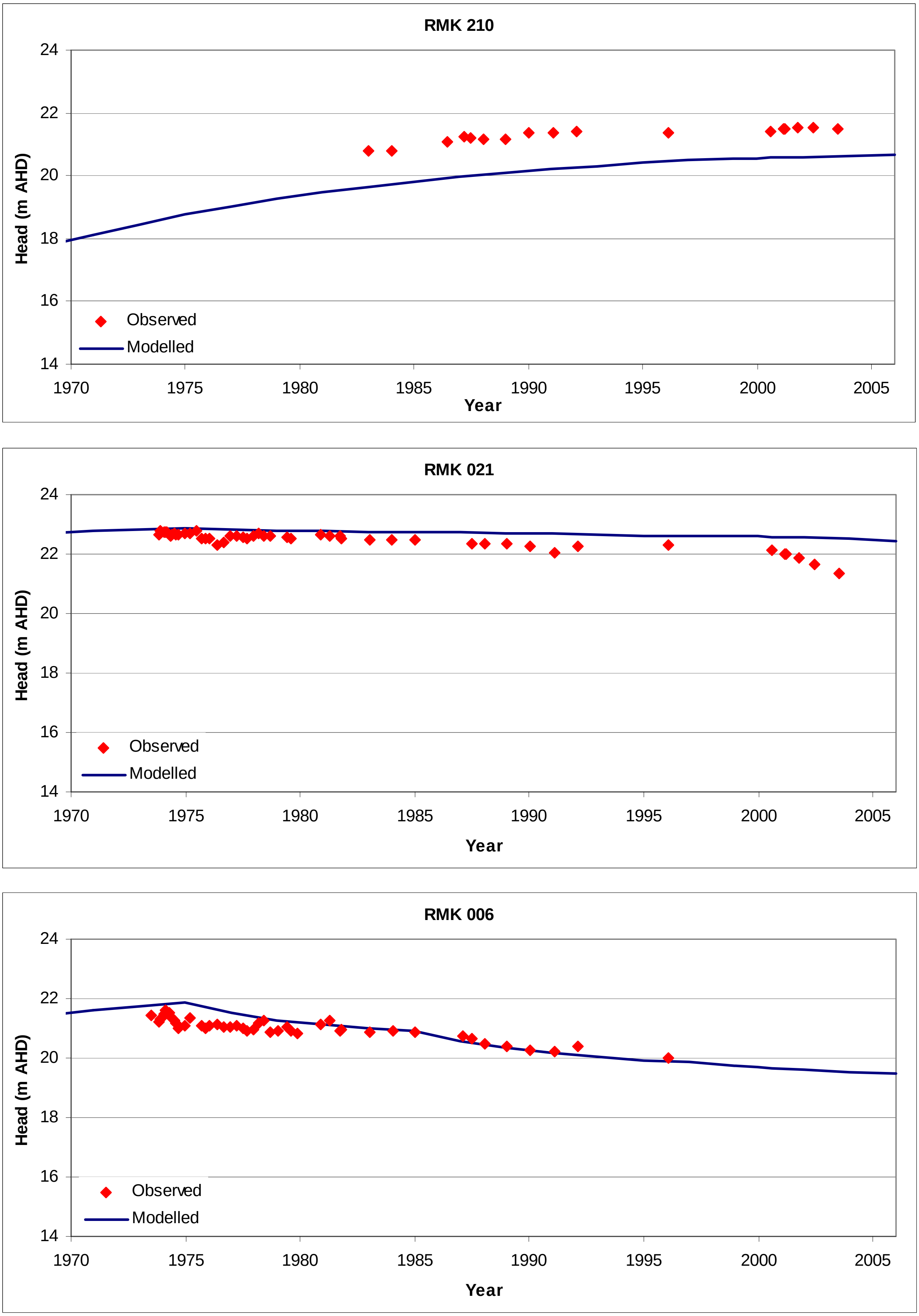


Figure 37: Berri calibration results – Modelled and observed potentiometric heads (Observation wells RMK210, RMK021, RMK006)

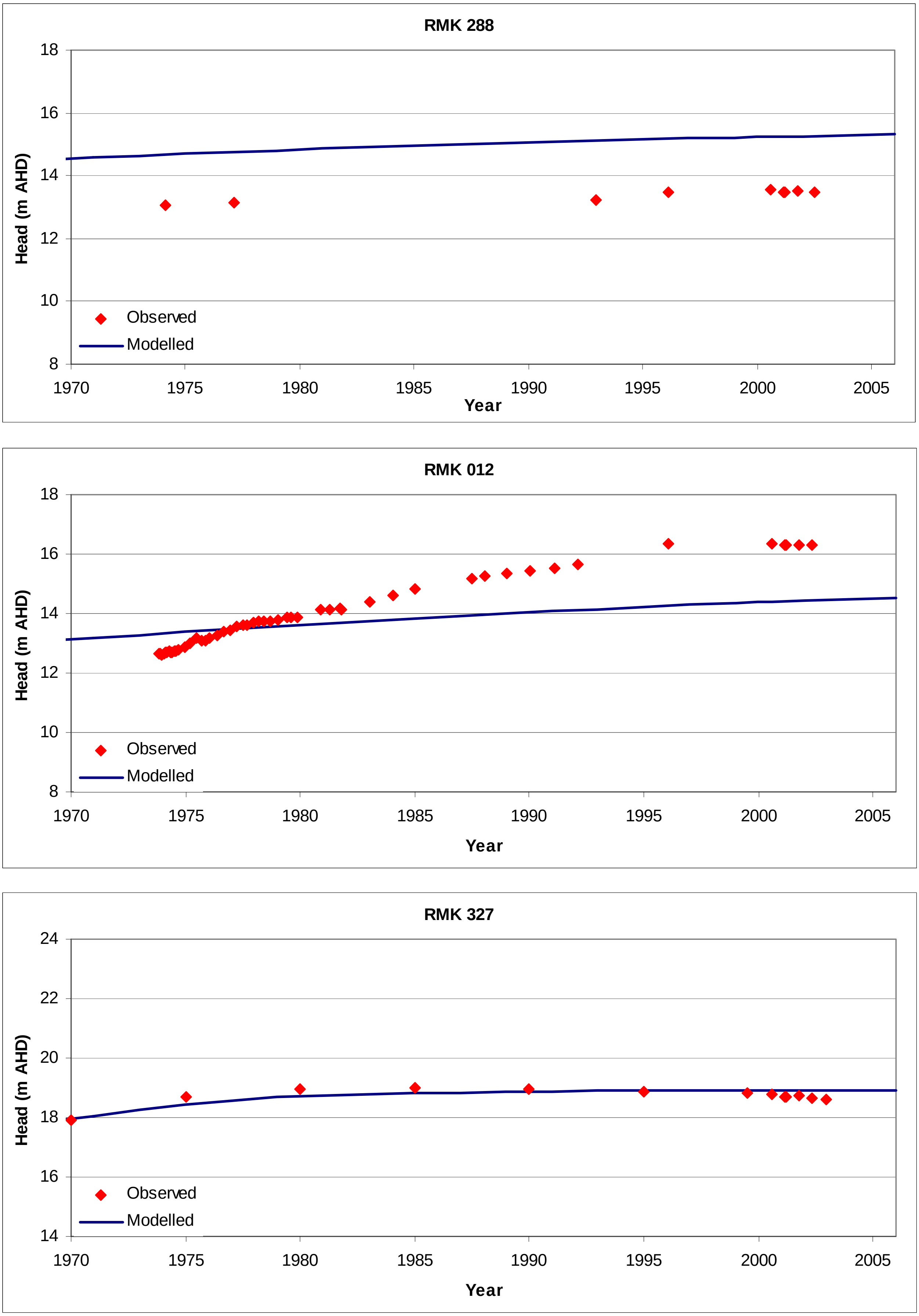


Figure 38: Berri calibration results – Modelled and observed potentiometric heads (Observation wells RMK288, RMK012, RMK327)

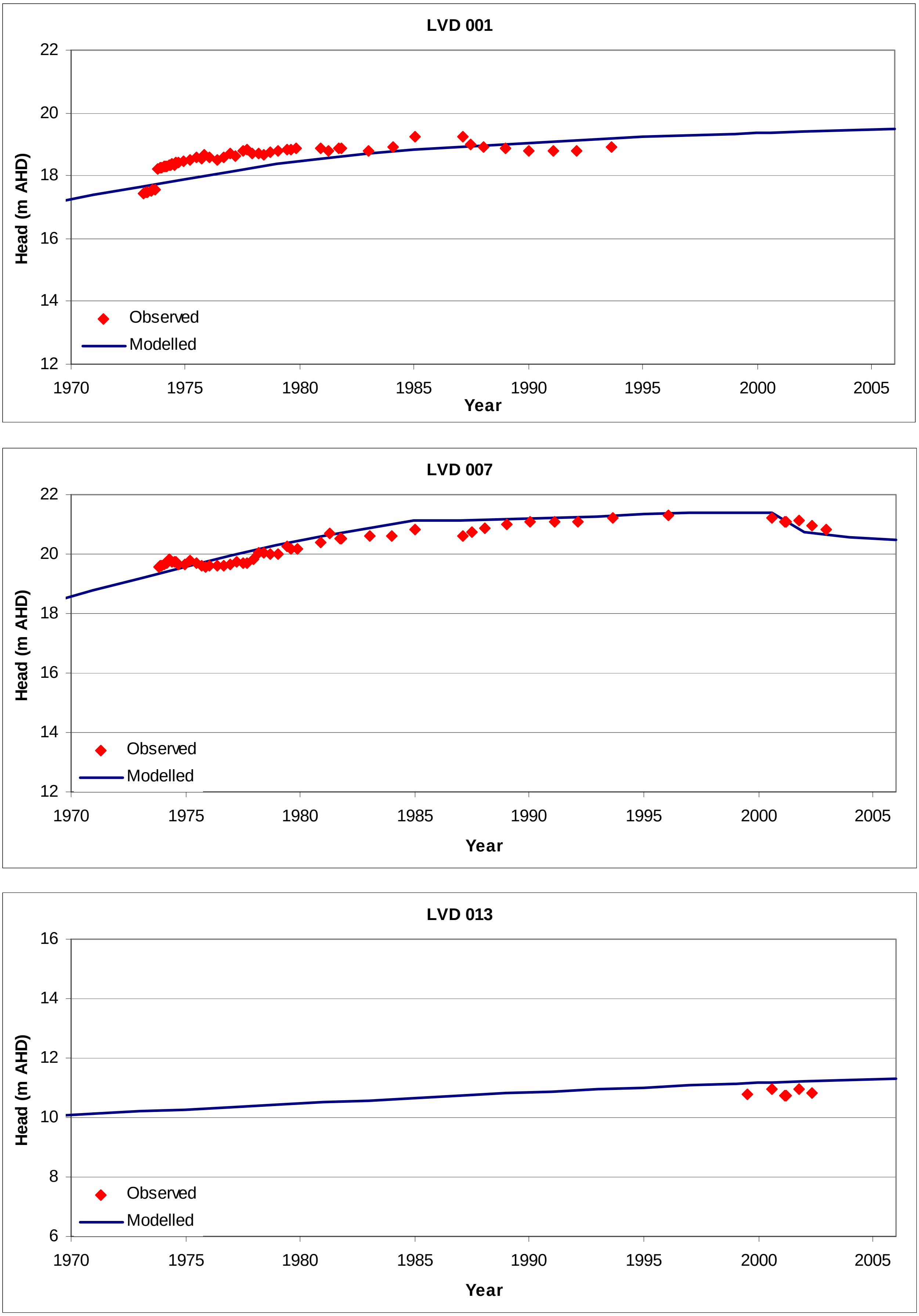
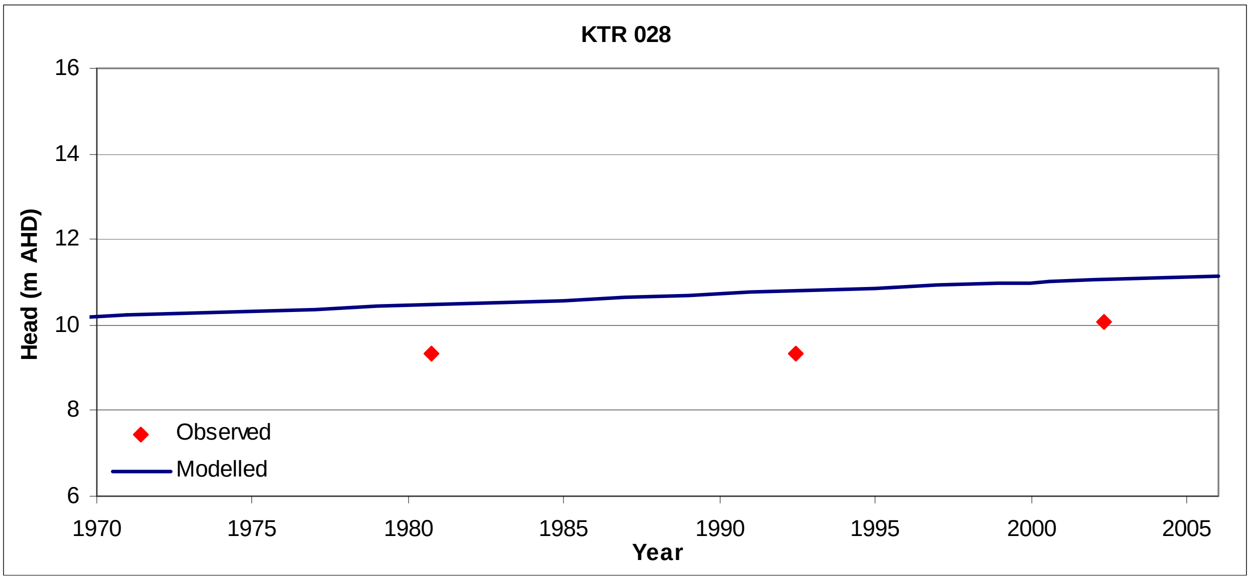
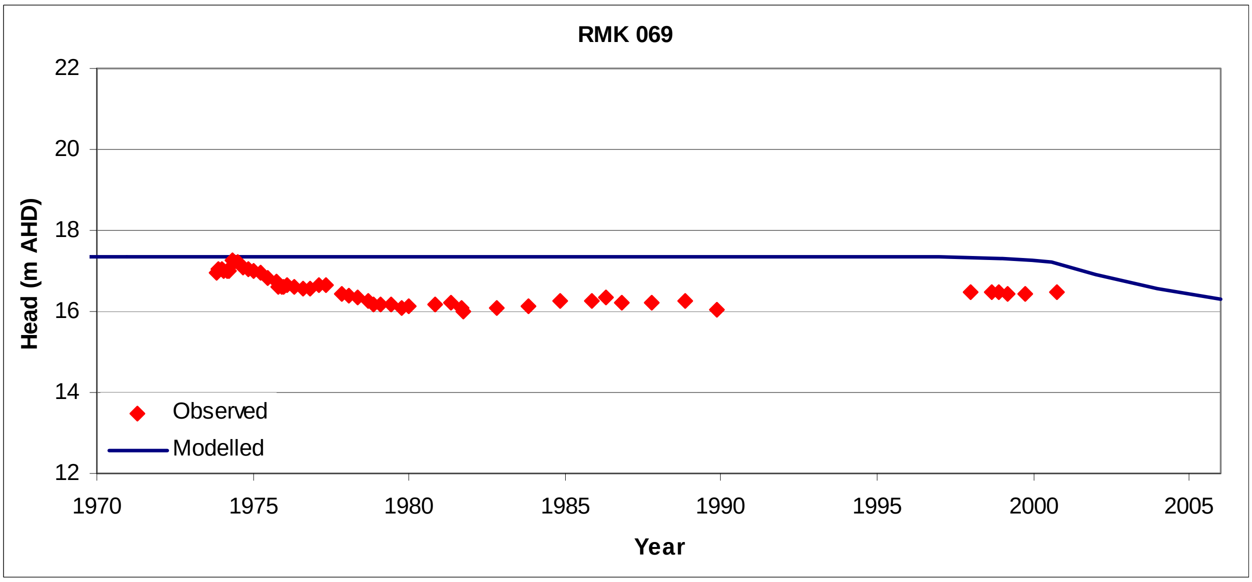


Figure 39: Berri calibration results – Modelled and observed potentiometric heads (Observation wells LVD001, LVD007, LVD013)





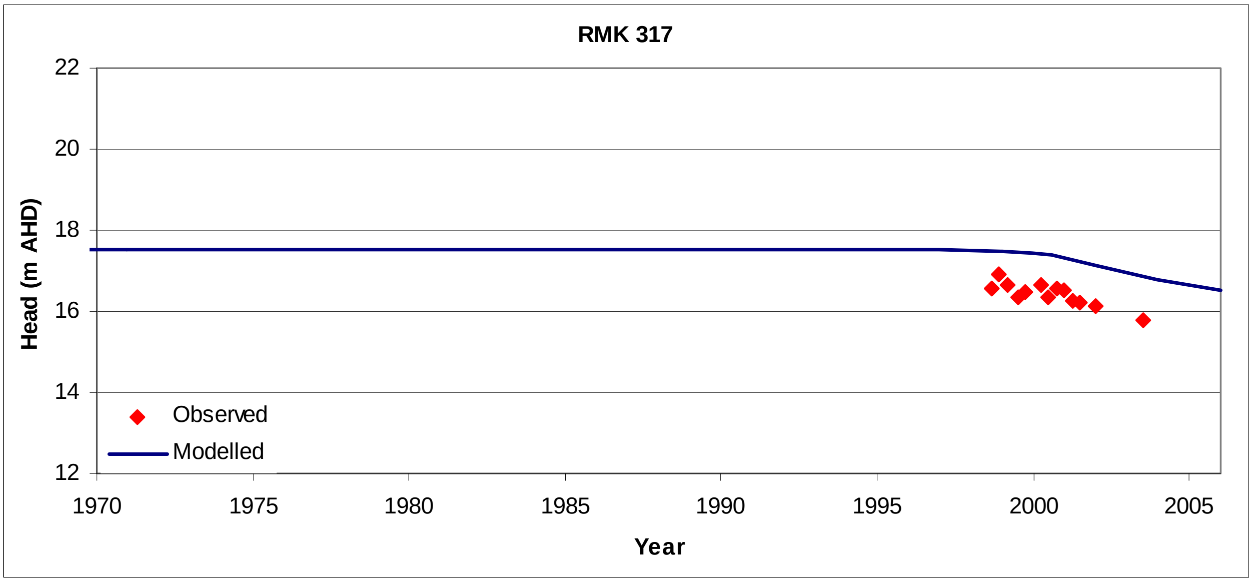
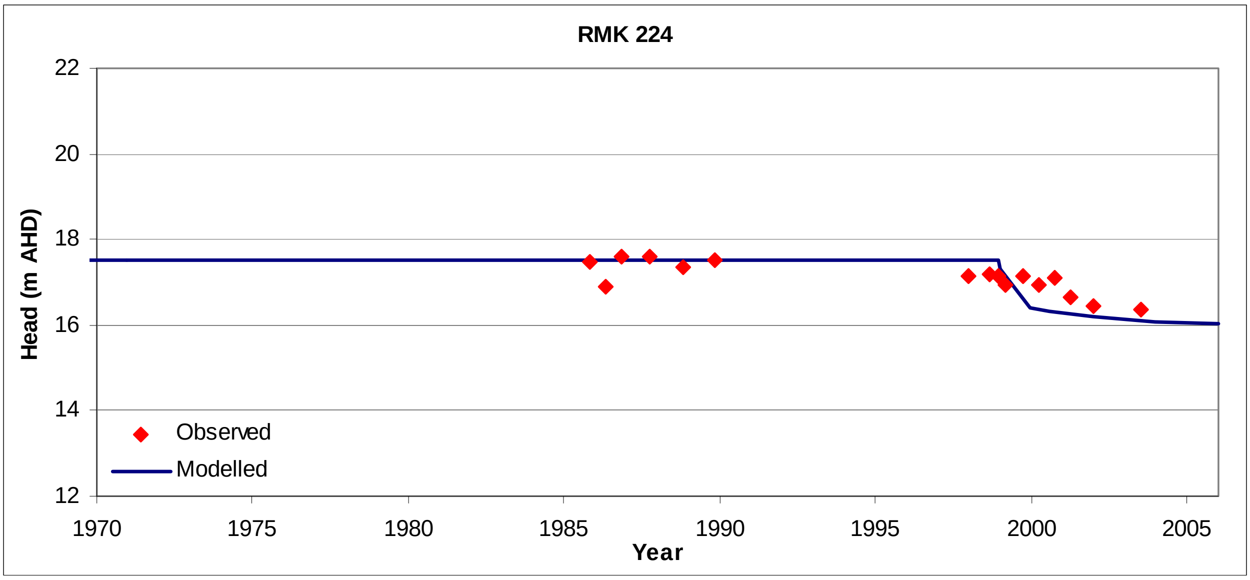
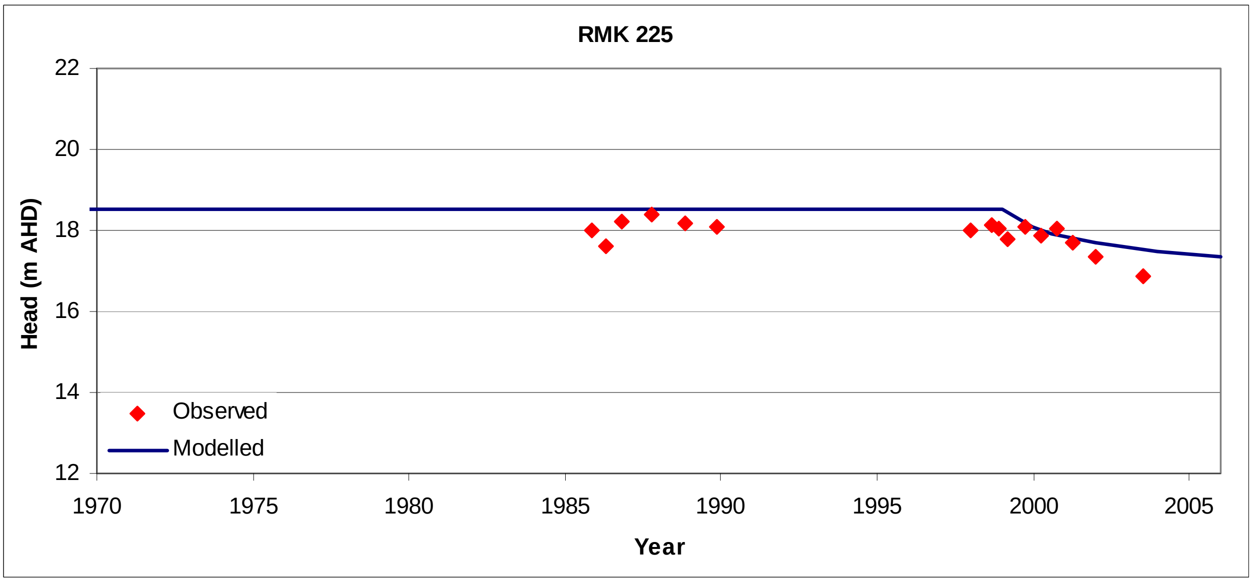


Figure 40: Berri and Renmark calibration results – Modelled and observed potentiometric heads(Observation wells KTR028, RMK069, RMK317)





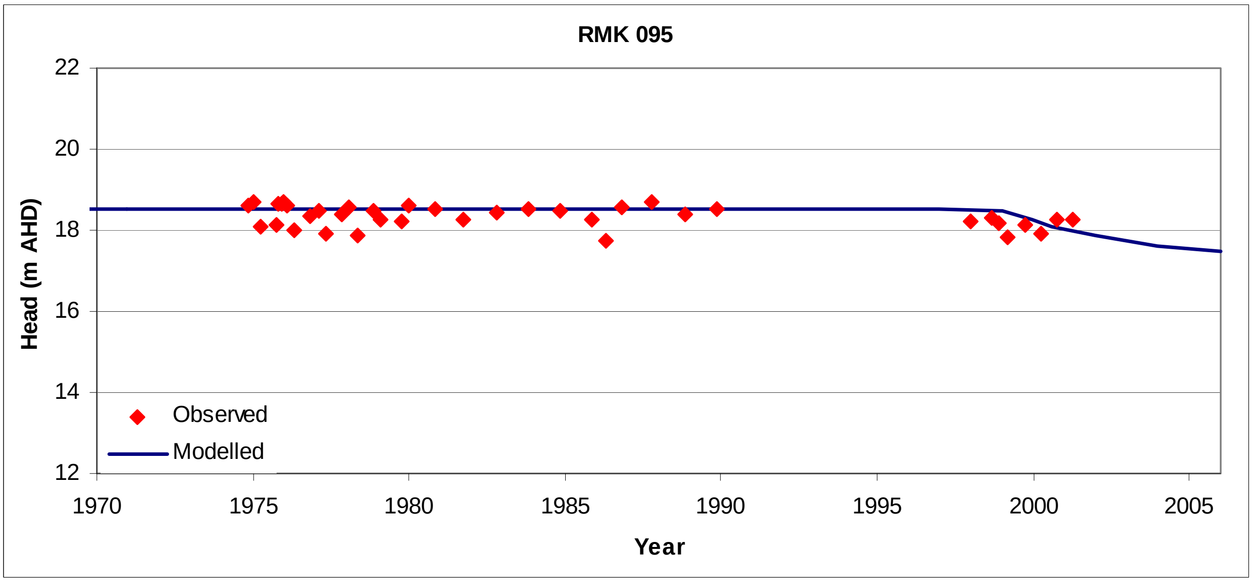
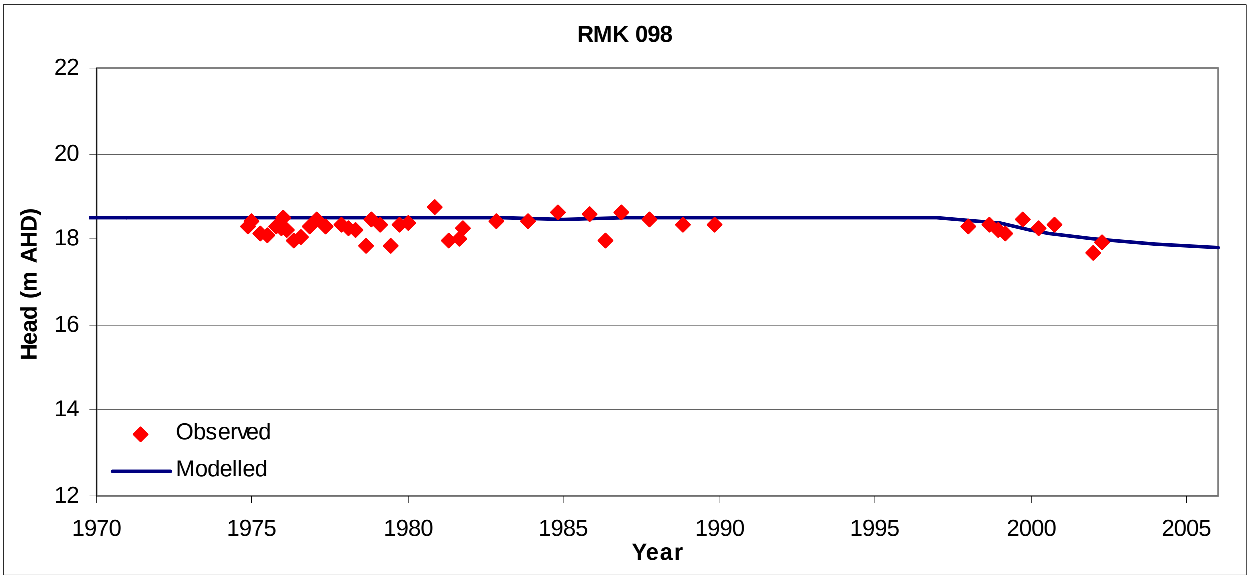
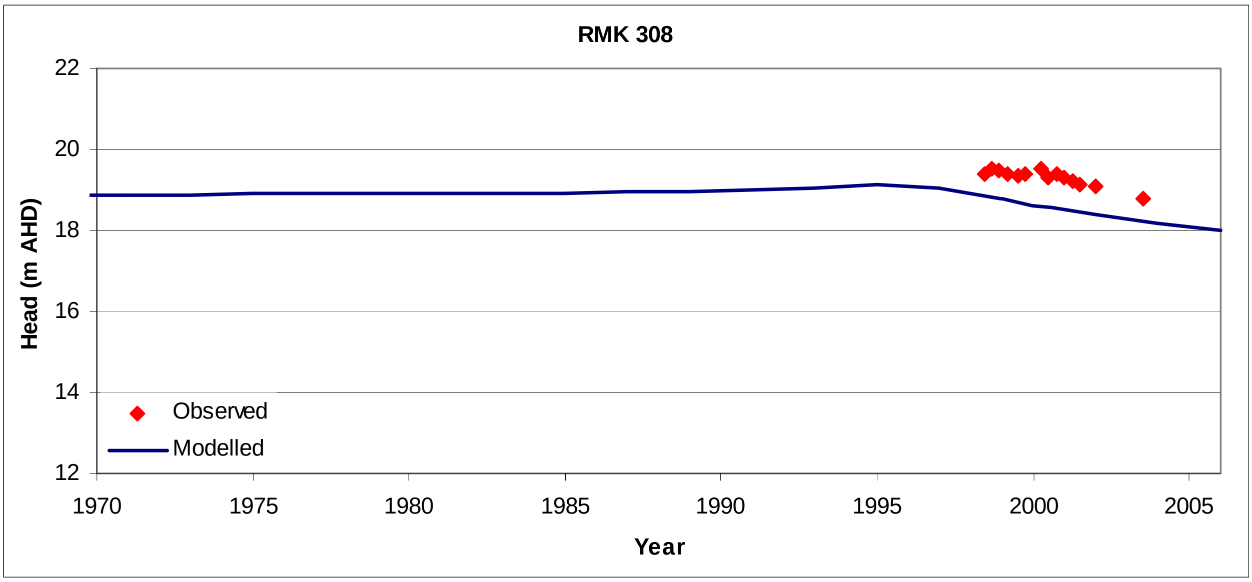


Figure 41: Renmark calibration results – Modelled and observed potentiometric heads (Observation wells RMK224, RMK255, RMK095)





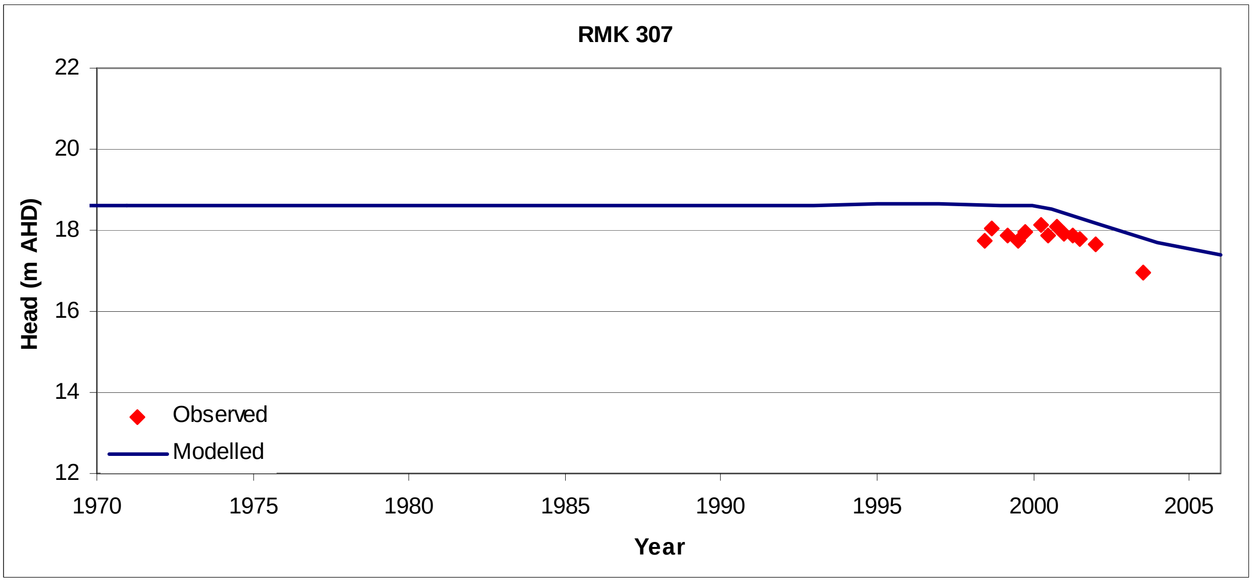
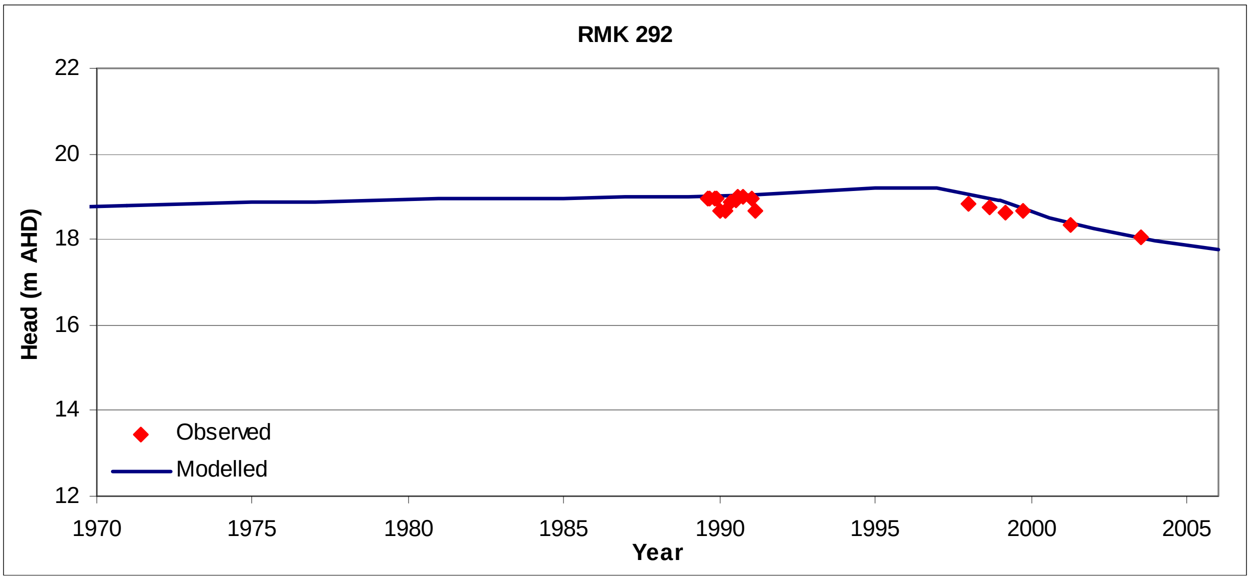
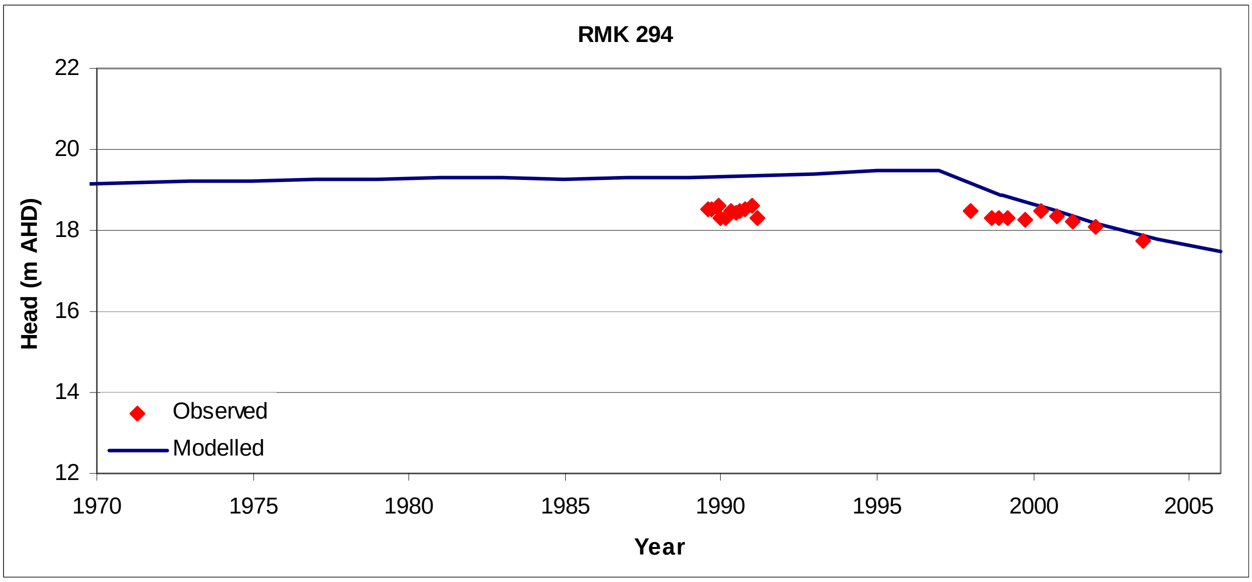


Figure 42: Renmark calibration results – Modelled and observed potentiometric heads (Observation wells RMK098, RMK308, RMK307)





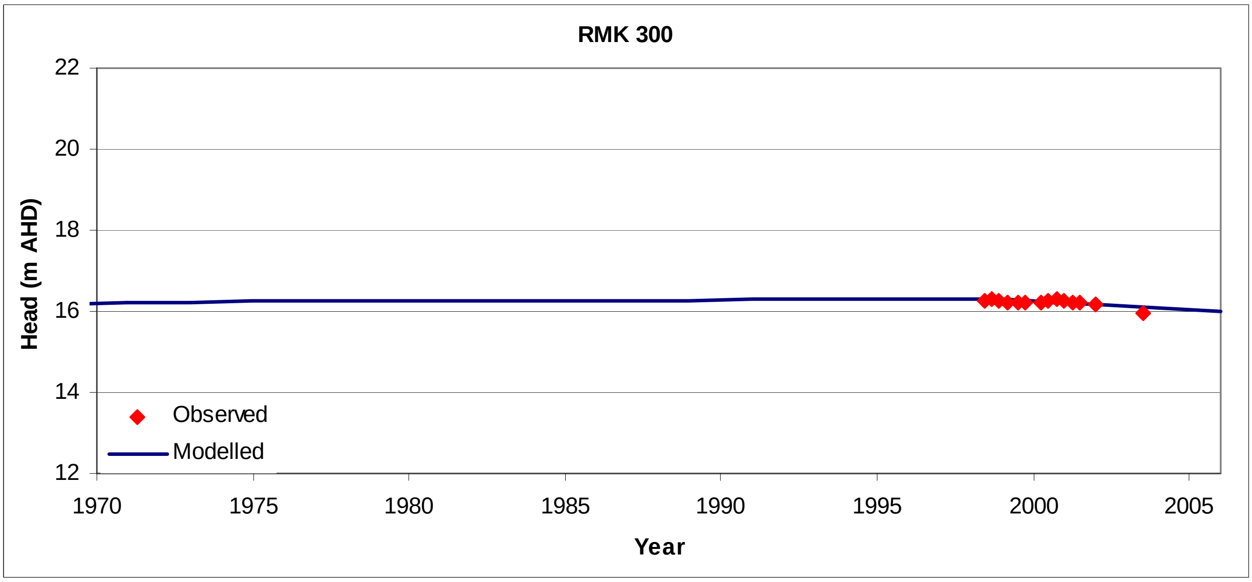
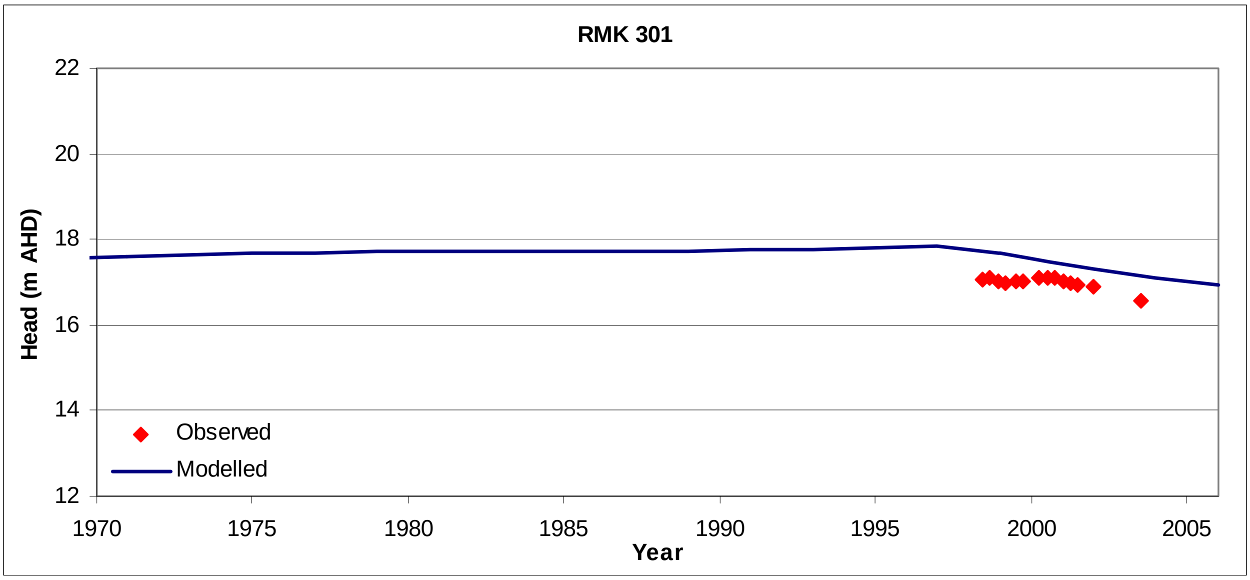
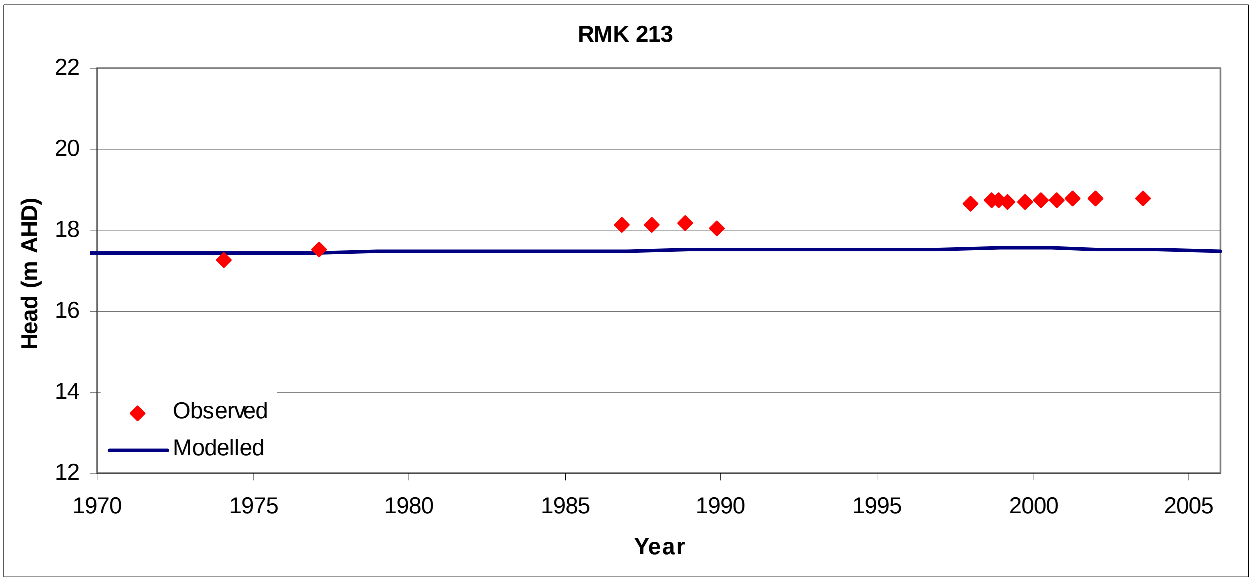


Figure 43: Renmark calibration results – Modelled and observed potentiometric heads (Observation wells RMK292, RMK294, RMK300)





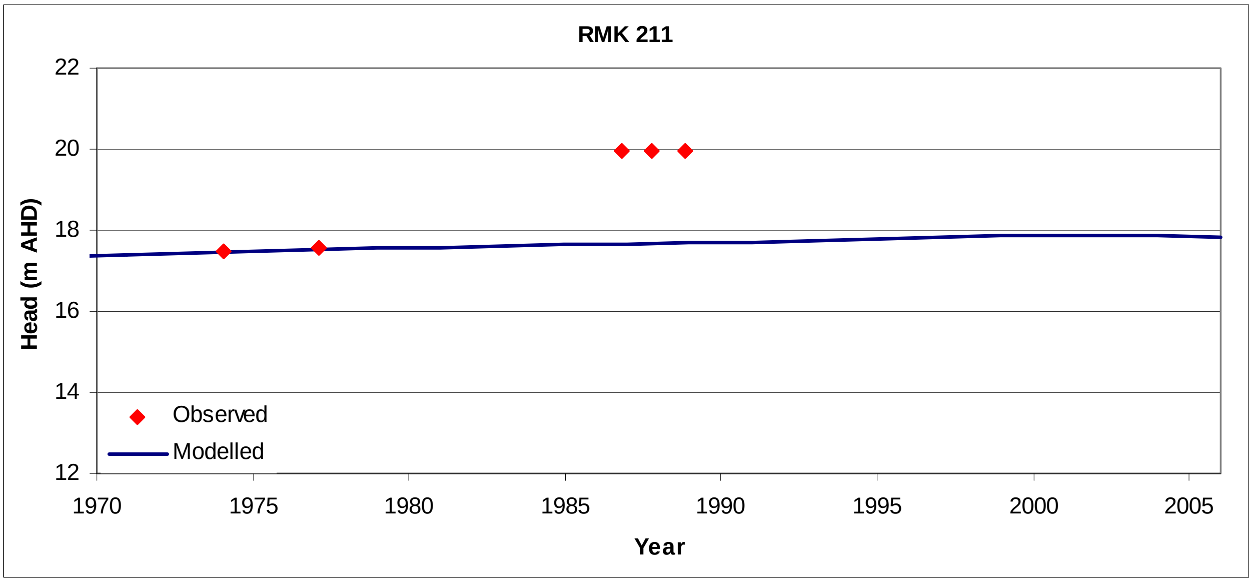
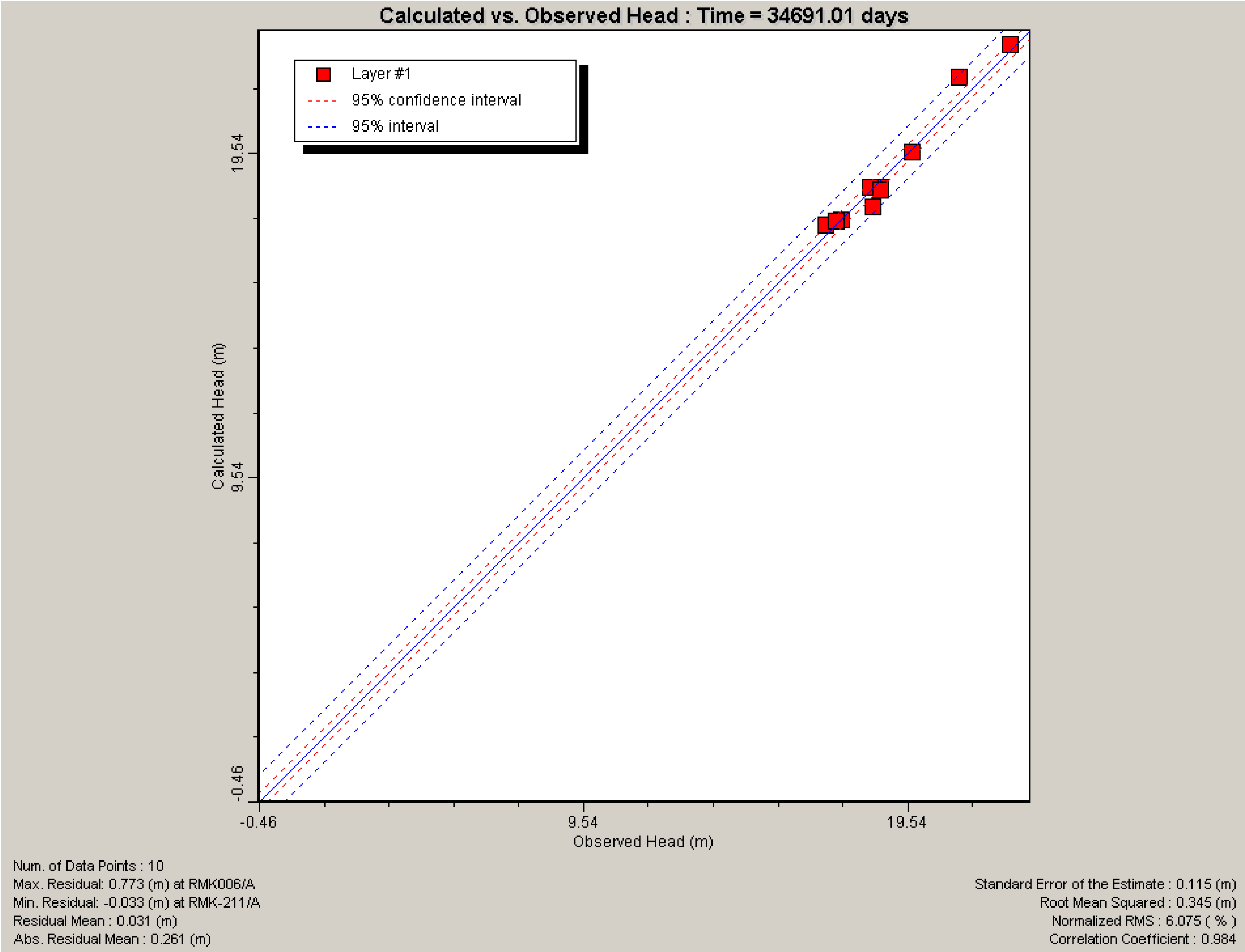


Figure 44: Renmark calibration results – Modelled and observed potentiometric heads (Observation wells RMK301, RMK213, RMK211)



Included OBSwells
RMK021
RMK006
RMK327
LVD001
LVD007
RMK069
RMK095
RMK098
RMK213
RMK211

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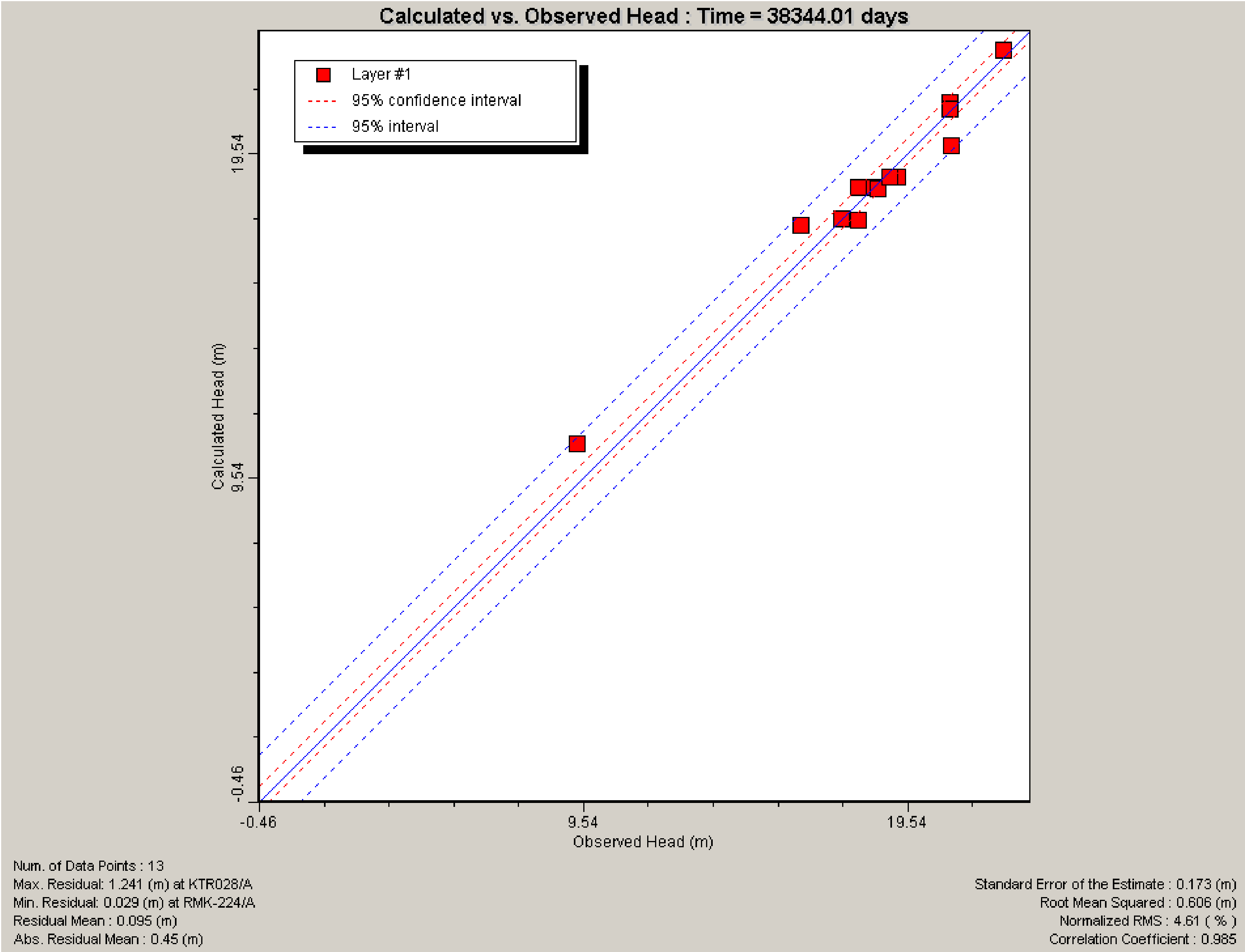
Figure 45: Berri Renmark area calibration results (1975)



Included OBSwells
RMK210
RMK021
RMK006
RMK327
LVD001
LVD007
KTR028
RMK069
RMK224
RMK225
RMK095
RMK098
RMK213

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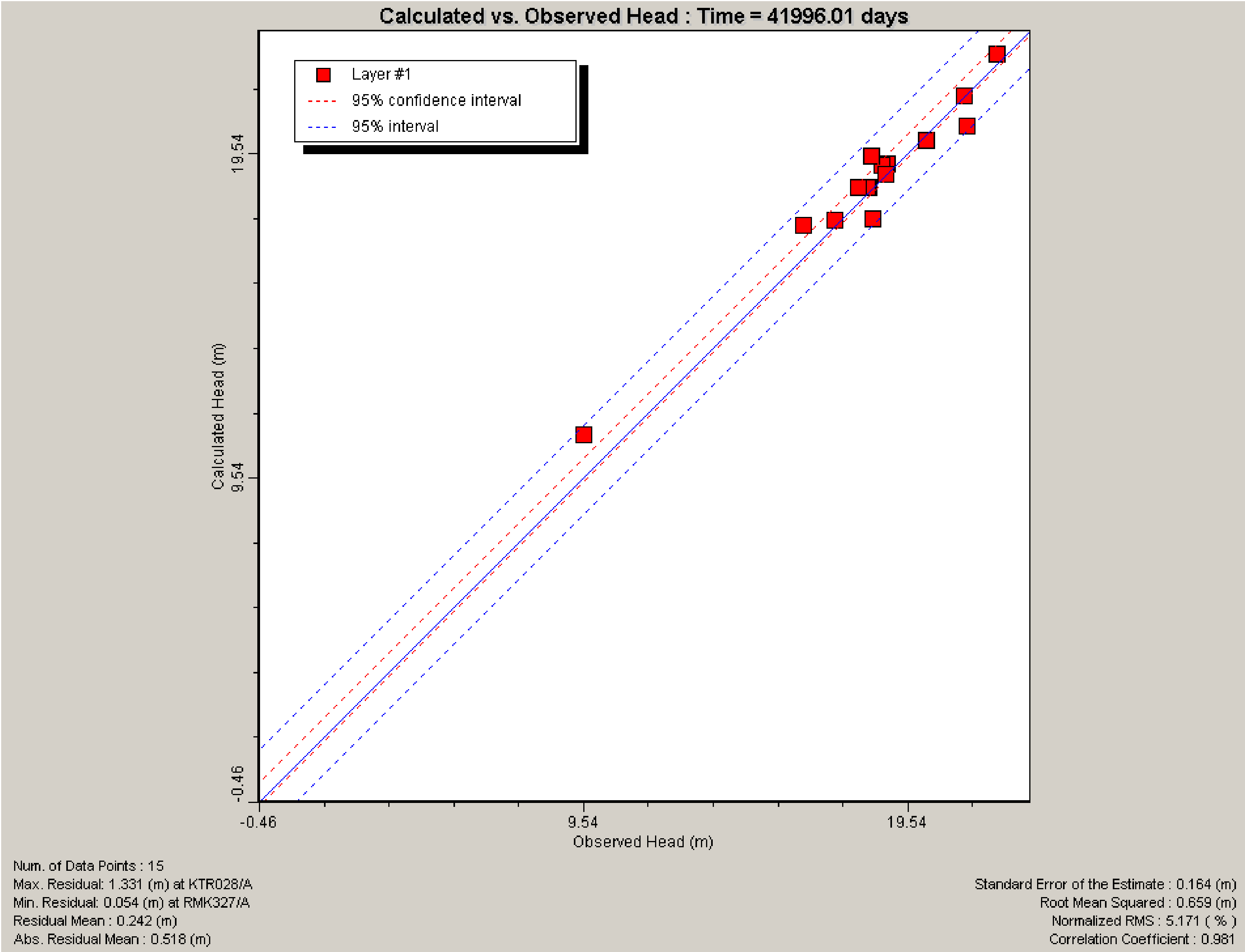
Figure 46: Berri Renmark area calibration results (1985)



Included OBSwells
RMK210
RMK021
RMK006
RMK327
LVD001
LVD007
KTR028
RMK069
RMK224
RMK225
RMK095
RMK098
RMK292
RMK294
RMK213

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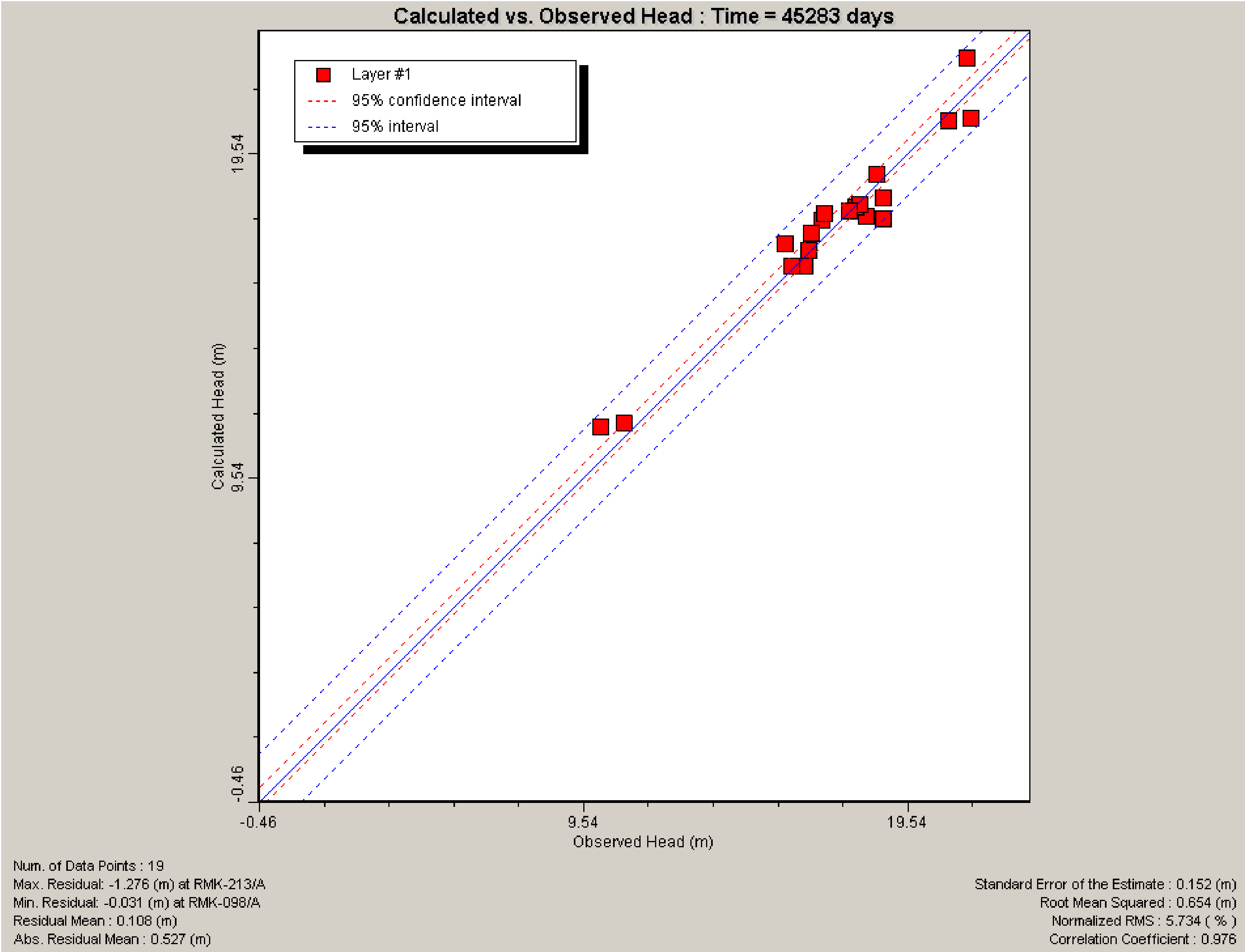
Figure 47: Berri Renmark area calibration results (1995)



Included OBSwells
RMK210
RMK021
RMK327
LVD007
LVD013
KTR028
RMK069
RMK317
RMK224
RMK225
RMK095
RMK098
RMK308
RMK307
RMK292
RMK294
RMK300
RMK301
RMK213

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Figure 48: Berri Renmark area calibration results (2004)

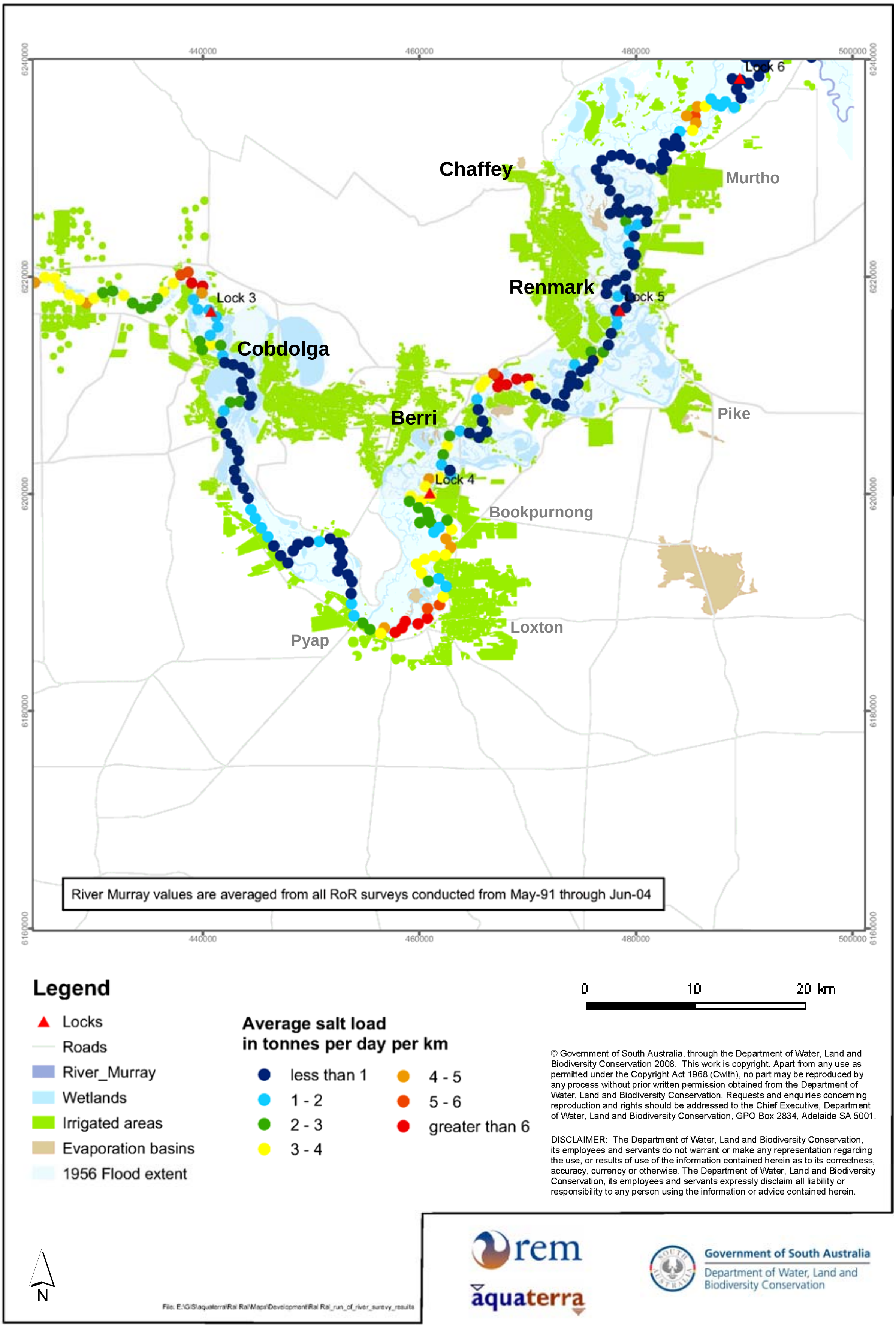
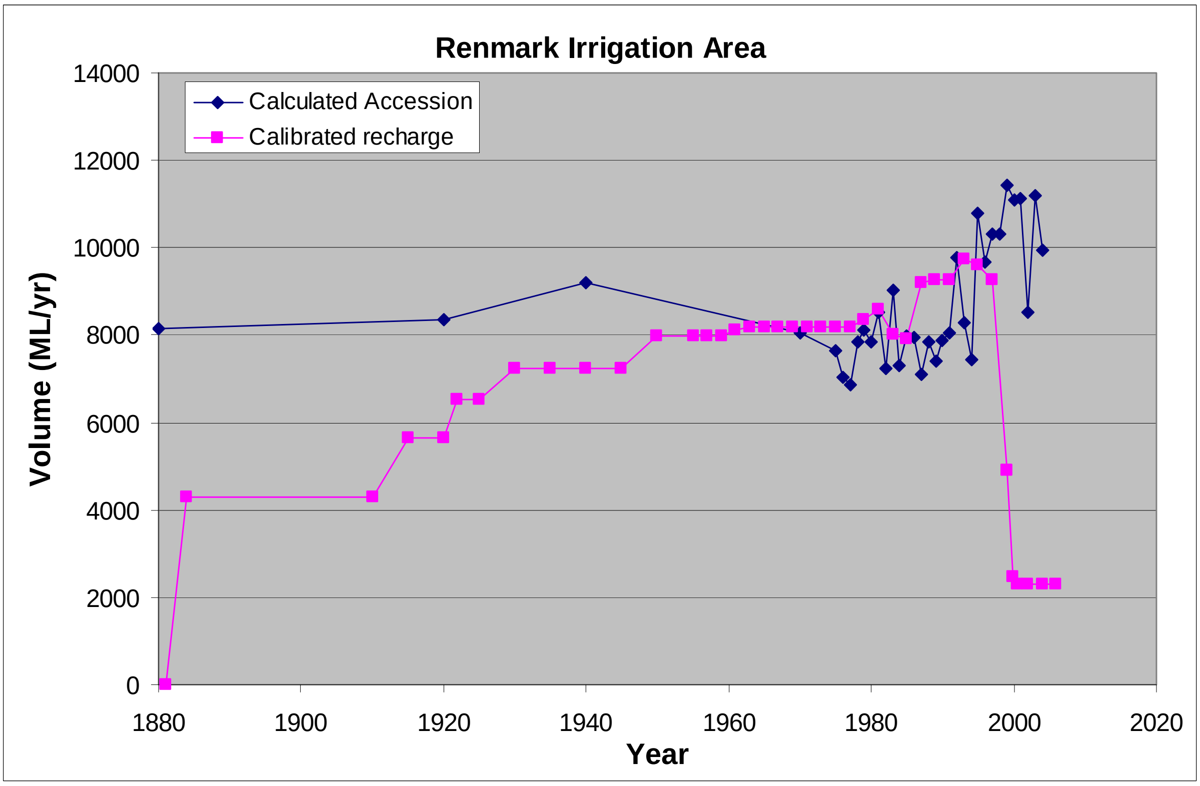


Figure 49: Average Run-of-River Survey results (after Aquaterra et al. 2006)



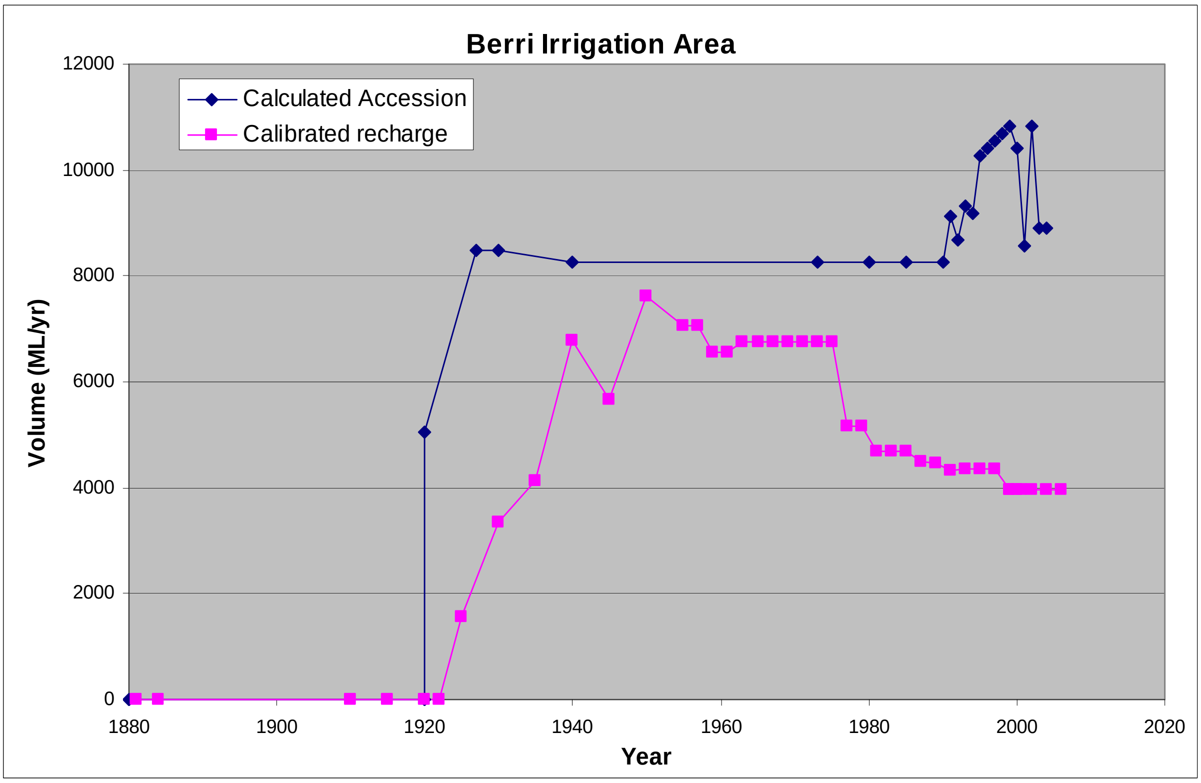


Figure 50: Comparison of modelled (calibrated) total recharge volume vs calculated accession (Aquaterra et al. 2006) based on 15% RZD of application.

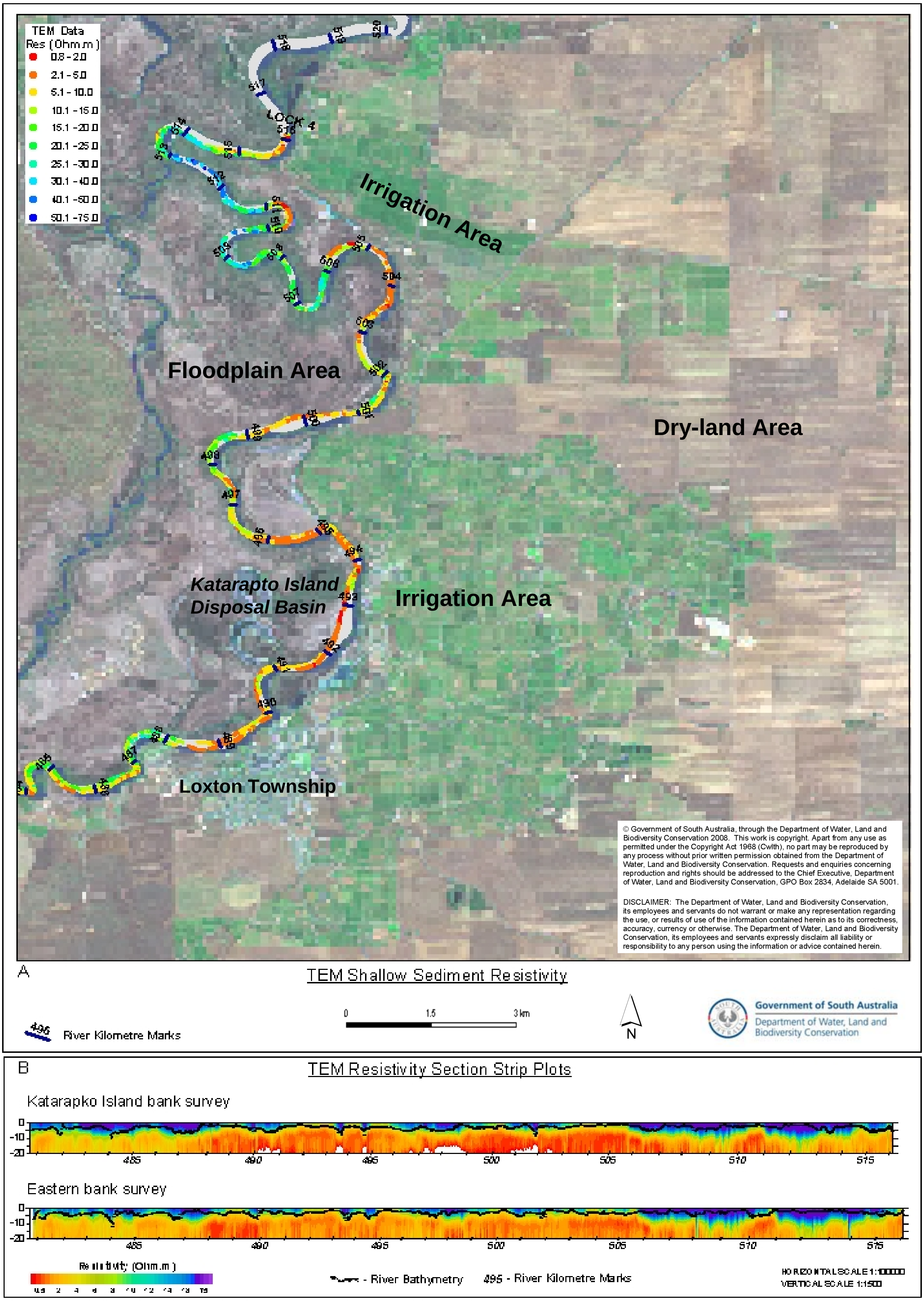


Figure 51: Local NanoTEM results for the Loxton-Bookpurnong Area

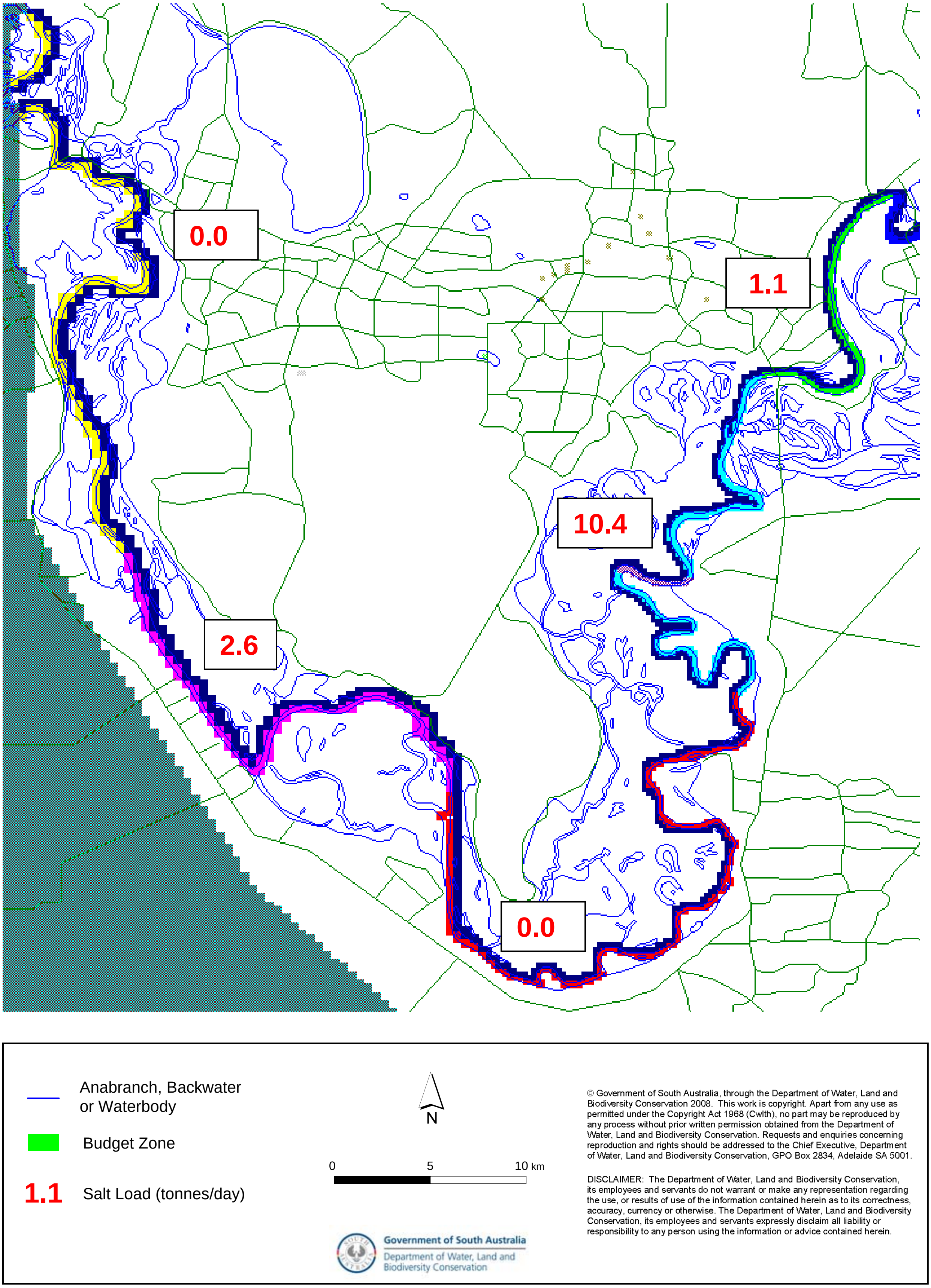


Figure 52a: Model flow budget zones and modelled salt load at 2006 (t/day) in Berri Area

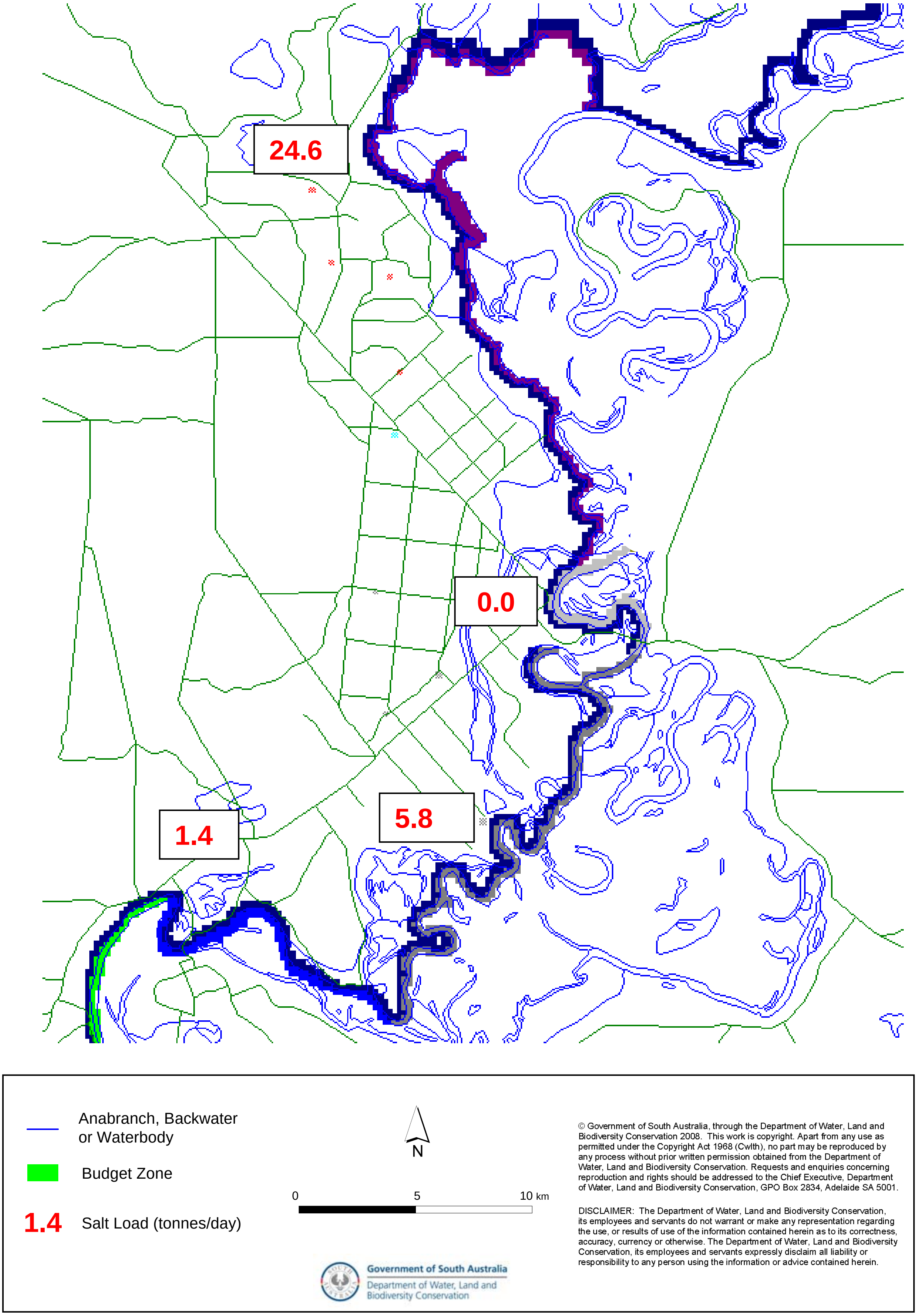
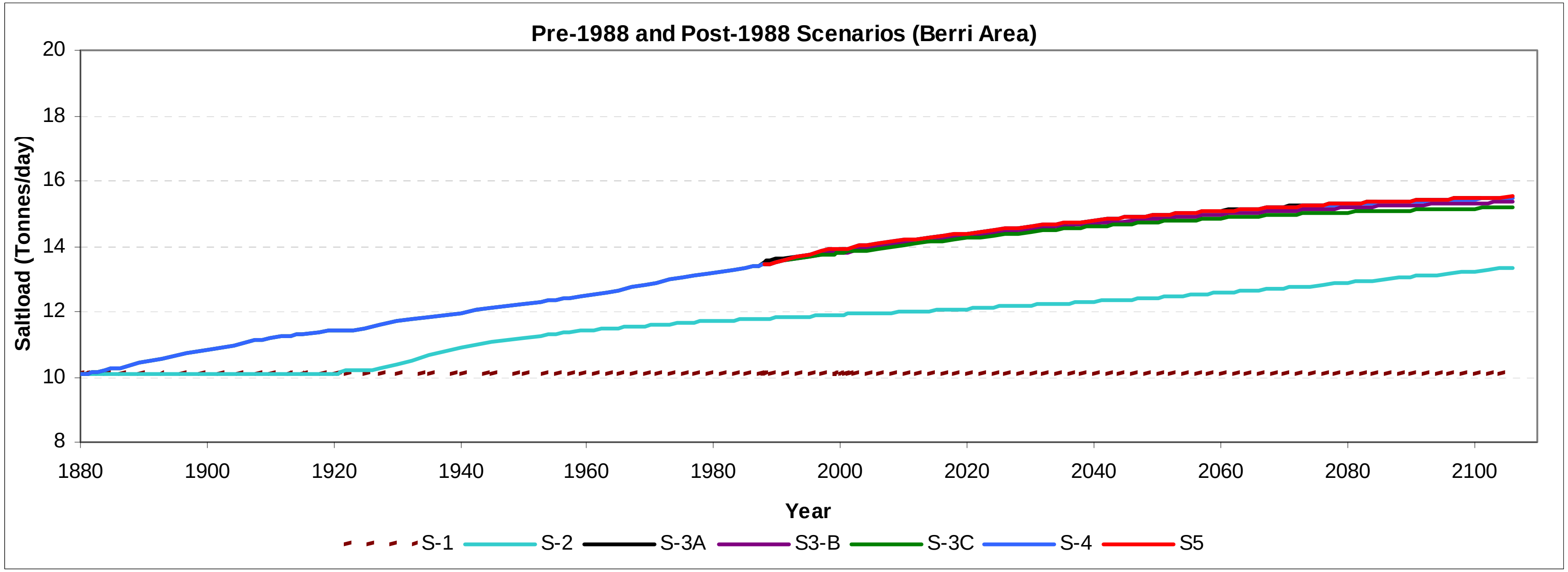


Figure 52b: Model flow budget zones and modelled salt load at 2006 (t/day) in Renmark Area



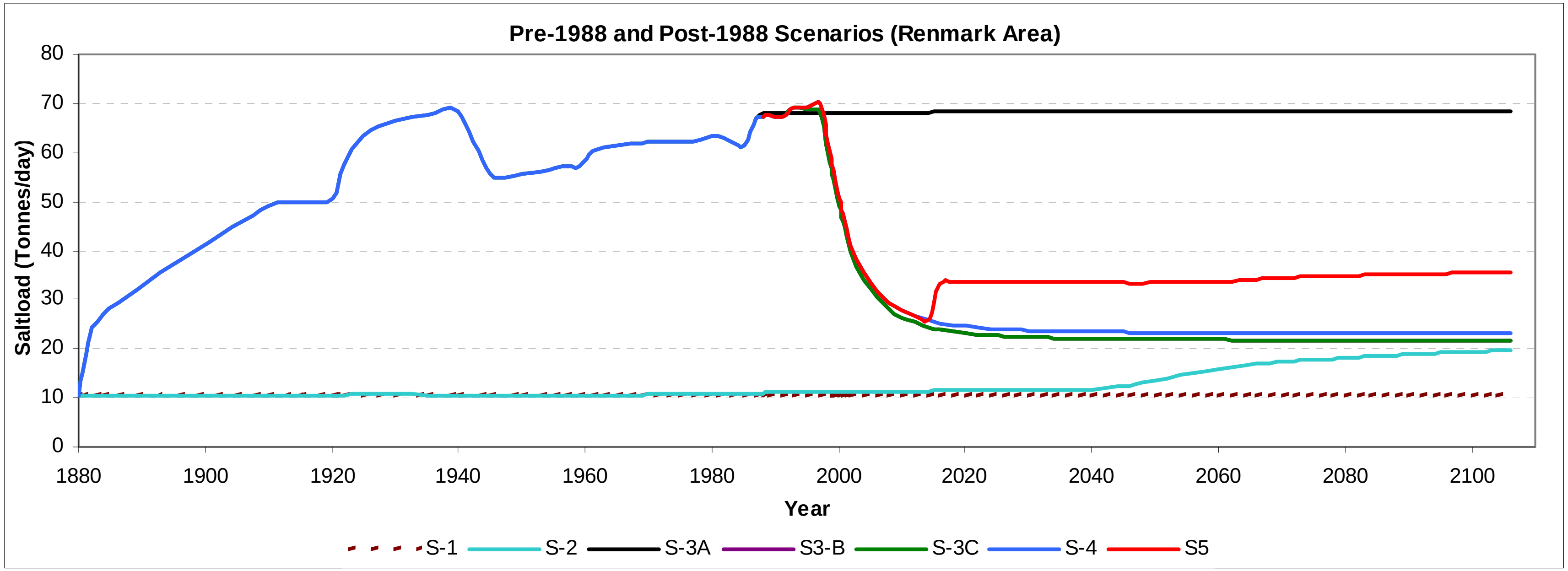


Figure 53: Predicted salt loads entering the River Murray for all scenarios

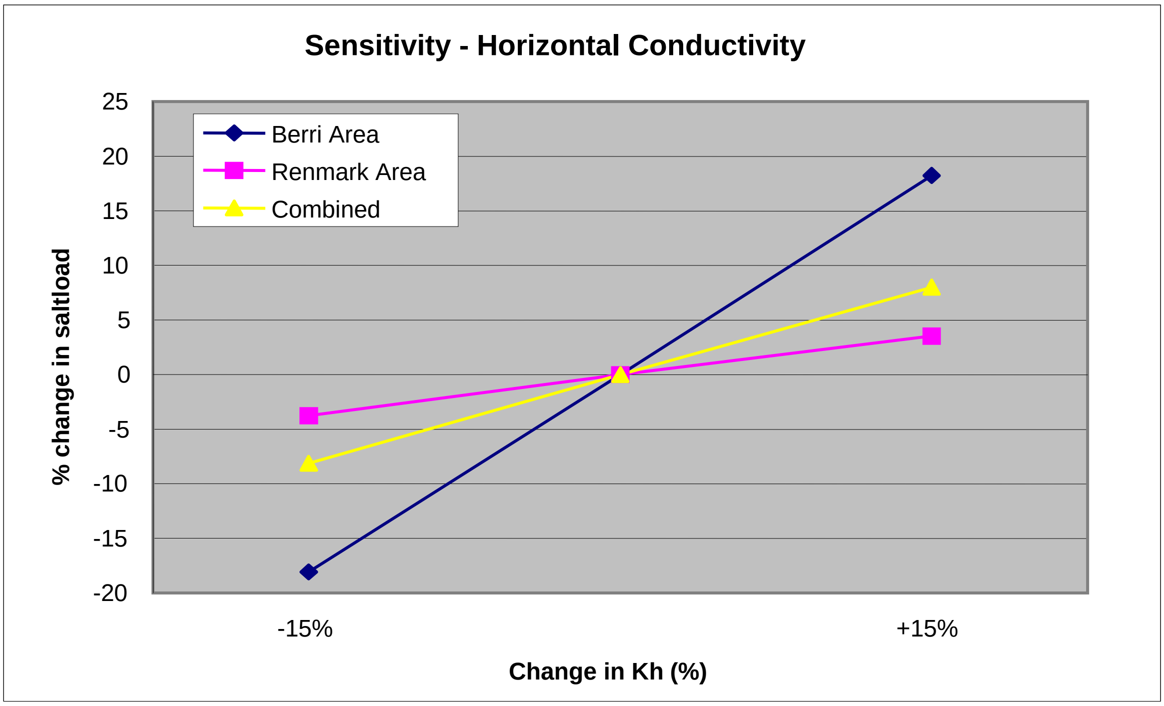


Figure 54: Model sensitivity to hydraulic conductivity of Loxton Sands aquifer

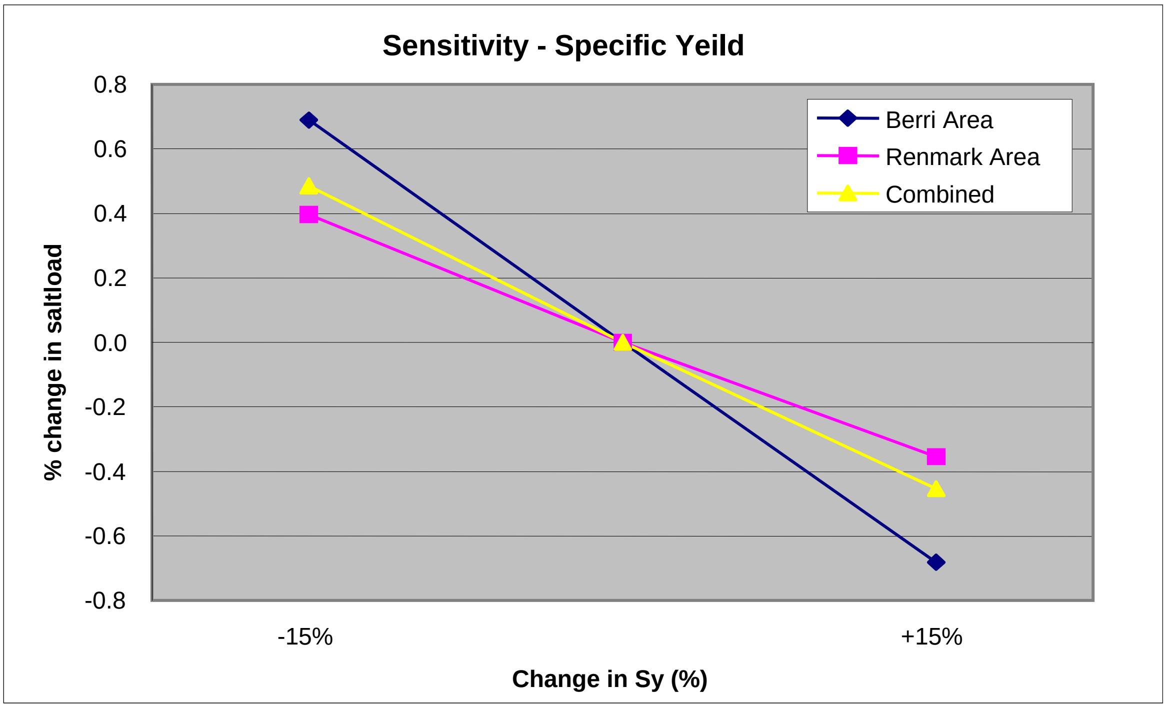


Figure 55: Model sensitivity to specific yield of Loxton Sands aquifer

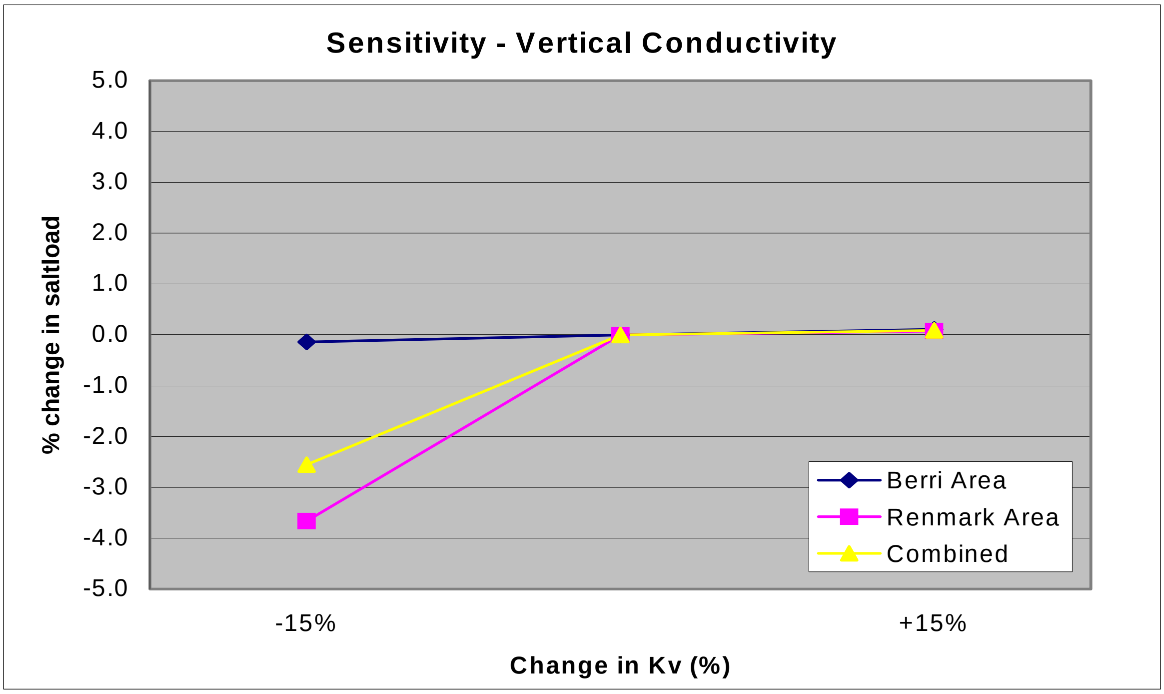


Figure 56: Model sensitivity to vertical hydraulic conductivity of Bookpurnong Beds

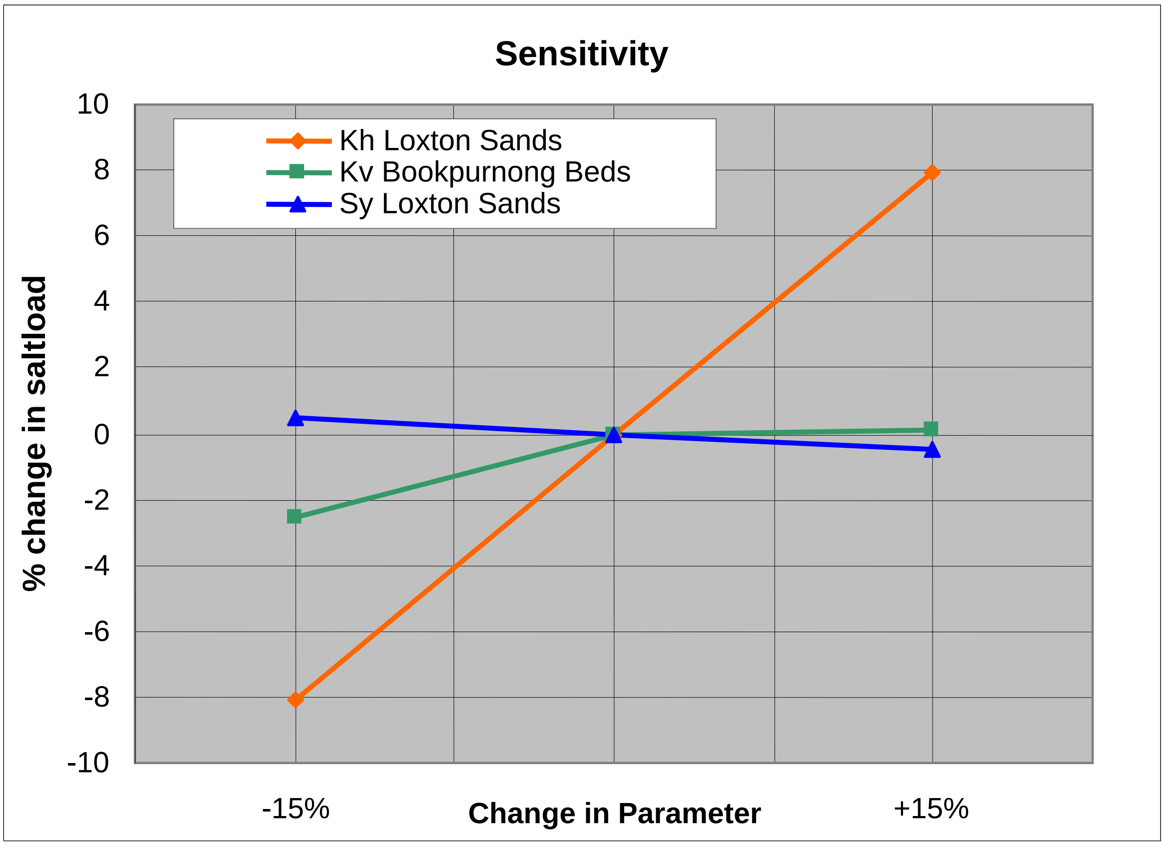


Figure 57: Comparative model sensitivity of the three model parameters tested

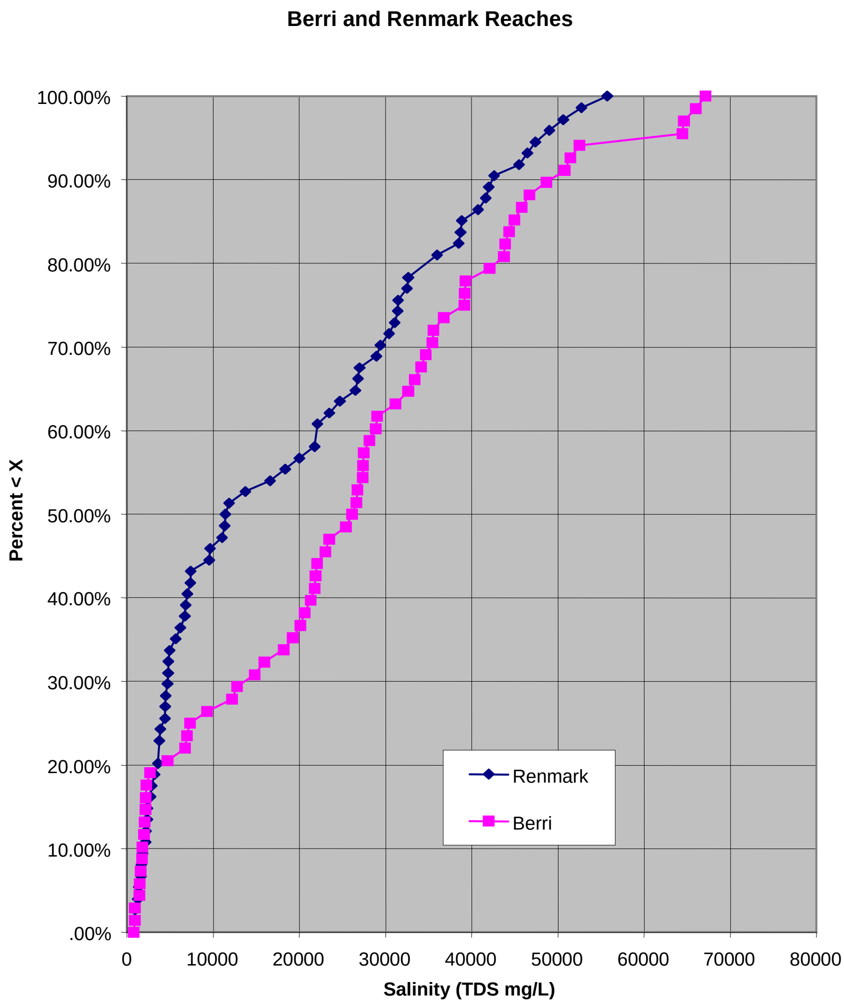


Figure 58: Frequency Distribution of Salinities from Renmark and Berri reaches

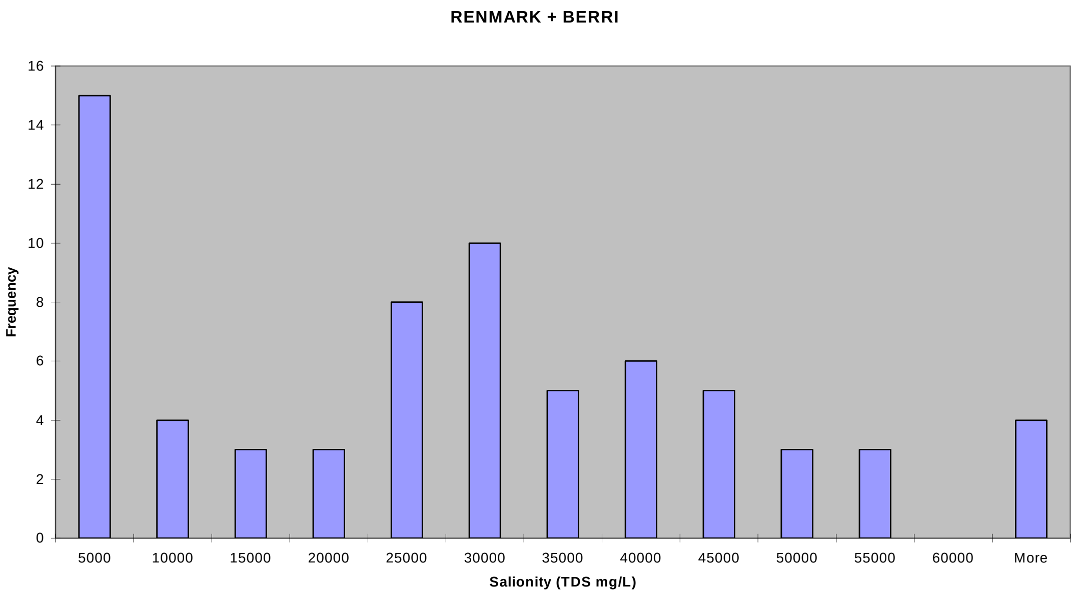


Figure 59: Frequency Distribution Histogram – Renmark and Berri Salinities

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	356 or 366 days	time interval

EC electrical conductivity (µS/cm)

pH acidity

TDS total dissolved solids (mg/L)

GLOSSARY

Act. The *Water Resources Act 1997* (South Australia).

Anabranch. A branch of a river that leaves the main stream.

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 and the water is held at greater than atmospheric pressure. Water in a penetrating well will rise above the surface of the aquifer.

Aquifer test. A hydrological test performed on a well, aimed to increase the understanding of the aquifer properties, including any interference between wells, and to more accurately estimate the sustainable use of the water resource available for development from the well.

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.

Artesian. Under pressure such that when wells penetrate the aquifer water will rise to the ground surface without the need for pumping.

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

Benchmark condition. Points of reference from which change can be measured.

Bore. *See well.*

EC. Abbreviation for electrical conductivity. 1 EC unit = 1 micro-Siemen per centimetre (µS/cm)

Erosion. Natural breakdown and movement of soil and rock by water, wind or ice. The process may be accelerated by human activities.

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

Floodplain. Of a watercourse means: (a) the floodplain (if any) of the watercourse identified in a catchment water management plan or a local water management plan; adopted under Part 7 of the Water Resources Act 1997; or (b) where paragraph (a) does not apply — the floodplain (if any) of the watercourse identified in a development plan under the Development Act 1993, or (c) where neither paragraph (a) nor paragraph (b) applies — the land adjoining the watercourse that is periodically subject to flooding from the watercourse.

Future irrigation Development Future irrigation development area and recharge (assuming recharge of 100 mm/yr) resulting from activation of already allocated water that is assumed to occur after the current year

Gigalitre (GL). One thousand million litres (1 000 000 000).

GIS (geographic information system). Computer software allows for the linking of 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.

GL. *See gigalitre.*

Groundwater. *See underground water.*

Hydrogeology. The study of groundwater, which includes its occurrence, recharge and discharge processes and the properties of aquifers. *(See 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 hydrogeology.)*

Infrastructure. Artificial lakes; or dams or reservoirs; or embankments, walls, channels or other works; or buildings or structures; or pipes, machinery or other equipment.

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.

Improved Irrigation Practices (IIP). Commencing in the mid 1990s when flood irrigation via earth channels was replaced by sprinkler and drip irrigation systems, thus increasing irrigation efficiency (70–85%) and reducing recharge to the groundwater table

Lag time. Time (years) taken for recharge to reach the groundwater table. Lag time is affected by depth to groundwater table and the presence and properties of aquitards.

Lake. A natural lake, pond, lagoon, wetland or spring (whether modified or not) and includes: part of a lake; and a body of water declared by regulation to be a lake; a reference to a lake is a reference to either the bed, banks and shores of the lake or the water for the time being held by the bed, banks and shores of the lake, or both, depending on the context.

Land. Whether under water or not and includes an interest in land and any building or structure fixed to the land.

Licence. A licence to take water in accordance with the Water Resources Act 1997. *(See water licence.)*

Mallee Clearance. Clearance of natural vegetation

MDBC. Murray-Darling Basin Commission.

Megalitre (ML). One million litres (1 000 000).

ML. *See megalitre.*

Model. A conceptual or mathematical means of understanding elements of the real world which allows for predictions of outcomes given certain conditions. Examples include estimating storm runoff, assessing the impacts of dams or predicting ecological response to environmental change.

Modelled result. Output from the calibrated model (e.g. a potentiometric head distribution) that can be compared to observed data

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

Occupier of land. A person who has, or is entitled to, possession or control of the land.

Percentile. A way of describing sets of data by ranking the data set and establishing the value for each percentage of the total number of data records. The 90th percentile of the distribution is the value such that 90% of the observations fall at or below it.

Permeability. A measure of the ease with which water flows through an aquifer or aquitard.

PIRSA. (Department of) Primary Industries and Resources South Australia.

Post-1988 irrigation. Irrigation development area and recharge that occurred between 01/01/1988 and the current year

Pre – Committed Water. Water allocation that has been approved but is not yet being used.

Pre-1988 irrigation. Irrigation development area and recharge that occurred prior to 01/01/1988

Predicted result. Output from the prediction model has been used to determine the future result of a particular scenario

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.

Recharge. Irrigation drainage and/or rainfall infiltration reaching the groundwater table

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

Rehabilitation (RH). Replacement of leaky concrete water distribution channels with pipelines resulting in reduced transportation losses, which are reflected by reduced recharge to the groundwater table

SIS. Salt Interception Scheme designed to intercept the (maximum) groundwater flux and salt load resulting from the pre-1988, post-1988 and future irrigation development

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.

Underground water (groundwater). Water occurring naturally below ground level or water pumped, diverted or released into a well for storage underground

Water licence. A licence granted under the Act entitling the holder to take water from a prescribed watercourse, lake or well or to take surface water from a surface water prescribed area. This grants the licensee a right to take an allocation of water specified on the licence, which may also include conditions on the taking and use of that water. A water licence confers a property right on the holder of the licence and this right is separate from land title.

Water table. The saturated - unsaturated interface within the ground.

Waterbody. Waterbodies include watercourses, riparian zones, floodplains, wetlands, estuaries, lakes and groundwater aquifers.

Watercourse. A river, creek or other natural watercourse (whether modified or not) and includes: a dam or reservoir that collects water flowing in a watercourse; and a lake through which water flows; and a channel (but not a channel declared by regulation to be excluded from the this definition) into which the water of a watercourse has been diverted; and part of a watercourse.

Well. (a) an opening in the ground excavated for the purpose of obtaining access to underground water; (b) an opening in the ground excavated for some other purpose but that gives access to underground water; (c) a natural opening in the ground that gives access to underground water.

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DWLBC REPORT

Berri-Renmark Numerical Goundwater Model 2007 Volume 2 - Appendices

2007/30

Government of South Australia
Department of Water, Land and Biodiversity Conservation

Berri – Renmark Numerical Groundwater Model 2007

Volume 2 – Appendices

Wei Yan, Joel Georgiou, Steve Barnett and Brenton Howe

Knowledge and Information Division
Department of Water, Land and Biodiversity Conservation

April 2007

Report DWLBC 2007/30

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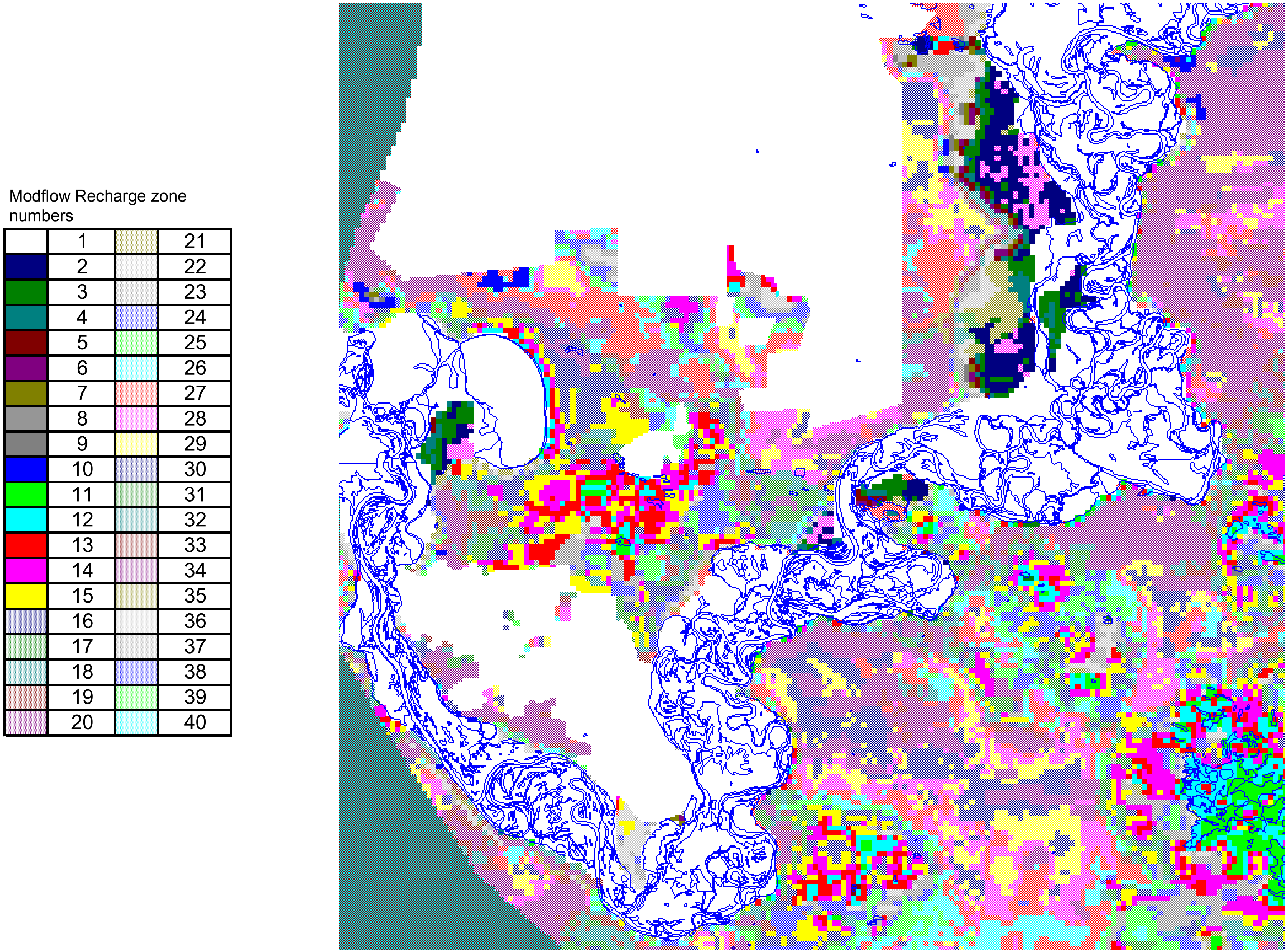
Appendix A-1
Model Input - Mallee Clearance

-Model recharge zones
-Zone number and recharge rates (mm/yr)



Appendix A-1-1: Mallee clearance recharge zones applied in the Berri - Renmark Area (Scenario-2) (Modflow zone numbers shown)

Modflow Recharge Zone				41	42	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DEH Zone No.				0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Start Year	Stop Year	Start Day	Stop Day																					
1920	1930	0	3650	0.07	0.18	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.33	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1930	1940	3650	7300	0.07	0.65	0.16	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	2.12	0.39	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1940	1950	7300	10950	0.07	0.71	0.48	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	2.16	1.56	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1950	1960	10950	14600	0.07	0.71	0.67	0.18	0.07	0.07	0.07	0.07	0.07	0.07	0.07	2.16	2.37	0.62	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1960	1970	14600	18250	0.07	0.71	0.70	0.43	0.09	0.07	0.07	0.07	0.07	0.07	0.07	2.16	2.52	1.98	0.15	0.07	0.07	0.07	0.07	0.07	0.07
1970	1980	18250	21900	0.07	0.71	0.70	0.59	0.23	0.07	0.07	0.07	0.07	0.07	0.08	2.16	2.53	2.98	0.71	0.10	0.07	0.07	0.07	0.07	0.07
1980	1990	21900	25550	0.07	0.71	0.70	0.63	0.43	0.12	0.07	0.07	0.07	0.07	0.11	2.16	2.53	3.30	1.83	0.35	0.08	0.07	0.07	0.07	0.07
1990	2000	25550	29200	0.07	0.71	0.70	0.64	0.56	0.25	0.08	0.07	0.07	0.07	0.12	2.16	2.53	3.35	2.79	1.06	0.15	0.07	0.07	0.07	0.07
2000	2010	29200	32850	0.07	0.72	0.70	0.64	0.61	0.41	0.14	0.08	0.07	0.07	0.12	2.16	2.53	3.36	3.24	1.97	0.45	0.11	0.07	0.07	0.07
2010	2020	32850	36500	0.07	0.73	0.70	0.64	0.62	0.54	0.25	0.10	0.07	0.07	0.13	2.16	2.53	3.36	3.37	2.66	1.05	0.26	0.08	0.07	0.07
2020	2030	36500	40150	0.09	0.74	0.70	0.64	0.62	0.61	0.38	0.16	0.09	0.07	0.13	2.16	2.53	3.36	3.40	3.00	1.80	0.63	0.15	0.08	0.07
2030	2040	40150	43800	0.19	0.75	0.70	0.64	0.62	0.63	0.49	0.27	0.14	0.08	0.13	2.16	2.53	3.36	3.40	3.13	2.43	1.23	0.35	0.11	0.07
2040	2050	43800	47450	0.48	0.76	0.70	0.64	0.62	0.64	0.56	0.39	0.23	0.11	0.13	2.16	2.53	3.36	3.40	3.17	2.82	1.91	0.75	0.22	0.07
2050	2060	47450	51100	1.10	0.76	0.70	0.64	0.62	0.64	0.59	0.49	0.35	0.17	0.13	2.16	2.53	3.36	3.40	3.18	3.01	2.48	1.29	0.47	0.09
2060	2070	51100	54750	2.06	0.76	0.70	0.64	0.62	0.64	0.60	0.56	0.49	0.26	0.13	2.16	2.53	3.36	3.40	3.18	3.08	2.86	1.88	0.88	0.12
2070	2080	54750	58400	3.20	0.76	0.70	0.64	0.62	0.64	0.61	0.59	0.61	0.37	0.13	2.16	2.53	3.36	3.40	3.18	3.11	3.07	2.39	1.40	0.17
2080	2090	58400	62050	4.32	0.76	0.70	0.64	0.62	0.64	0.61	0.61	0.70	0.48	0.14	2.16	2.53	3.36	3.40	3.18	3.12	3.17	2.76	1.95	0.27
2090	2100	62050	65700	5.22	0.76	0.70	0.64	0.62	0.64	0.61	0.62	0.76	0.57	0.15	2.16	2.53	3.36	3.40	3.18	3.12	3.22	3.00	2.43	0.40
2100	2110	65700	69350	5.86	0.76	0.70	0.64	0.62	0.64	0.61	0.62	0.79	0.64	0.17	2.16	2.53	3.36	3.40	3.18	3.12	3.24	3.13	2.81	0.55
2110	2120	69350	73000	6.25	0.76	0.70	0.64	0.62	0.64	0.61	0.62	0.81	0.69	0.19	2.16	2.53	3.36	3.40	3.18	3.12	3.24	3.19	3.06	0.73
2120	2145	73000	82125	6.25	0.76	0.70	0.64	0.62	0.64	0.61	0.62	0.81	0.69	0.19	2.16	2.53	3.36	3.40	3.18	3.12	3.24	3.19	3.06	0.73

Appendix A-1-2: Mallee clearance recharge rates in mm/yr (Scenario-2)

Modflow Recharge Zone				21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
DEH Zone No.				21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Start Year	Stop Year	Start Day	Stop Day																				
1920	**1930**	***0***	***3650***	2.77	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	2.43	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1930	**1940**	***3650***	***7300***	7.83	0.60	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	10.53	0.87	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1940	**1950**	***7300***	***10950***	8.09	3.63	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07	10.90	5.79	0.15	0.07	0.07	0.07	0.07	0.07	0.07	0.07
1950	**1960**	***10950***	***14600***	8.09	6.70	0.97	0.07	0.07	0.07	0.07	0.07	0.07	0.07	10.90	10.15	2.24	0.08	0.07	0.07	0.07	0.07	0.07	0.07
1960	**1970**	***14600***	***18250***	8.09	7.35	3.68	0.35	0.07	0.07	0.07	0.07	0.07	0.07	10.90	10.91	6.82	0.56	0.07	0.07	0.07	0.07	0.07	0.07
1970	**1980**	***18250***	***21900***	8.09	7.38	6.23	1.91	0.13	0.07	0.07	0.07	0.07	0.07	10.90	10.94	9.91	3.12	0.18	0.07	0.07	0.07	0.07	0.07
1980	**1990**	***21900***	***25550***	8.09	7.38	7.16	4.37	0.64	0.09	0.07	0.07	0.07	0.07	10.90	10.94	10.83	6.89	1.07	0.09	0.07	0.07	0.07	0.07
1990	**2000**	***25550***	***29200***	8.09	7.38	7.32	6.08	2.19	0.26	0.08	0.07	0.07	0.07	10.90	10.94	10.97	9.51	3.50	0.26	0.08	0.07	0.07	0.07
2000	**2010**	***29200***	***32850***	8.09	7.38	7.34	6.78	4.34	0.97	0.15	0.07	0.07	0.07	10.90	10.94	10.99	10.62	6.60	1.03	0.18	0.08	0.07	0.07
2010	**2020**	***32850***	***36500***	8.09	7.38	7.34	6.97	6.06	2.44	0.51	0.10	0.07	0.07	10.90	10.94	10.99	10.94	8.93	2.82	0.64	0.13	0.07	0.07
2020	**2030**	***36500***	***40150***	8.09	7.38	7.34	7.01	6.97	4.30	1.41	0.27	0.09	0.07	10.90	10.94	10.99	11.00	10.13	5.29	1.81	0.39	0.10	0.07
2030	**2040**	***40150***	***43800***	8.09	7.38	7.34	7.01	7.32	5.89	2.85	0.74	0.18	0.07	10.90	10.94	10.99	11.01	10.60	7.62	3.72	1.13	0.25	0.08
2040	**2050**	***43800***	***47450***	8.09	7.38	7.34	7.01	7.42	6.89	4.48	1.67	0.45	0.09	10.90	10.94	10.99	11.01	10.76	9.22	5.91	2.53	0.69	0.11
2050	**2060**	***47450***	***51100***	8.09	7.38	7.34	7.01	7.45	7.39	5.85	2.98	1.05	0.15	10.90	10.94	10.99	11.01	10.82	10.08	7.82	4.44	1.66	0.24
2060	**2070**	***51100***	***54750***	8.09	7.38	7.34	7.01	7.46	7.60	6.77	4.39	1.99	0.30	10.90	10.94	10.99	11.01	10.86	10.45	9.15	6.42	3.21	0.54
2070	**2080**	***54750***	***58400***	8.09	7.38	7.34	7.01	7.46	7.67	7.28	5.61	3.18	0.59	10.90	10.94	10.99	11.01	10.89	10.59	9.93	8.07	5.14	1.11
2080	**2090**	***58400***	***62050***	8.09	7.38	7.34	7.01	7.46	7.70	7.53	6.51	4.40	1.06	10.90	10.94	10.99	11.01	10.90	10.64	10.31	9.22	7.11	2.00
2090	**2100**	***62050***	***65700***	8.09	7.38	7.34	7.01	7.46	7.70	7.63	7.06	5.45	1.69	10.90	10.94	10.99	11.01	10.91	10.65	10.48	9.90	8.79	3.17
2100	**2110**	***65700***	***69350***	8.09	7.38	7.34	7.01	7.46	7.70	7.67	7.37	6.23	2.43	10.90	10.94	10.99	11.01	10.92	10.66	10.55	10.27	10.04	4.51
2110	**2120**	***69350***	***73000***	8.09	7.38	7.34	7.01	7.46	7.70	7.69	7.53	6.75	3.21	10.90	10.94	10.99	11.01	10.92	10.66	10.58	10.44	10.87	5.90
2120	**2145**	***73000***	***82125***	8.09	7.38	7.34	7.01	7.46	7.70	7.69	7.53	6.75	3.21	10.90	10.94	10.99	11.01	10.92	10.66	10.58	10.44	10.87	5.90

Appendix A-1-3: Mallee clearance recharge rates in mm/yr (Scenario-2)

Appendix A-2
Model Input - Berri Area

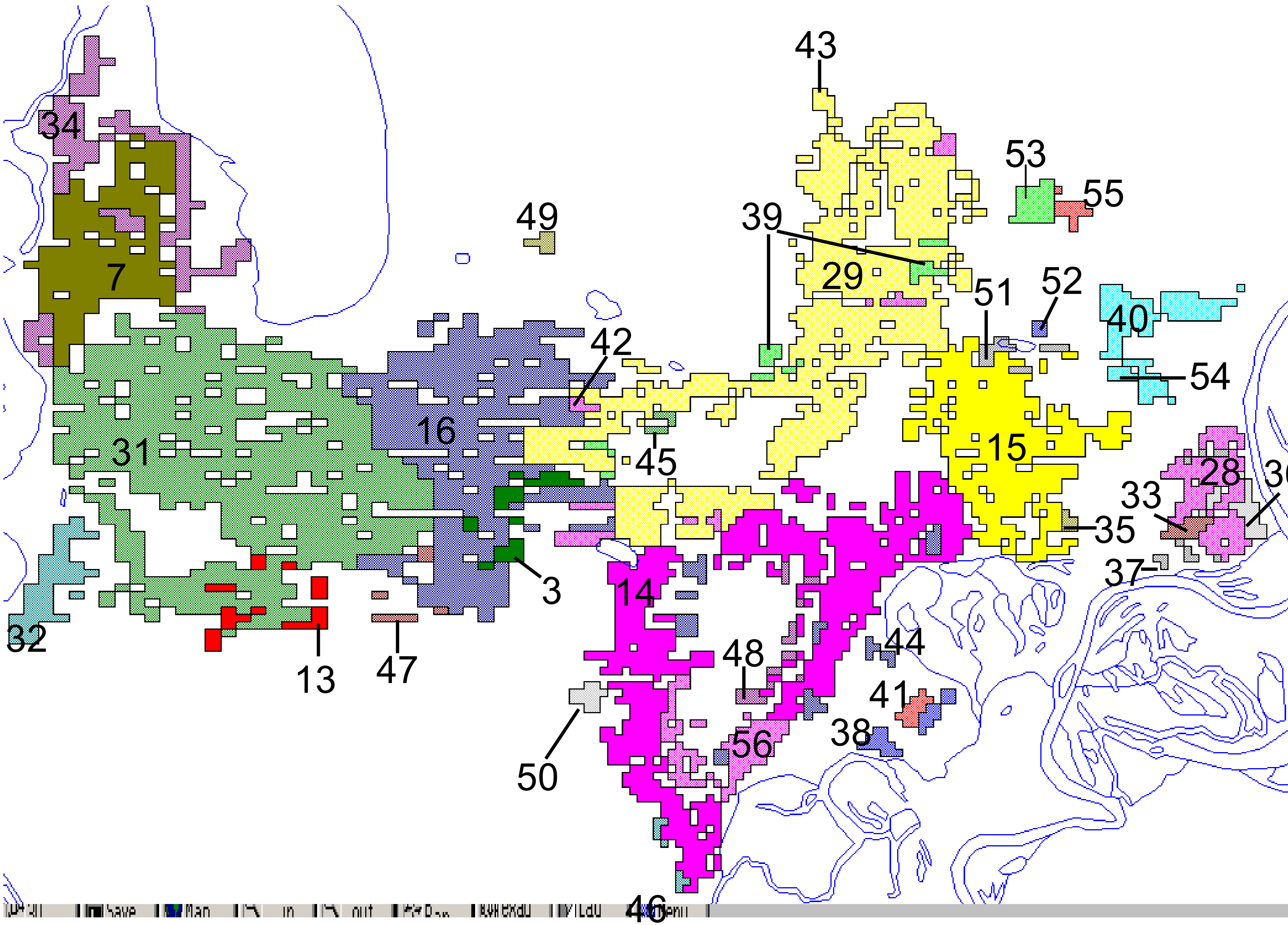
- Model recharge zones
- Model recharge rates (mm/yr)
- Irrigation start year and lag time
- Total model recharge volume
- Caisson Modelled Specifications

(Scenario-3A, Scenario-3B, Scenario-3C & Scenario-4)

Scenario	Name	Model Run	Irrigation development area	IIP[1]	RH[2]	SIS[3]
S–1	Natural system	Steady State	None	–	–	–
S–2	Mallee clearance	1920 – 2105	None (but includes Mallee clearance area)	–	–	–
S–3A	Pre-1988, no IIP, no RH	1988 – 2105	Pre-1988	No	No	–
S–3B	Pre-1988, with IIP, no RH	1988 – 2105	Pre-1988	Yes	No	–
S–3C	Pre-1988, with IIP and with RH	1988 – 2105	Pre-1988	Yes	Yes	–
S–4	Current irrigation	2005 – 2105	Pre-1988 + Post-1988	Yes	Yes	No
S–5	Current plus future irrigation	2005 – 2105	Pre-1988 + Post-1988 + Future development	Yes	Yes	No

1 Improved Irrigation Practices 2 Rehabilitation 3 Salt Interception Scheme

Appendix A-2: Model Scenario conditions



Appendix A-2: Model recharge zones in the Berri Area (Scenario-3A, Scenario-3B, Scenario-3C, Scenario-4)

Irrigation Start year				1925	1920	1920	1920	1967	1961	1970	1991	1995	1995	1920	1930	1920	1930	1930	1985	1996
Lag time (yrs)				0	2	15	20	0	0	17	0	0	2	15	0	5	15	10	0	10
Start Year	Stop Year	Start Day	Stop Day	Z 28	Z 29	Z 14	Z 15	Z 33	Z 40	Z 35	Z 36	Z 37	Z 38	Z 56	Z 7	Z 16	Z 31	Z 32	Z 34	Z 39
1880	1881	0	365	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	1884	365	1460	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	1910	1460	10950	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	1915	10950	12776	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	1920	12776	14603	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	1922	14603	15333	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1922	1925	15333	16430	0.1	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	1930	16430	18255	109.4	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	168.5	0.1	0.1	0.1	0.1
1930	1935	18255	20081	109.4	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	168.5	168.5	0.1	0.1	0.1	0.1
1935	1940	20081	21908	99.4	118.7	237.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	237.4	168.5	168.5	0.1	0.1	0.1	0.1
1940	1945	21908	23734	99.4	109.4	118.7	118.7	0.1	0.1	0.1	0.1	0.1	0.1	237.4	118.7	118.7	0.1	168.5	0.1	0.1
1945	1950	23734	25560	99.4	109.4	118.7	118.7	0.1	0.1	0.1	0.1	0.1	0.1	237.4	118.7	118.7	118.7	118.7	0.1	0.1
1950	1955	25560	27386	99.4	99.4	109.4	109.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	109.4	109.4	109.4	109.4	0.1	0.1
1955	1957	27386	28117	99.4	99.4	109.4	109.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	109.4	109.4	109.4	109.4	0.1	0.1
1957	1959	28117	28847	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1959	1961	28847	29578	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1961	1963	29578	30308	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1963	1965	30308	31039	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1965	1967	31039	31769	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1967	1969	31769	32500	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1969	1971	32500	33230	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1971	1973	33230	33961	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1973	1975	33961	34691	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1975	1977	34691	35422	66.3	33.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	99.4	99.4	99.4	0.1	0.1
1977	1979	35422	36152	66.3	33.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	99.4	99.4	99.4	0.1	0.1
1979	1981	36152	36883	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1981	1983	36883	37613	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1983	1985	37613	38344	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1985	1987	38344	39074	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1987	1988	0	365	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1988	1989	365	731	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1989	1991	731	1461	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1991	1993	1461	2192	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1993	1995	2192	2922	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1995	1997	2922	3653	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1997	1999	3653	4383	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1999	2000	4383	4749	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2000	2002	4749	5479	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2002	2004	5479	6209	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2004	2006	6209	6939	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2006	2008	6939	7670	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2008	2010	7670	8401	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1

Appendix A-2-(S3A-1): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3A from 1880 to 2010 (Berri Area).

Irrigation Start year				1996	2001	1998	2000	1995	1995	1995	2002	1997	1997	2002	1999	1999	2001	2001	2003	2003
Lag time (yrs)				10	5	10	10	15	15	15	10	15	15	10	15	15	15	15	15	15
Start Year	Stop Year	Start Day	Stop Day	Z 3	Z 41	Z 42	Z 43	Z 44	Z 13	Z 53	Z 45	Z 46	Z 54	Z 47	Z 48	Z 51	Z 49	Z 55	Z 50	Z 52
1880	1881	0	365	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	1884	365	1460	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	1910	1460	10950	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	1915	10950	12776	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	1920	12776	14603	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	1922	14603	15333	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1922	1925	15333	16430	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	1930	16430	18255	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	1935	18255	20081	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	1940	20081	21908	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	1945	21908	23734	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	1950	23734	25560	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	1955	25560	27386	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	1957	27386	28117	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	1959	28117	28847	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	1961	28847	29578	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	1963	29578	30308	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1963	1965	30308	31039	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1965	1967	31039	31769	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1967	1969	31769	32500	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1969	1971	32500	33230	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1971	1973	33230	33961	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1973	1975	33961	34691	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1975	1977	34691	35422	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1977	1979	35422	36152	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1979	1981	36152	36883	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1981	1983	36883	37613	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1983	1985	37613	38344	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1985	1987	38344	39074	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1987	1988	0	365	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1988	1989	365	731	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1989	1991	731	1461	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1991	1993	1461	2192	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1993	1995	2192	2922	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1995	1997	2922	3653	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1997	1999	3653	4383	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1999	2000	4383	4749	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2000	2002	4749	5479	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2002	2004	5479	6209	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2004	2006	6209	6939	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2006	2008	6939	7670	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2008	2010	7670	8401	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

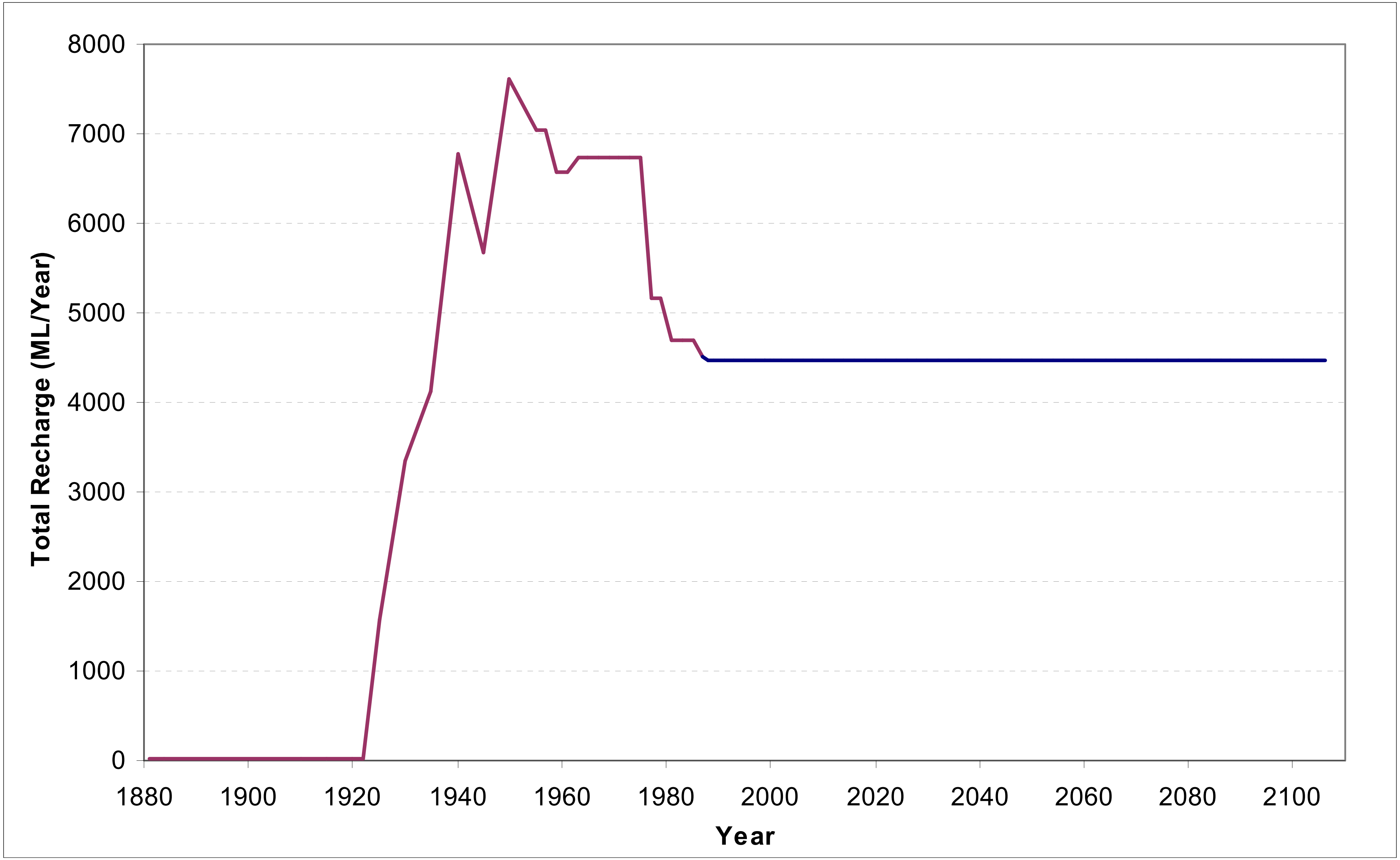
Appendix A-2-(S3A-2): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3A from 1880 to 2010 (Berri Area) cont.

Irrigation Start year				1925	1920	1920	1920	1967	1961	1970	1991	1995	1995	1920	1930	1920	1930	1930	1985	1996
Lag time (yrs)				0	2	15	20	0	0	17	0	0	2	15	0	5	15	10	0	10
Start Year	Stop Year	Start Day	Stop Day	Z 28	Z 29	Z 14	Z 15	Z 33	Z 40	Z 35	Z 36	Z 37	Z 38	Z 56	Z 7	Z 16	Z 31	Z 32	Z 34	Z 39
2010	**2012**	*8401*	*9131*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2012	**2014**	*9131*	*9862*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2014	**2016**	*9862*	*10592*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2016	**2018**	*10592*	*11323*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2018	**2020**	*11323*	*12053*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2020	**2022**	*12053*	*12784*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2022	**2024**	*12784*	*13514*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2024	**2026**	*13514*	*14245*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2026	**2028**	*14245*	*14975*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2028	**2030**	*14975*	*15706*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2030	**2032**	*15706*	*16436*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2032	**2034**	*16436*	*17167*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2034	**2036**	*17167*	*17897*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2036	**2038**	*17897*	*18628*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2038	**2040**	*18628*	*19358*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2040	**2042**	*19358*	*20089*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2042	**2044**	*20089*	*20819*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2044	**2046**	*20819*	*21550*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2046	**2048**	*21550*	*22280*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2048	**2050**	*22280*	*23011*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2050	**2052**	*23011*	*23741*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2052	**2054**	*23741*	*24472*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2054	**2056**	*24472*	*25202*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2056	**2058**	*25202*	*25933*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2058	**2060**	*25933*	*26663*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2060	**2062**	*26663*	*27394*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2062	**2064**	*27394*	*28124*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2064	**2066**	*28124*	*28855*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2066	**2068**	*28855*	*29585*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2068	**2070**	*29585*	*30316*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2070	**2072**	*30316*	*31046*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2072	**2074**	*31046*	*31777*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2074	**2076**	*31777*	*32507*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2076	**2078**	*32507*	*33238*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2078	**2080**	*33238*	*33968*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2080	**2082**	*33968*	*34699*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2082	**2084**	*34699*	*35429*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2084	**2086**	*35429*	*36160*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2086	**2088**	*36160*	*36890*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2088	**2090**	*36890*	*37621*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2090	**2092**	*37621*	*38351*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2092	**2094**	*38351*	*39082*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2094	**2096**	*39082*	*39812*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2096	**2098**	*39812*	*40543*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2098	**2100**	*40543*	*41273*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2100	**2102**	*41273*	*42004*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2102	**2104**	*42004*	*42734*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
2104	**2106**	*42734*	*43465*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1

Appendix A-2-(S3A-3): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3A from 2010 to 2106 (Berri Area).

Irrigation Start year				1996	2001	1998	2000	1995	1995	1995	2002	1997	1997	2002	1999	1999	2001	2001	2003	2003
Lag time (yrs)				10	5	10	10	15	15	15	10	15	15	10	15	15	15	15	15	15
Start Year	Stop Year	Start Day	Stop Day	Z 3	Z 41	Z 42	Z 43	Z 44	Z 13	Z 53	Z 45	Z 46	Z 54	Z 47	Z 48	Z 51	Z 49	Z 55	Z 50	Z 52
2010	2012	8401	9131	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2012	2014	9131	9862	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2014	2016	9862	10592	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2016	2018	10592	11323	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2018	2020	11323	12053	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2020	2022	12053	12784	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2022	2024	12784	13514	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2024	2026	13514	14245	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2026	2028	14245	14975	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2028	2030	14975	15706	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2030	2032	15706	16436	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2032	2034	16436	17167	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2034	2036	17167	17897	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2036	2038	17897	18628	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2038	2040	18628	19358	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2040	2042	19358	20089	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2042	2044	20089	20819	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2044	2046	20819	21550	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2046	2048	21550	22280	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2048	2050	22280	23011	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2050	2052	23011	23741	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2052	2054	23741	24472	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2054	2056	24472	25202	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2056	2058	25202	25933	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2058	2060	25933	26663	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2060	2062	26663	27394	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2062	2064	27394	28124	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2064	2066	28124	28855	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2066	2068	28855	29585	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2068	2070	29585	30316	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2070	2072	30316	31046	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2072	2074	31046	31777	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2074	2076	31777	32507	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2076	2078	32507	33238	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2078	2080	33238	33968	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2080	2082	33968	34699	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2082	2084	34699	35429	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2084	2086	35429	36160	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2086	2088	36160	36890	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2088	2090	36890	37621	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2090	2092	37621	38351	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2092	2094	38351	39082	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2094	2096	39082	39812	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2096	2098	39812	40543	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2098	2100	40543	41273	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2100	2102	41273	42004	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2102	2104	42004	42734	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2104	2106	42734	43465	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Appendix A-2-(S3A-4): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3A from 2010 to 2106 (Berri Area) cont.



Appendix A-2-(S3A-5): Total recharge volume to the Loxton Sands in Scenario-3A (Berri Area)

Irrigation Start year				1925	1920	1920	1920	1967	1961	1970	1991	1995	1995	1920	1930	1920	1930	1930	1985	1996
Lag time (yrs)				0	2	15	20	0	0	17	0	0	2	15	0	5	15	10	0	10
Start Year	Stop Year	Start Day	Stop Day	Z 28	Z 29	Z 14	Z 15	Z 33	Z 40	Z 35	Z 36	Z 37	Z 38	Z 56	Z 7	Z 16	Z 31	Z 32	Z 34	Z 39
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1922**	*14603*	*15333*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1922	**1925**	*15333*	*16430*	0.1	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16430*	*18255*	109.4	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	168.5	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	109.4	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	168.5	168.5	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	99.4	118.7	237.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	237.4	168.5	168.5	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	99.4	109.4	118.7	118.7	0.1	0.1	0.1	0.1	0.1	0.1	237.4	118.7	118.7	0.1	168.5	0.1	0.1
1945	**1950**	*23734*	*25560*	99.4	109.4	118.7	118.7	0.1	0.1	0.1	0.1	0.1	0.1	237.4	118.7	118.7	118.7	118.7	0.1	0.1
1950	**1955**	*25560*	*27386*	99.4	99.4	109.4	109.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	109.4	109.4	109.4	109.4	0.1	0.1
1955	**1957**	*27386*	*28117*	99.4	99.4	109.4	109.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	109.4	109.4	109.4	109.4	0.1	0.1
1957	**1959**	*28117*	*28847*	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1959	**1961**	*28847*	*29578*	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1961	**1963**	*29578*	*30308*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1963	**1965**	*30308*	*31039*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1965	**1967**	*31039*	*31769*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1967	**1969**	*31769*	*32500*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1969	**1971**	*32500*	*33230*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1971	**1973**	*33230*	*33961*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1973	**1975**	*33961*	*34691*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1975	**1977**	*34691*	*35422*	66.3	33.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	99.4	99.4	99.4	0.1	0.1
1977	**1979**	*35422*	*36152*	66.3	33.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	99.4	99.4	99.4	0.1	0.1
1979	**1981**	*36152*	*36883*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1981	**1983**	*36883*	*37613*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1983	**1985**	*37613*	*38344*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1985	**1987**	*38344*	*39074*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1987	**1988**	*0*	*365*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1988	**1989**	*365*	*731*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1989	**1991**	*731*	*1461*	64.2	28.5	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1991	**1993**	*1461*	*2192*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1993	**1995**	*2192*	*2922*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1995	**1997**	*2922*	*3653*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1997	**1999**	*3653*	*4383*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1999	**2000**	*4383*	*4749*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2000	**2002**	*4749*	*5479*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2002	**2004**	*5479*	*6209*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2004	**2006**	*6209*	*6939*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2006	**2008**	*6939*	*7670*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2008	**2010**	*7670*	*8401*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1

Appendix A-2-(S3B-1): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3B from 1880 to 2010 (Berri Area).

Irrigation Start year				1996	2001	1998	2000	1995	1995	1995	2002	1997	1997	2002	1999	1999	2001	2001	2003	2003
Lag time (yrs)				10	5	10	10	15	15	15	10	15	15	10	15	15	15	15	15	15
Start Year	Stop Year	Start Day	Stop Day	Z 3	Z 41	Z 42	Z 43	Z 44	Z 13	Z 53	Z 45	Z 46	Z 54	Z 47	Z 48	Z 51	Z 49	Z 55	Z 50	Z 52
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1922**	*14603*	*15333*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1922	**1925**	*15333*	*16430*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16430*	*18255*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1977	**1979**	*35422*	*36152*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1979	**1981**	*36152*	*36883*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1981	**1983**	*36883*	*37613*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1983	**1985**	*37613*	*38344*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1985	**1987**	*38344*	*39074*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1987	**1988**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1988	**1989**	*365*	*731*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1989	**1991**	*731*	*1461*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1991	**1993**	*1461*	*2192*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1993	**1995**	*2192*	*2922*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1995	**1997**	*2922*	*3653*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1997	**1999**	*3653*	*4383*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1999	**2000**	*4383*	*4749*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2000	**2002**	*4749*	*5479*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2002	**2004**	*5479*	*6209*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2004	**2006**	*6209*	*6939*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2006	**2008**	*6939*	*7670*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2008	**2010**	*7670*	*8401*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

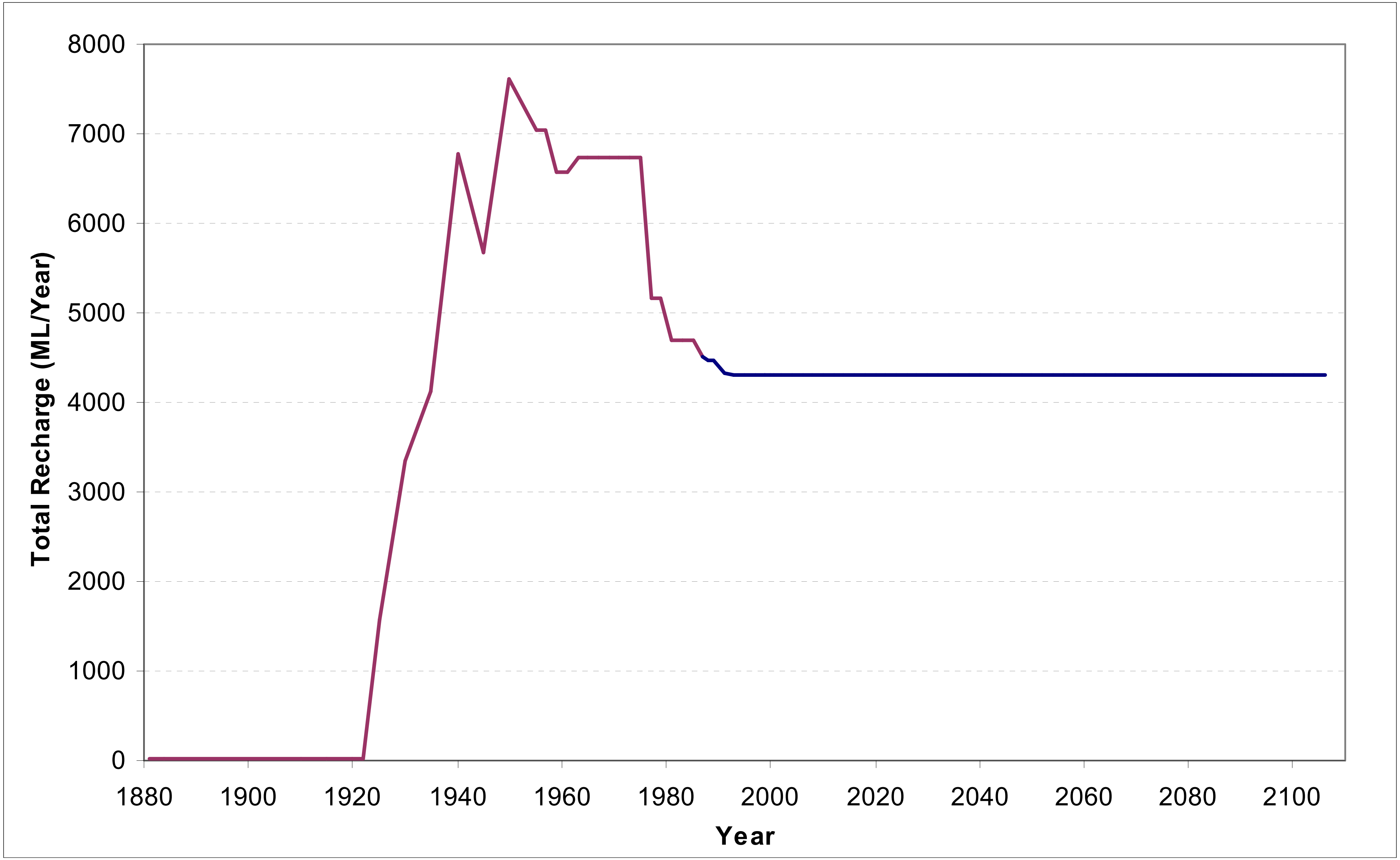
Appendix A-2-(S3B-2): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3B from 1880 to 2010 (Berri Area) cont.

Irrigation Start year				1925	1920	1920	1920	1967	1961	1970	1991	1995	1995	1920	1930	1920	1930	1930	1985	1996
Lag time (yrs)				0	2	15	20	0	0	17	0	0	2	15	0	5	15	10	0	10
Start Year	Stop Year	Start Day	Stop Day	Z 28	Z 29	Z 14	Z 15	Z 33	Z 40	Z 35	Z 36	Z 37	Z 38	Z 56	Z 7	Z 16	Z 31	Z 32	Z 34	Z 39
2010	2012	8401	9131	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2012	2014	9131	9862	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2014	2016	9862	10592	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2016	2018	10592	11323	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2018	2020	11323	12053	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2020	2022	12053	12784	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2022	2024	12784	13514	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2024	2026	13514	14245	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2026	2028	14245	14975	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2028	2030	14975	15706	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2030	2032	15706	16436	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2032	2034	16436	17167	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2034	2036	17167	17897	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2036	2038	17897	18628	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2038	2040	18628	19358	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2040	2042	19358	20089	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2042	2044	20089	20819	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2044	2046	20819	21550	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2046	2048	21550	22280	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2048	2050	22280	23011	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2050	2052	23011	23741	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2052	2054	23741	24472	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2054	2056	24472	25202	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2056	2058	25202	25933	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2058	2060	25933	26663	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2060	2062	26663	27394	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2062	2064	27394	28124	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2064	2066	28124	28855	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2066	2068	28855	29585	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2068	2070	29585	30316	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2070	2072	30316	31046	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2072	2074	31046	31777	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2074	2076	31777	32507	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2076	2078	32507	33238	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2078	2080	33238	33968	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2080	2082	33968	34699	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2082	2084	34699	35429	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2084	2086	35429	36160	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2086	2088	36160	36890	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2088	2090	36890	37621	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2090	2092	37621	38351	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2092	2094	38351	39082	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2094	2096	39082	39812	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2096	2098	39812	40543	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2098	2100	40543	41273	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2100	2102	41273	42004	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2102	2104	42004	42734	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
2104	2106	42734	43465	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1

Appendix A-2-(S3B-3): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3B from 2010 to 2106 (Berri Area).

Irrigation Start year				1996	2001	1998	2000	1995	1995	1995	2002	1997	1997	2002	1999	1999	2001	2001	2003	2003
Lag time (yrs)				10	5	10	10	15	15	15	10	15	15	10	15	15	15	15	15	15
Start Year	Stop Year	Start Day	Stop Day	Z 3	Z 41	Z 42	Z 43	Z 44	Z 13	Z 53	Z 45	Z 46	Z 54	Z 47	Z 48	Z 51	Z 49	Z 55	Z 50	Z 52
2010	2012	8401	9131	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2012	2014	9131	9862	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2014	2016	9862	10592	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2016	2018	10592	11323	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2018	2020	11323	12053	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2020	2022	12053	12784	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2022	2024	12784	13514	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2024	2026	13514	14245	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2026	2028	14245	14975	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2028	2030	14975	15706	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2030	2032	15706	16436	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2032	2034	16436	17167	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2034	2036	17167	17897	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2036	2038	17897	18628	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2038	2040	18628	19358	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2040	2042	19358	20089	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2042	2044	20089	20819	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2044	2046	20819	21550	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2046	2048	21550	22280	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2048	2050	22280	23011	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2050	2052	23011	23741	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2052	2054	23741	24472	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2054	2056	24472	25202	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2056	2058	25202	25933	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2058	2060	25933	26663	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2060	2062	26663	27394	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2062	2064	27394	28124	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2064	2066	28124	28855	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2066	2068	28855	29585	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2068	2070	29585	30316	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2070	2072	30316	31046	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2072	2074	31046	31777	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2074	2076	31777	32507	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2076	2078	32507	33238	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2078	2080	33238	33968	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2080	2082	33968	34699	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2082	2084	34699	35429	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2084	2086	35429	36160	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2086	2088	36160	36890	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2088	2090	36890	37621	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2090	2092	37621	38351	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2092	2094	38351	39082	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2094	2096	39082	39812	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2096	2098	39812	40543	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2098	2100	40543	41273	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2100	2102	41273	42004	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2102	2104	42004	42734	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2104	2106	42734	43465	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Appendix A-2-(S3B-4): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3B from 2010 to 2106 (Berri Area) cont.



Appendix A-2-(S3B-5): Total recharge volume to the Loxton Sands in Scenario-3B (Berri Area)

Irrigation Start year				1925	1920	1920	1920	1967	1961	1970	1991	1995	1995	1920	1930	1920	1930	1930	1985	1996
Lag time (yrs)				0	2	15	20	0	0	17	0	0	2	15	0	5	15	10	0	10
Start Year	Stop Year	Start Day	Stop Day	Z 28	Z 29	Z 14	Z 15	Z 33	Z 40	Z 35	Z 36	Z 37	Z 38	Z 56	Z 7	Z 16	Z 31	Z 32	Z 34	Z 39
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1922**	*14603*	*15333*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1922	**1925**	*15333*	*16430*	0.1	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16430*	*18255*	109.4	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	168.5	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	109.4	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	168.5	168.5	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	99.4	118.7	237.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	237.4	168.5	168.5	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	99.4	109.4	118.7	118.7	0.1	0.1	0.1	0.1	0.1	0.1	237.4	118.7	118.7	0.1	168.5	0.1	0.1
1945	**1950**	*23734*	*25560*	99.4	109.4	118.7	118.7	0.1	0.1	0.1	0.1	0.1	0.1	237.4	118.7	118.7	118.7	118.7	0.1	0.1
1950	**1955**	*25560*	*27386*	99.4	99.4	109.4	109.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	109.4	109.4	109.4	109.4	0.1	0.1
1955	**1957**	*27386*	*28117*	99.4	99.4	109.4	109.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	109.4	109.4	109.4	109.4	0.1	0.1
1957	**1959**	*28117*	*28847*	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1959	**1961**	*28847*	*29578*	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1961	**1963**	*29578*	*30308*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1963	**1965**	*30308*	*31039*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1965	**1967**	*31039*	*31769*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1967	**1969**	*31769*	*32500*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1969	**1971**	*32500*	*33230*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1971	**1973**	*33230*	*33961*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1973	**1975**	*33961*	*34691*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1975	**1977**	*34691*	*35422*	66.3	33.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	99.4	99.4	99.4	0.1	0.1
1977	**1979**	*35422*	*36152*	66.3	33.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	99.4	99.4	99.4	0.1	0.1
1979	**1981**	*36152*	*36883*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1981	**1983**	*36883*	*37613*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1983	**1985**	*37613*	*38344*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1985	**1987**	*38344*	*39074*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1987	**1988**	*0*	*365*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1988	**1989**	*365*	*731*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1989	**1991**	*731*	*1461*	64.2	28.5	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1991	**1993**	*1461*	*2192*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1993	**1995**	*2192*	*2922*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1995	**1997**	*2922*	*3653*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1997	**1999**	*3653*	*4383*	57.1	28.0	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
1999	**2000**	*4383*	*4749*	57.1	28.3	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2000	**2002**	*4749*	*5479*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2002	**2004**	*5479*	*6209*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2004	**2006**	*6209*	*6939*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2006	**2008**	*6939*	*7670*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2008	**2010**	*7670*	*8401*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1

Appendix A-2-(S3C-1): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3C from 1880 to 2010 (Berri Area).

Irrigation Start year				1996	2001	1998	2000	1995	1995	1995	2002	1997	1997	2002	1999	1999	2001	2001	2003	2003
Lag time (yrs)				10	5	10	10	15	15	15	10	15	15	10	15	15	15	15	15	15
Start Year	Stop Year	Start Day	Stop Day	Z 3	Z 41	Z 42	Z 43	Z 44	Z 13	Z 53	Z 45	Z 46	Z 54	Z 47	Z 48	Z 51	Z 49	Z 55	Z 50	Z 52
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1922**	*14603*	*15333*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1922	**1925**	*15333*	*16430*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16430*	*18255*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1977	**1979**	*35422*	*36152*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1979	**1981**	*36152*	*36883*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1981	**1983**	*36883*	*37613*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1983	**1985**	*37613*	*38344*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1985	**1987**	*38344*	*39074*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1987	**1988**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1988	**1989**	*365*	*731*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1989	**1991**	*731*	*1461*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1991	**1993**	*1461*	*2192*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1993	**1995**	*2192*	*2922*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1995	**1997**	*2922*	*3653*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1997	**1999**	*3653*	*4383*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1999	**2000**	*4383*	*4749*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2000	**2002**	*4749*	*5479*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2002	**2004**	*5479*	*6209*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2004	**2006**	*6209*	*6939*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2006	**2008**	*6939*	*7670*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2008	**2010**	*7670*	*8401*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

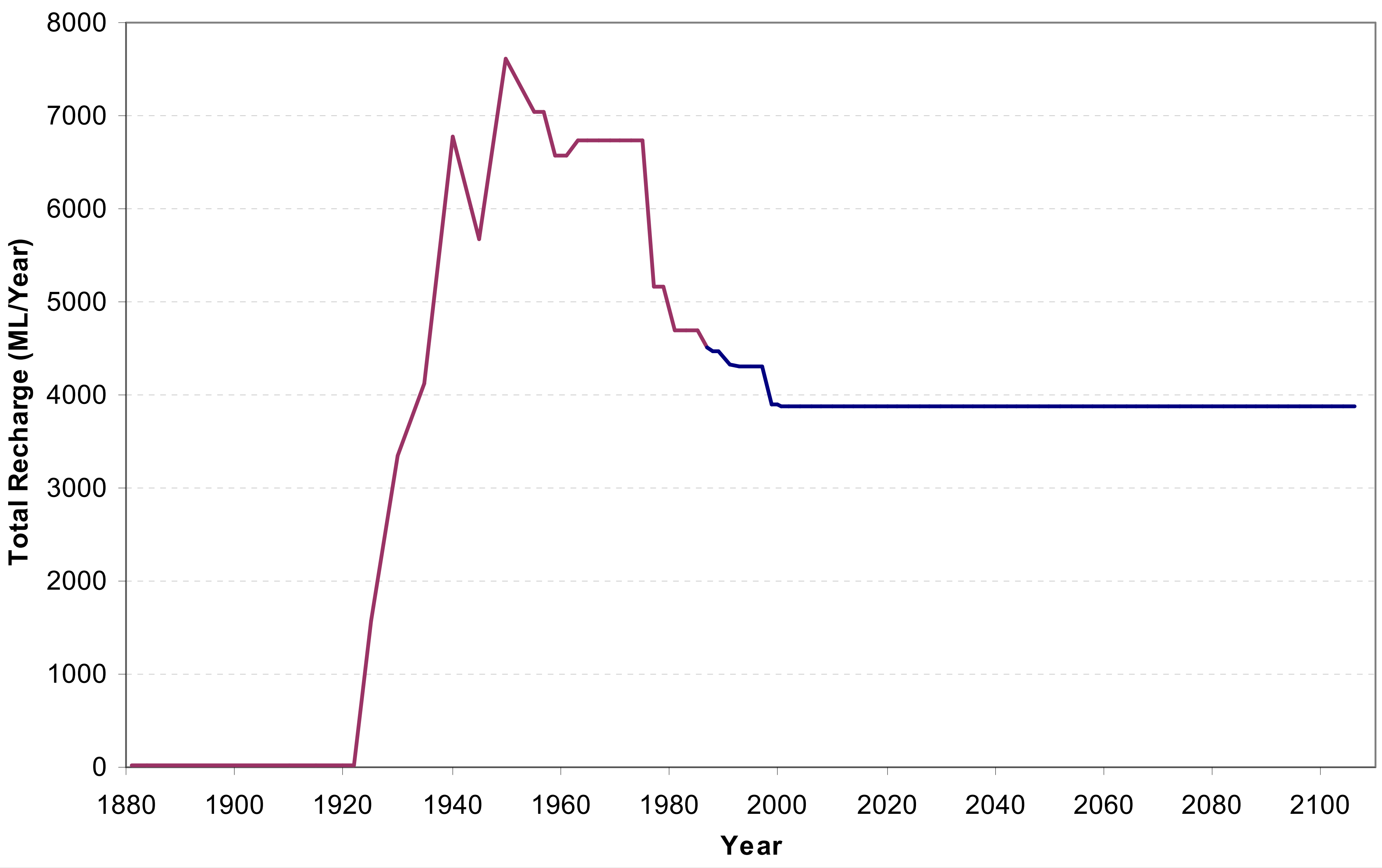
Appendix A-2-(S3C-2): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3C from 1880 to 2010 (Berri Area) cont.

Irrigation Start year				1925	1920	1920	1920	1967	1961	1970	1991	1995	1995	1920	1930	1920	1930	1930	1985	1996
Lag time (yrs)				0	2	15	20	0	0	17	0	0	2	15	0	5	15	10	0	10
Start Year	Stop Year	Start Day	Stop Day	Z 28	Z 29	Z 14	Z 15	Z 33	Z 40	Z 35	Z 36	Z 37	Z 38	Z 56	Z 7	Z 16	Z 31	Z 32	Z 34	Z 39
2010	**2012**	*8401*	*9131*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2012	**2014**	*9131*	*9862*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2014	**2016**	*9862*	*10592*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2016	**2018**	*10592*	*11323*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2018	**2020**	*11323*	*12053*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2020	**2022**	*12053*	*12784*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2022	**2024**	*12784*	*13514*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2024	**2026**	*13514*	*14245*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2026	**2028**	*14245*	*14975*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2028	**2030**	*14975*	*15706*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2030	**2032**	*15706*	*16436*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2032	**2034**	*16436*	*17167*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2034	**2036**	*17167*	*17897*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2036	**2038**	*17897*	*18628*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2038	**2040**	*18628*	*19358*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2040	**2042**	*19358*	*20089*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2042	**2044**	*20089*	*20819*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2044	**2046**	*20819*	*21550*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2046	**2048**	*21550*	*22280*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2048	**2050**	*22280*	*23011*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2050	**2052**	*23011*	*23741*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2052	**2054**	*23741*	*24472*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2054	**2056**	*24472*	*25202*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2056	**2058**	*25202*	*25933*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2058	**2060**	*25933*	*26663*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2060	**2062**	*26663*	*27394*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2062	**2064**	*27394*	*28124*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2064	**2066**	*28124*	*28855*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2066	**2068**	*28855*	*29585*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2068	**2070**	*29585*	*30316*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2070	**2072**	*30316*	*31046*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2072	**2074**	*31046*	*31777*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2074	**2076**	*31777*	*32507*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2076	**2078**	*32507*	*33238*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2078	**2080**	*33238*	*33968*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2080	**2082**	*33968*	*34699*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2082	**2084**	*34699*	*35429*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2084	**2086**	*35429*	*36160*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2086	**2088**	*36160*	*36890*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2088	**2090**	*36890*	*37621*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2090	**2092**	*37621*	*38351*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2092	**2094**	*38351*	*39082*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2094	**2096**	*39082*	*39812*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2096	**2098**	*39812*	*40543*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2098	**2100**	*40543*	*41273*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2100	**2102**	*41273*	*42004*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2102	**2104**	*42004*	*42734*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2104	**2106**	*42734*	*43465*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	0.1	0.1	0.1	85.6	85.6	42.8	64.2	85.6	85.6	0.1

Appendix A-2-(S3C-3): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3C from 2010 to 2106 (Berri Area).

Irrigation Start year				1996	2001	1998	2000	1995	1995	1995	2002	1997	1997	2002	1999	1999	2001	2001	2003	2003
Lag time (yrs)				10	5	10	10	15	15	15	10	15	15	10	15	15	15	15	15	15
Start Year	Stop Year	Start Day	Stop Day	Z 3	Z 41	Z 42	Z 43	Z 44	Z 13	Z 53	Z 45	Z 46	Z 54	Z 47	Z 48	Z 51	Z 49	Z 55	Z 50	Z 52
2010	2012	8401	9131	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2012	2014	9131	9862	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2014	2016	9862	10592	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2016	2018	10592	11323	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2018	2020	11323	12053	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2020	2022	12053	12784	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2022	2024	12784	13514	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2024	2026	13514	14245	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2026	2028	14245	14975	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2028	2030	14975	15706	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2030	2032	15706	16436	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2032	2034	16436	17167	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2034	2036	17167	17897	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2036	2038	17897	18628	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2038	2040	18628	19358	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2040	2042	19358	20089	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2042	2044	20089	20819	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2044	2046	20819	21550	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2046	2048	21550	22280	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2048	2050	22280	23011	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2050	2052	23011	23741	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2052	2054	23741	24472	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2054	2056	24472	25202	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2056	2058	25202	25933	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2058	2060	25933	26663	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2060	2062	26663	27394	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2062	2064	27394	28124	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2064	2066	28124	28855	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2066	2068	28855	29585	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2068	2070	29585	30316	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2070	2072	30316	31046	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2072	2074	31046	31777	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2074	2076	31777	32507	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2076	2078	32507	33238	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2078	2080	33238	33968	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2080	2082	33968	34699	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2082	2084	34699	35429	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2084	2086	35429	36160	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2086	2088	36160	36890	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2088	2090	36890	37621	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2090	2092	37621	38351	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2092	2094	38351	39082	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2094	2096	39082	39812	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2096	2098	39812	40543	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2098	2100	40543	41273	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2100	2102	41273	42004	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2102	2104	42004	42734	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2104	2106	42734	43465	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Appendix A-2-(S3C-4): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3C from 2010 to 2106 (Berri Area) cont.



Appendix A-2-(S3C-5): Total recharge volume to the Loxton Sands in Scenario-3C (Berri Area)

Irrigation Start year				1925	1920	1920	1920	1967	1961	1970	1991	1995	1995	1920	1930	1920	1930	1930	1985	1996
Lag time (yrs)				0	2	15	20	0	0	17	0	0	2	15	0	5	15	10	0	10
Start Year	Stop Year	Start Day	Stop Day	Z 28	Z 29	Z 14	Z 15	Z 33	Z 40	Z 35	Z 36	Z 37	Z 38	Z 56	Z 7	Z 16	Z 31	Z 32	Z 34	Z 39
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1922**	*14603*	*15333*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1922	**1925**	*15333*	*16430*	0.1	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16430*	*18255*	109.4	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	168.5	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	109.4	118.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	168.5	168.5	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	99.4	118.7	237.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	237.4	168.5	168.5	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	99.4	109.4	118.7	118.7	0.1	0.1	0.1	0.1	0.1	0.1	237.4	118.7	118.7	0.1	168.5	0.1	0.1
1945	**1950**	*23734*	*25560*	99.4	109.4	118.7	118.7	0.1	0.1	0.1	0.1	0.1	0.1	237.4	118.7	118.7	118.7	118.7	0.1	0.1
1950	**1955**	*25560*	*27386*	99.4	99.4	109.4	109.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	109.4	109.4	109.4	109.4	0.1	0.1
1955	**1957**	*27386*	*28117*	99.4	99.4	109.4	109.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	109.4	109.4	109.4	109.4	0.1	0.1
1957	**1959**	*28117*	*28847*	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1959	**1961**	*28847*	*29578*	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1961	**1963**	*29578*	*30308*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1963	**1965**	*30308*	*31039*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1965	**1967**	*31039*	*31769*	99.4	99.4	99.4	99.4	0.1	118.7	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1967	**1969**	*31769*	*32500*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1969	**1971**	*32500*	*33230*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1971	**1973**	*33230*	*33961*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1973	**1975**	*33961*	*34691*	99.4	99.4	99.4	99.4	99.4	99.4	0.1	0.1	0.1	0.1	237.4	99.4	99.4	99.4	99.4	0.1	0.1
1975	**1977**	*34691*	*35422*	66.3	33.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	99.4	99.4	99.4	0.1	0.1
1977	**1979**	*35422*	*36152*	66.3	33.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	99.4	99.4	99.4	0.1	0.1
1979	**1981**	*36152*	*36883*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1981	**1983**	*36883*	*37613*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1983	**1985**	*37613*	*38344*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	149.1	99.4	49.7	99.4	99.4	0.1	0.1
1985	**1987**	*38344*	*39074*	66.3	32.1	66.3	66.3	99.4	99.4	0.1	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1987	**1988**	*0*	*365*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1988	**1989**	*365*	*731*	66.3	28.5	66.3	66.3	99.4	99.4	99.4	0.1	0.1	0.1	99.4	99.4	49.7	74.5	99.4	99.4	0.1
1989	**1991**	*731*	*1461*	64.2	28.5	64.2	64.2	96.3	96.3	96.3	0.1	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1991	**1993**	*1461*	*2192*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	96.3	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1993	**1995**	*2192*	*2922*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	96.3	0.1	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1995	**1997**	*2922*	*3653*	64.2	26.6	64.2	64.2	96.3	96.3	96.3	96.3	96.3	0.1	96.3	96.3	48.1	72.2	96.3	96.3	0.1
1997	**1999**	*3653*	*4383*	57.1	28.0	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	0.1
1999	**2000**	*4383*	*4749*	57.1	28.3	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2000	**2002**	*4749*	*5479*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2002	**2004**	*5479*	*6209*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2004	**2006**	*6209*	*6939*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	0.1
2006	**2008**	*6939*	*7670*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2008	**2010**	*7670*	*8401*	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5

Appendix A-2-(S4-1): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-4 from 1880 to 2010 (Berri Area).

Irrigation Start year				1996	2001	1998	2000	1995	1995	1995	2002	1997	1997	2002	1999	1999	2001	2001	2003	2003
Lag time (yrs)				10	5	10	10	15	15	15	10	15	15	10	15	15	15	15	15	15
Start Year	Stop Year	Start Day	Stop Day	Z 3	Z 41	Z 42	Z 43	Z 44	Z 13	Z 53	Z 45	Z 46	Z 54	Z 47	Z 48	Z 51	Z 49	Z 55	Z 50	Z 52
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1922**	*14603*	*15333*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1922	**1925**	*15333*	*16430*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16430*	*18255*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1977	**1979**	*35422*	*36152*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1979	**1981**	*36152*	*36883*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1981	**1983**	*36883*	*37613*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1983	**1985**	*37613*	*38344*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1985	**1987**	*38344*	*39074*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1987	**1988**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1988	**1989**	*365*	*731*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1989	**1991**	*731*	*1461*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1991	**1993**	*1461*	*2192*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1993	**1995**	*2192*	*2922*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1995	**1997**	*2922*	*3653*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1997	**1999**	*3653*	*4383*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1999	**2000**	*4383*	*4749*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2000	**2002**	*4749*	*5479*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2002	**2004**	*5479*	*6209*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2004	**2006**	*6209*	*6939*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2006	**2008**	*6939*	*7670*	42.8	57.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2008	**2010**	*7670*	*8401*	42.8	57.1	27.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

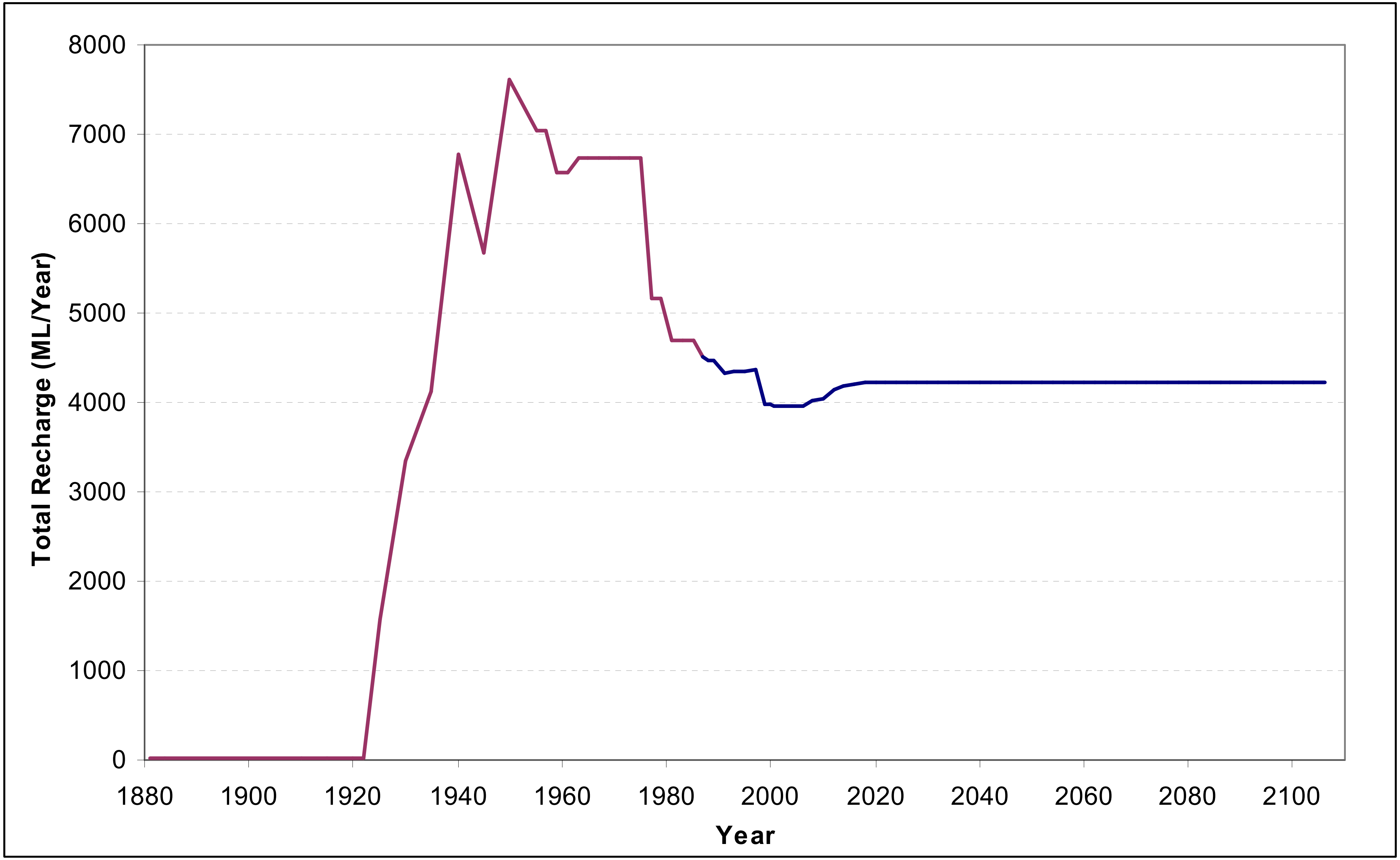
Appendix A-2-(S4-2): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-4 from 1880 to 2010 (Berri Area) cont.

Irrigation Start year				1925	1920	1920	1920	1967	1961	1970	1991	1995	1995	1920	1930	1920	1930	1930	1985	1996
Lag time (yrs)				0	2	15	20	0	0	17	0	0	2	15	0	5	15	10	0	10
Start Year	Stop Year	Start Day	Stop Day	Z 28	Z 29	Z 14	Z 15	Z 33	Z 40	Z 35	Z 36	Z 37	Z 38	Z 56	Z 7	Z 16	Z 31	Z 32	Z 34	Z 39
2010	2012	8401	9131	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2012	2014	9131	9862	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2014	2016	9862	10592	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2016	2018	10592	11323	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2018	2020	11323	12053	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2020	2022	12053	12784	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2022	2024	12784	13514	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2024	2026	13514	14245	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2026	2028	14245	14975	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2028	2030	14975	15706	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2030	2032	15706	16436	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2032	2034	16436	17167	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2034	2036	17167	17897	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2036	2038	17897	18628	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2038	2040	18628	19358	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2040	2042	19358	20089	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2042	2044	20089	20819	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2044	2046	20819	21550	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2046	2048	21550	22280	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2048	2050	22280	23011	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2050	2052	23011	23741	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2052	2054	23741	24472	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2054	2056	24472	25202	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2056	2058	25202	25933	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2058	2060	25933	26663	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2060	2062	26663	27394	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2062	2064	27394	28124	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2064	2066	28124	28855	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2066	2068	28855	29585	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2068	2070	29585	30316	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2070	2072	30316	31046	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2072	2074	31046	31777	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2074	2076	31777	32507	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2076	2078	32507	33238	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2078	2080	33238	33968	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2080	2082	33968	34699	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2082	2084	34699	35429	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2084	2086	35429	36160	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2086	2088	36160	36890	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2088	2090	36890	37621	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2090	2092	37621	38351	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2092	2094	38351	39082	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2094	2096	39082	39812	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2096	2098	39812	40543	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2098	2100	40543	41273	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2100	2102	41273	42004	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2102	2104	42004	42734	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5
2104	2106	42734	43465	57.1	27.5	57.1	57.1	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6	42.8	64.2	85.6	85.6	27.5

Appendix A-2-(S4-3): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-4 from 2010 to 2106 (Berri Area)

Irrigation Start year				1996	2001	1998	2000	1995	1995	1995	2002	1997	1997	2002	1999	1999	2001	2001	2003	2003
Lag time (yrs)				10	5	10	10	15	15	15	10	15	15	10	15	15	15	15	15	15
Start Year	Stop Year	Start Day	Stop Day	Z 3	Z 41	Z 42	Z 43	Z 44	Z 13	Z 53	Z 45	Z 46	Z 54	Z 47	Z 48	Z 51	Z 49	Z 55	Z 50	Z 52
2010	2012	8401	9131	42.8	57.1	27.5	27.5	57.1	64.2	27.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
2012	2014	9131	9862	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	0.1	0.1	0.1	0.1	0.1	0.1
2014	2016	9862	10592	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	0.1	0.1	0.1	0.1
2016	2018	10592	11323	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	0.1	0.1
2018	2020	11323	12053	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2020	2022	12053	12784	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2022	2024	12784	13514	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2024	2026	13514	14245	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2026	2028	14245	14975	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2028	2030	14975	15706	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2030	2032	15706	16436	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2032	2034	16436	17167	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2034	2036	17167	17897	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2036	2038	17897	18628	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2038	2040	18628	19358	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2040	2042	19358	20089	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2042	2044	20089	20819	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2044	2046	20819	21550	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2046	2048	21550	22280	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2048	2050	22280	23011	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2050	2052	23011	23741	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2052	2054	23741	24472	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2054	2056	24472	25202	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2056	2058	25202	25933	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2058	2060	25933	26663	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2060	2062	26663	27394	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2062	2064	27394	28124	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2064	2066	28124	28855	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2066	2068	28855	29585	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2068	2070	29585	30316	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2070	2072	30316	31046	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2072	2074	31046	31777	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2074	2076	31777	32507	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2076	2078	32507	33238	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2078	2080	33238	33968	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2080	2082	33968	34699	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2082	2084	34699	35429	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2084	2086	35429	36160	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2086	2088	36160	36890	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2088	2090	36890	37621	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2090	2092	37621	38351	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2092	2094	38351	39082	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2094	2096	39082	39812	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2096	2098	39812	40543	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2098	2100	40543	41273	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2100	2102	41273	42004	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2102	2104	42004	42734	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1
2104	2106	42734	43465	42.8	57.1	27.5	27.5	57.1	64.2	27.5	27.5	57.1	57.1	42.8	57.1	57.1	42.8	27.5	57.1	57.1

Appendix A-2-(S4-4): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-4 from 2010 to 2106 (Berri Area) cont



Appendix A-2-(S4-5): Total recharge volume to the Loxton Sands in Scenario-4 (Berri Area)

Region	Well name	Time activated		Drain level (mAHD)	Cond (m^2/d)
		Days	date		
Cobdolga	Cob 1	4976	2001	19.5	1000
Berri	Berri 1 -10	Caissons deactivated in model			
	G_Town	4976	2001	16	1000
	Pud_Town	0	1987	16	1000

Note: Caissons have been assumed to be part of Irrigation Efficiency Improvements (i.e. Caissons are inactive for scenario 3a)

Appendix A-2-(S3B, S3C & S4): Modelled Caisson Specifications for the Berri Area

Appendix A-3
Model Input - Renmark Area

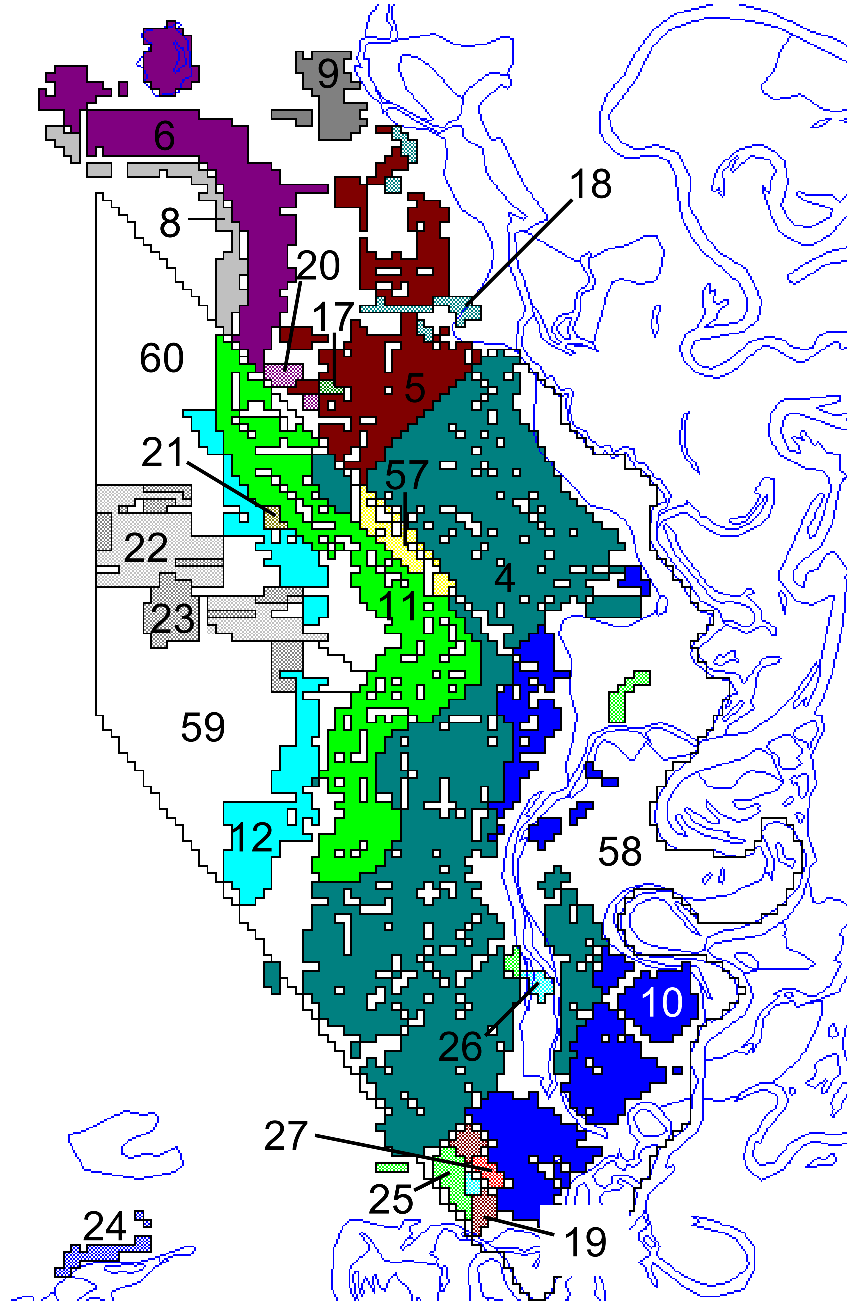
- Model recharge zones
- Model recharge rates (mm/yr)
- Irrigation start year and lag time
- Total model recharge volume
- Caisson Modelled Specifications

(Scenario-3A, Scenario-3B, Scenario-3C, Scenario-4 & Scenario-5)

Scenario	Name	Model Run	Irrigation development area	IIP[1]	RH[2]	SIS[3]
S–1	Natural system	Steady State	None	–	–	–
S–2	Mallee clearance	1920 – 2105	None (but includes Mallee clearance area)	–	–	–
S–3A	Pre-1988, no IIP, no RH	1988 – 2105	Pre-1988	No	No	–
S–3B	Pre-1988, with IIP, no RH	1988 – 2105	Pre-1988	Yes	No	–
S–3C	Pre-1988, with IIP and with RH	1988 – 2105	Pre-1988	Yes	Yes	–
S–4	Current irrigation	2005 – 2105	Pre-1988 + Post-1988	Yes	Yes	No
S–5	Current plus future irrigation	2005 – 2105	Pre-1988 + Post-1988 + Future development	Yes	Yes	No

1 Improved Irrigation Practices 2 Rehabilitation 3 Salt Interception Scheme

Appendix A-3: Model Scenario conditions



Appendix A-3: Model recharge zones in the Renmark Area (Scenario-3A, Scenario-3B, Scenario-3C, Scenario-4, Scenario-5)

Irrigation Start year				1881	1900	1880	1985	1997	2004	1999	1995	1999	1970	1997	1999
Lag time (yrs)				0	10	35	0	0	0	35	40	40	5	0	0
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**4**	**11**	**12**	**10**	**19**	**27**	**21**	**22**	**23**	**24**	**25**	**26**
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1925**	*14603*	*16429*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16429*	*18255*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1977	**1979**	*35422*	*36152*	183.6	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1979	**1981**	*36152*	*36883*	194.6	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1981	**1983**	*36883*	*37613*	171.7	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1983	**1985**	*37613*	*38344*	171.7	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1985	**1987**	*38344*	*39074*	171.7	176.4	176.4	156.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1987	**1988**	*0*	*365*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1988	**1989**	*365*	*731*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1989	**1991**	*731*	*1461*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1991	**1993**	*1461*	*2192*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1993	**1995**	*2192*	*2922*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1995	**1997**	*2922*	*3653*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1997	**1999**	*3653*	*4383*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1999	**2000**	*4383*	*4749*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2000	**2002**	*4749*	*5479*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2002	**2004**	*5479*	*6209*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2004	**2006**	*6209*	*6939*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2006	**2008**	*6939*	*7670*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2008	**2010**	*7670*	*8401*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1

Appendix A-3-(S3A-1): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3A from 1880 to 2010 (Renmark Area).

Irrigation Start year				1881	1920	1940	1951	1954	1999	1995	1961	2014	2014	2014
Lag time (yrs)				0	0	5	40	5	0	0	0	0	30	40
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**57**	**5**	**6**	**8**	**9**	**17**	**18**	**20**	**58**	**59**	**60**
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1925**	*14603*	*16429*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16429*	*18255*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1977	**1979**	*35422*	*36152*	183.6	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1979	**1981**	*36152*	*36883*	194.6	169.3	141.1	0.1	135.4	0.1	0.1	176.4	0.1	0.1	0.1
1981	**1983**	*36883*	*37613*	171.7	168.9	141.1	0.1	135.1	0.1	0.1	176.4	0.1	0.1	0.1
1983	**1985**	*37613*	*38344*	171.7	156.2	135.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1985	**1987**	*38344*	*39074*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1987	**1988**	*0*	*365*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1988	**1989**	*365*	*731*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1989	**1991**	*731*	*1461*	0.1	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1991	**1993**	*1461*	*2192*	0.1	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1993	**1995**	*2192*	*2922*	0.1	156.2	146.4	0.1	125.0	0.1	0.1	190.6	0.1	0.1	0.1
1995	**1997**	*2922*	*3653*	0.1	156.2	146.4	0.1	125.0	0.1	132.6	132.6	0.1	0.1	0.1
1997	**1999**	*3653*	*4383*	0.1	156.2	146.4	0.1	125.0	0.1	80.6	80.6	0.1	0.1	0.1
1999	**2000**	*4383*	*4749*	0.1	156.2	146.4	0.1	125.0	41.6	41.6	41.6	0.1	0.1	0.1
2000	**2002**	*4749*	*5479*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2002	**2004**	*5479*	*6209*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2004	**2006**	*6209*	*6939*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2006	**2008**	*6939*	*7670*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2008	**2010**	*7670*	*8401*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1

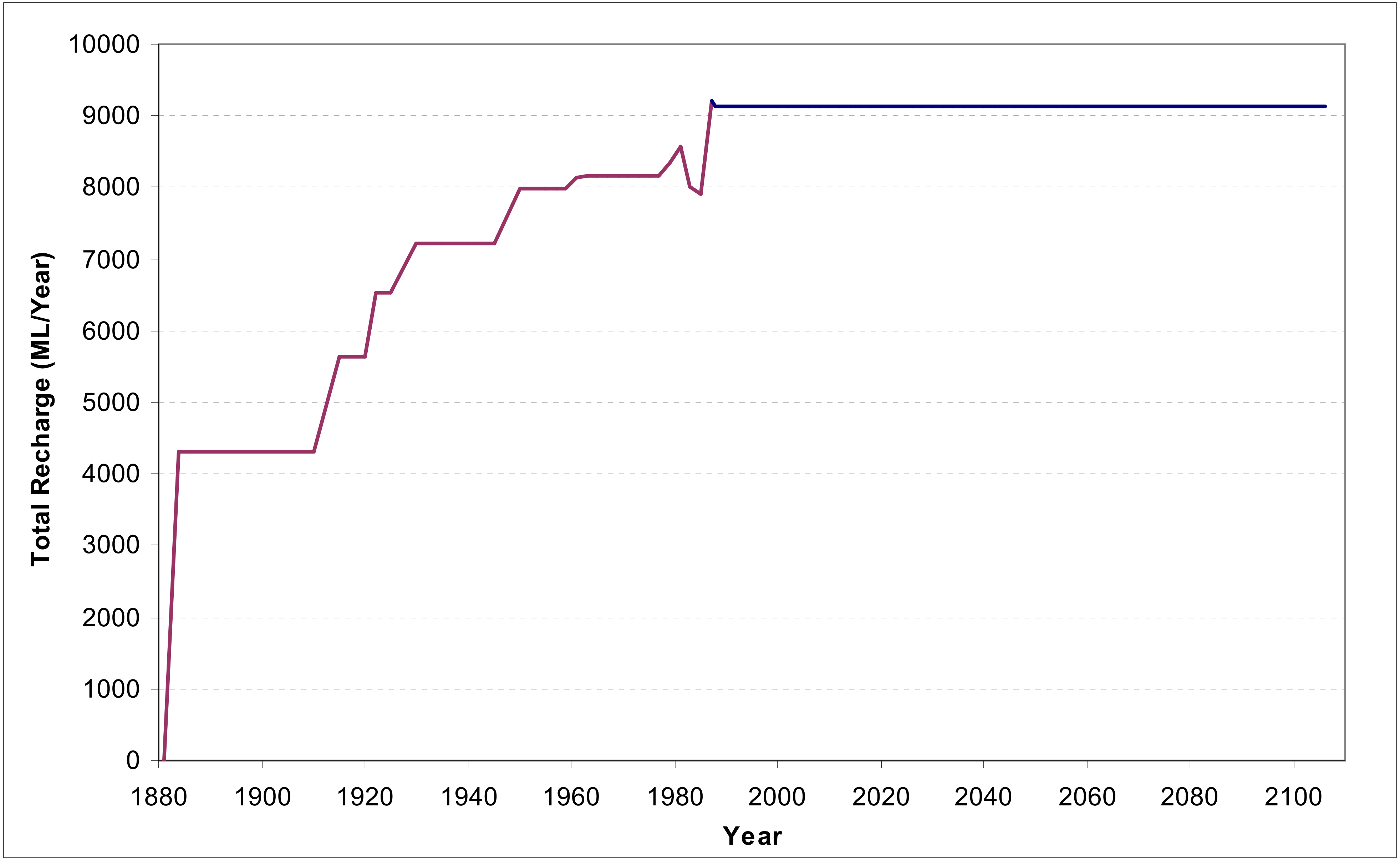
Appendix A-3-(S3A-2): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3A from 1880 to 2010 (Renmark Area) cont.

Irrigation Start year				1881	1900	1880	1985	1997	2004	1999	1995	1999	1970	1997	1999
Lag time (yrs)				0	10	35	0	0	0	35	40	40	5	0	0
Start Year	Stop Year	Start (day)	Stop (day)	4	11	12	10	19	27	21	22	23	24	25	26
2010	2012	8401	9131	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2012	2014	9131	9862	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2014	2016	9862	10592	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2016	2018	10592	11323	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2018	2020	11323	12053	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2020	2022	12053	12784	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2022	2024	12784	13514	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2024	2026	13514	14245	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2026	2028	14245	14975	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2028	2030	14975	15706	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2030	2032	15706	16436	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2032	2034	16436	17167	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2034	2036	17167	17897	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2036	2038	17897	18628	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2038	2040	18628	19358	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2040	2042	19358	20089	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2042	2044	20089	20819	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2044	2046	20819	21550	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2046	2048	21550	22280	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2048	2050	22280	23011	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2050	2052	23011	23741	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2052	2054	23741	24472	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2054	2056	24472	25202	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2056	2058	25202	25933	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2058	2060	25933	26663	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2060	2062	26663	27394	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2062	2064	27394	28124	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2064	2066	28124	28855	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2066	2068	28855	29585	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2068	2070	29585	30316	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2070	2072	30316	31046	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2072	2074	31046	31777	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2074	2076	31777	32507	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2076	2078	32507	33238	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2078	2080	33238	33968	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2080	2082	33968	34699	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2082	2084	34699	35429	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2084	2086	35429	36160	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2086	2088	36160	36890	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2088	2090	36890	37621	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2090	2092	37621	38351	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2092	2094	38351	39082	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2094	2096	39082	39812	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2096	2098	39812	40543	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2098	2100	40543	41273	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2100	2102	41273	42004	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2102	2104	42004	42734	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
2104	2106	42734	43465	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1

Appendix A-3-(S3A-3): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3A from 2010 to 2106 (Renmark Area).

Irrigation Start year				1881	1920	1940	1951	1954	1999	1995	1961	2014	2014	2014
Lag time (yrs)				0	0	5	40	5	0	0	0	0	30	40
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**57**	**5**	**6**	**8**	**9**	**17**	**18**	**20**	**58**	**59**	**60**
2010	**2012**	*8401*	*9131*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2012	**2014**	*9131*	*9862*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2014	**2016**	*9862*	*10592*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2016	**2018**	*10592*	*11323*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2018	**2020**	*11323*	*12053*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2020	**2022**	*12053*	*12784*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2022	**2024**	*12784*	*13514*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2024	**2026**	*13514*	*14245*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2026	**2028**	*14245*	*14975*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2028	**2030**	*14975*	*15706*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2030	**2032**	*15706*	*16436*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2032	**2034**	*16436*	*17167*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2034	**2036**	*17167*	*17897*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2036	**2038**	*17897*	*18628*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2038	**2040**	*18628*	*19358*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2040	**2042**	*19358*	*20089*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2042	**2044**	*20089*	*20819*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2044	**2046**	*20819*	*21550*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2046	**2048**	*21550*	*22280*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2048	**2050**	*22280*	*23011*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2050	**2052**	*23011*	*23741*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2052	**2054**	*23741*	*24472*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2054	**2056**	*24472*	*25202*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2056	**2058**	*25202*	*25933*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2058	**2060**	*25933*	*26663*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2060	**2062**	*26663*	*27394*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2062	**2064**	*27394*	*28124*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2064	**2066**	*28124*	*28855*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2066	**2068**	*28855*	*29585*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2068	**2070**	*29585*	*30316*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2070	**2072**	*30316*	*31046*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2072	**2074**	*31046*	*31777*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2074	**2076**	*31777*	*32507*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2076	**2078**	*32507*	*33238*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2078	**2080**	*33238*	*33968*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2080	**2082**	*33968*	*34699*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2082	**2084**	*34699*	*35429*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2084	**2086**	*35429*	*36160*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2086	**2088**	*36160*	*36890*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2088	**2090**	*36890*	*37621*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2090	**2092**	*37621*	*38351*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2092	**2094**	*38351*	*39082*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2094	**2096**	*39082*	*39812*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2096	**2098**	*39812*	*40543*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2098	**2100**	*40543*	*41273*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2100	**2102**	*41273*	*42004*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2102	**2104**	*42004*	*42734*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1
2104	**2106**	*42734*	*43465*	0.1	156.2	146.4	0.1	125.0	44.4	44.4	44.4	0.1	0.1	0.1

Appendix A-3-(S3A-4): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3A from 2010 to 2106 (Renmark Area) cont



Appendix A-3-(S3A-5): Total recharge volume to the Loxton Sands in Scenario-3A (Renmark Area)

Irrigation Start year				1881	1900	1880	1985	1997	2004	1999	1995	1999	1970	1997	1999
Lag time (yrs)				0	10	35	0	0	0	35	40	40	5	0	0
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**4**	**11**	**12**	**10**	**19**	**27**	**21**	**22**	**23**	**24**	**25**	**26**
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1925**	*14603*	*16429*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16429*	*18255*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1977	**1979**	*35422*	*36152*	183.6	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1979	**1981**	*36152*	*36883*	194.6	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1981	**1983**	*36883*	*37613*	171.7	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1983	**1985**	*37613*	*38344*	171.7	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1985	**1987**	*38344*	*39074*	171.7	176.4	176.4	156.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1987	**1988**	*0*	*365*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1988	**1989**	*365*	*731*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1989	**1991**	*731*	*1461*	171.7	176.4	176.4	154.2	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1991	**1993**	*1461*	*2192*	183.0	176.4	176.4	183.0	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1993	**1995**	*2192*	*2922*	177.4	190.6	176.4	168.6	0.1	0.1	0.1	0.1	0.1	190.6	0.1	0.1
1995	**1997**	*2922*	*3653*	177.4	132.6	176.4	177.4	0.1	0.1	0.1	0.1	0.1	132.6	0.1	0.1
1997	**1999**	*3653*	*4383*	85.0	80.6	117.2	85.0	0.1	0.1	0.1	0.1	0.1	80.6	0.1	0.1
1999	**2000**	*4383*	*4749*	41.9	41.6	58.6	41.9	0.1	0.1	0.1	0.1	0.1	41.6	0.1	0.1
2000	**2002**	*4749*	*5479*	37.3	44.4	58.6	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2002	**2004**	*5479*	*6209*	37.3	44.4	58.6	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2004	**2006**	*6209*	*6939*	37.3	44.4	58.6	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2006	**2008**	*6939*	*7670*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2008	**2010**	*7670*	*8401*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1

Appendix A-3-(S3B-1): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3B from 1880 to 2010 (Renmark Area).

Irrigation Start year				1881	1920	1940	1951	1954	1999	1995	1961	2014	2014	2014
Lag time (yrs)				0	0	5	40	5	0	0	0	0	30	40
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**57**	**5**	**6**	**8**	**9**	**17**	**18**	**20**	**58**	**59**	**60**
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1925**	*14603*	*16429*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16429*	*18255*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1977	**1979**	*35422*	*36152*	183.6	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1979	**1981**	*36152*	*36883*	194.6	169.3	141.1	0.1	135.4	0.1	0.1	176.4	0.1	0.1	0.1
1981	**1983**	*36883*	*37613*	171.7	168.9	141.1	0.1	135.1	0.1	0.1	176.4	0.1	0.1	0.1
1983	**1985**	*37613*	*38344*	171.7	156.2	135.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1985	**1987**	*38344*	*39074*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1987	**1988**	*0*	*365*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1988	**1989**	*365*	*731*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1989	**1991**	*731*	*1461*	0.1	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1991	**1993**	*1461*	*2192*	0.1	156.2	146.4	156.2	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1993	**1995**	*2192*	*2922*	0.1	156.2	146.4	156.2	125.0	0.1	0.1	190.6	0.1	0.1	0.1
1995	**1997**	*2922*	*3653*	0.1	132.6	142.0	132.6	106.1	0.1	0.1	132.6	0.1	0.1	0.1
1997	**1999**	*3653*	*4383*	0.1	80.6	85.0	80.6	64.5	0.1	0.1	80.6	0.1	0.1	0.1
1999	**2000**	*4383*	*4749*	0.1	41.9	41.9	41.9	41.6	0.1	0.1	41.6	0.1	0.1	0.1
2000	**2002**	*4749*	*5479*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2002	**2004**	*5479*	*6209*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2004	**2006**	*6209*	*6939*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2006	**2008**	*6939*	*7670*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2008	**2010**	*7670*	*8401*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1

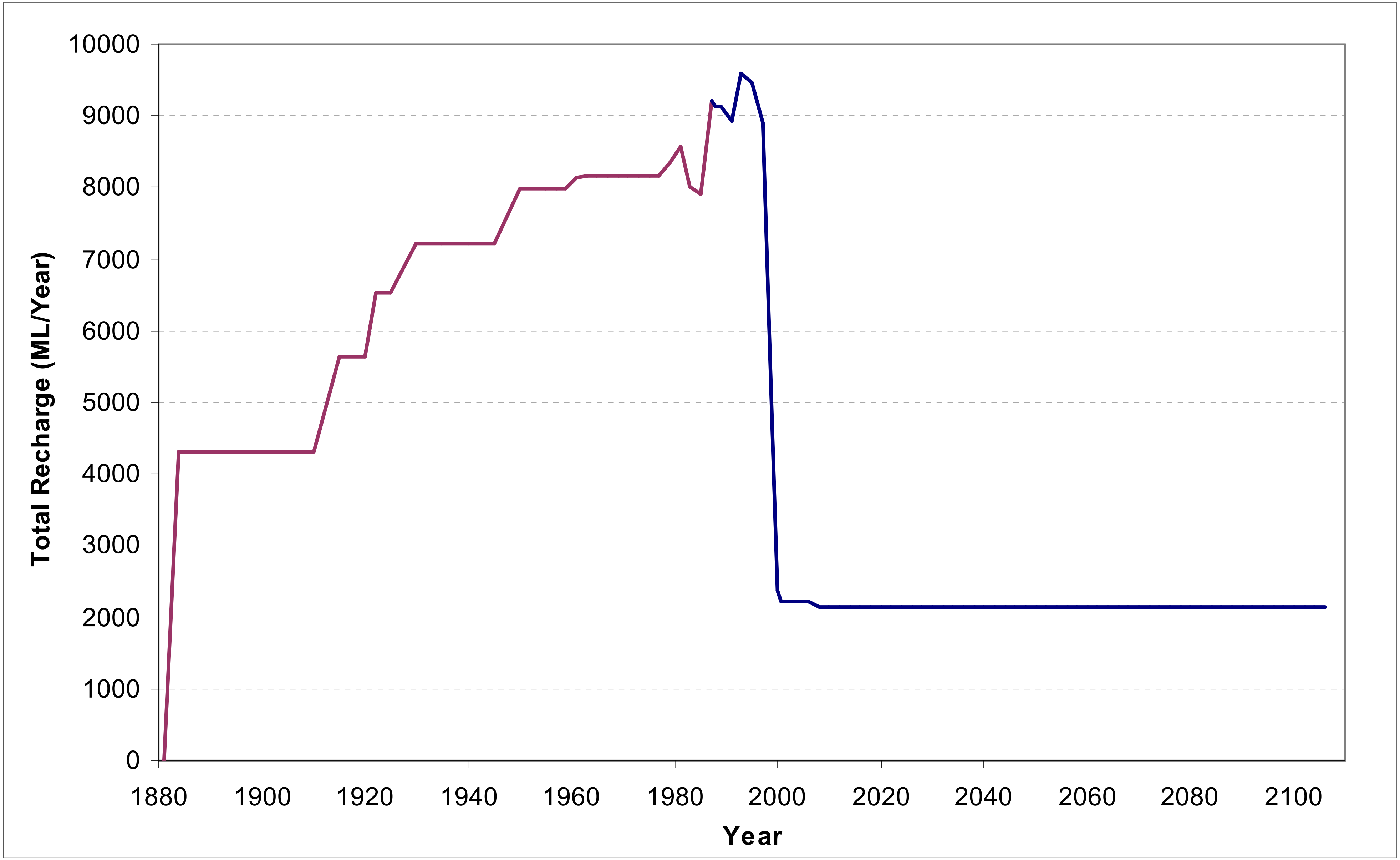
Appendix A-3-(S3B-2): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3B from 1880 to 2010 (Renmark Area) cont.

Irrigation Start year				1881	1900	1880	1985	1997	2004	1999	1995	1999	1970	1997	1999
Lag time (yrs)				0	10	35	0	0	0	35	40	40	5	0	0
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**4**	**11**	**12**	**10**	**19**	**27**	**21**	**22**	**23**	**24**	**25**	**26**
2010	**2012**	*8401*	*9131*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2012	**2014**	*9131*	*9862*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2014	**2016**	*9862*	*10592*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2016	**2018**	*10592*	*11323*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2018	**2020**	*11323*	*12053*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2020	**2022**	*12053*	*12784*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2022	**2024**	*12784*	*13514*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2024	**2026**	*13514*	*14245*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2026	**2028**	*14245*	*14975*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2028	**2030**	*14975*	*15706*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2030	**2032**	*15706*	*16436*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2032	**2034**	*16436*	*17167*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2034	**2036**	*17167*	*17897*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2036	**2038**	*17897*	*18628*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2038	**2040**	*18628*	*19358*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2040	**2042**	*19358*	*20089*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2042	**2044**	*20089*	*20819*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2044	**2046**	*20819*	*21550*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2046	**2048**	*21550*	*22280*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2048	**2050**	*22280*	*23011*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2050	**2052**	*23011*	*23741*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2052	**2054**	*23741*	*24472*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2054	**2056**	*24472*	*25202*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2056	**2058**	*25202*	*25933*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2058	**2060**	*25933*	*26663*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2060	**2062**	*26663*	*27394*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2062	**2064**	*27394*	*28124*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2064	**2066**	*28124*	*28855*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2066	**2068**	*28855*	*29585*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2068	**2070**	*29585*	*30316*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2070	**2072**	*30316*	*31046*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2072	**2074**	*31046*	*31777*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2074	**2076**	*31777*	*32507*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2076	**2078**	*32507*	*33238*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2078	**2080**	*33238*	*33968*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2080	**2082**	*33968*	*34699*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2082	**2084**	*34699*	*35429*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2084	**2086**	*35429*	*36160*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2086	**2088**	*36160*	*36890*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2088	**2090**	*36890*	*37621*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2090	**2092**	*37621*	*38351*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2092	**2094**	*38351*	*39082*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2094	**2096**	*39082*	*39812*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2096	**2098**	*39812*	*40543*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2098	**2100**	*40543*	*41273*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2100	**2102**	*41273*	*42004*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2102	**2104**	*42004*	*42734*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1
2104	**2106**	*42734*	*43465*	37.3	44.4	44.4	37.3	0.1	0.1	0.1	0.1	0.1	44.4	0.1	0.1

Appendix A-3-(S3B-3): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3B from 2010 to 2106 (Renmark Area).

Irrigation Start year				1881	1920	1940	1951	1954	1999	1995	1961	2014	2014	2014
Lag time (yrs)				0	0	5	40	5	0	0	0	0	30	40
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**57**	**5**	**6**	**8**	**9**	**17**	**18**	**20**	**58**	**59**	**60**
2010	**2012**	*8401*	*9131*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2012	**2014**	*9131*	*9862*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2014	**2016**	*9862*	*10592*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2016	**2018**	*10592*	*11323*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2018	**2020**	*11323*	*12053*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2020	**2022**	*12053*	*12784*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2022	**2024**	*12784*	*13514*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2024	**2026**	*13514*	*14245*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2026	**2028**	*14245*	*14975*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2028	**2030**	*14975*	*15706*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2030	**2032**	*15706*	*16436*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2032	**2034**	*16436*	*17167*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2034	**2036**	*17167*	*17897*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2036	**2038**	*17897*	*18628*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2038	**2040**	*18628*	*19358*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2040	**2042**	*19358*	*20089*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2042	**2044**	*20089*	*20819*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2044	**2046**	*20819*	*21550*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2046	**2048**	*21550*	*22280*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2048	**2050**	*22280*	*23011*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2050	**2052**	*23011*	*23741*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2052	**2054**	*23741*	*24472*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2054	**2056**	*24472*	*25202*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2056	**2058**	*25202*	*25933*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2058	**2060**	*25933*	*26663*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2060	**2062**	*26663*	*27394*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2062	**2064**	*27394*	*28124*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2064	**2066**	*28124*	*28855*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2066	**2068**	*28855*	*29585*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2068	**2070**	*29585*	*30316*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2070	**2072**	*30316*	*31046*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2072	**2074**	*31046*	*31777*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2074	**2076**	*31777*	*32507*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2076	**2078**	*32507*	*33238*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2078	**2080**	*33238*	*33968*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2080	**2082**	*33968*	*34699*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2082	**2084**	*34699*	*35429*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2084	**2086**	*35429*	*36160*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2086	**2088**	*36160*	*36890*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2088	**2090**	*36890*	*37621*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2090	**2092**	*37621*	*38351*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2092	**2094**	*38351*	*39082*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2094	**2096**	*39082*	*39812*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2096	**2098**	*39812*	*40543*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2098	**2100**	*40543*	*41273*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2100	**2102**	*41273*	*42004*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2102	**2104**	*42004*	*42734*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1
2104	**2106**	*42734*	*43465*	0.1	37.3	37.3	37.3	44.4	0.1	0.1	44.4	0.1	0.1	0.1

Appendix A-3-(S3B-4): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-3B from 2010 to 2106 (Renmark Area) cont



Appendix A-3-(S3B-5): Total recharge volume to the Loxton Sands in Scenario-3B (Renmark Area)

Irrigation Start year				1881	1900	1880	1985	1997	2004	1999	1995	1999	1970	1997	1999
Lag time (yrs)				0	10	35	0	0	0	35	40	40	5	0	0
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**4**	**11**	**12**	**10**	**19**	**27**	**21**	**22**	**23**	**24**	**25**	**26**
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1925**	*14603*	*16429*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16429*	*18255*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1977	**1979**	*35422*	*36152*	183.6	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1979	**1981**	*36152*	*36883*	194.6	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1981	**1983**	*36883*	*37613*	171.7	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1983	**1985**	*37613*	*38344*	171.7	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1985	**1987**	*38344*	*39074*	171.7	176.4	176.4	156.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1987	**1988**	*0*	*365*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1988	**1989**	*365*	*731*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1989	**1991**	*731*	*1461*	171.7	176.4	176.4	154.2	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1991	**1993**	*1461*	*2192*	183.0	176.4	176.4	183.0	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1993	**1995**	*2192*	*2922*	177.4	190.6	176.4	168.6	168.6	0.1	0.1	0.1	0.1	190.6	0.1	0.1
1995	**1997**	*2922*	*3653*	177.4	132.6	176.4	177.4	177.4	0.1	0.1	0.1	0.1	132.6	0.1	0.1
1997	**1999**	*3653*	*4383*	85.0	80.6	117.2	85.0	85.0	0.1	0.1	0.1	0.1	80.6	80.6	0.1
1999	**2000**	*4383*	*4749*	41.9	41.6	58.6	41.9	41.9	0.1	0.1	0.1	0.1	41.6	41.6	41.6
2000	**2002**	*4749*	*5479*	37.3	44.4	58.6	37.3	37.3	0.1	0.1	0.1	0.1	44.4	44.4	44.4
2002	**2004**	*5479*	*6209*	37.3	44.4	58.6	37.3	37.3	0.1	0.1	0.1	0.1	44.4	44.4	44.4
2004	**2006**	*6209*	*6939*	37.3	44.4	58.6	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2006	**2008**	*6939*	*7670*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2008	**2010**	*7670*	*8401*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4

Appendix A-3-(S4-1): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-4 from 1880 to 2010 (Renmark Area).

Irrigation Start year				1881	1920	1940	1951	1954	1999	1995	1961	2014	2014	2014
Lag time (yrs)				0	0	5	40	5	0	0	0	0	30	40
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**57**	**5**	**6**	**8**	**9**	**17**	**18**	**20**	**58**	**59**	**60**
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1925**	*14603*	*16429*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16429*	*18255*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1977	**1979**	*35422*	*36152*	183.6	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1979	**1981**	*36152*	*36883*	194.6	169.3	141.1	0.1	135.4	0.1	0.1	176.4	0.1	0.1	0.1
1981	**1983**	*36883*	*37613*	171.7	168.9	141.1	0.1	135.1	0.1	0.1	176.4	0.1	0.1	0.1
1983	**1985**	*37613*	*38344*	171.7	156.2	135.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1985	**1987**	*38344*	*39074*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1987	**1988**	*0*	*365*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1988	**1989**	*365*	*731*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1989	**1991**	*731*	*1461*	0.1	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1991	**1993**	*1461*	*2192*	0.1	156.2	146.4	156.2	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1993	**1995**	*2192*	*2922*	0.1	156.2	146.4	156.2	125.0	0.1	0.1	190.6	0.1	0.1	0.1
1995	**1997**	*2922*	*3653*	0.1	132.6	142.0	132.6	106.1	0.1	132.6	132.6	0.1	0.1	0.1
1997	**1999**	*3653*	*4383*	0.1	80.6	85.0	80.6	64.5	0.1	80.6	80.6	0.1	0.1	0.1
1999	**2000**	*4383*	*4749*	0.1	41.9	41.9	41.9	41.6	41.6	41.6	41.6	0.1	0.1	0.1
2000	**2002**	*4749*	*5479*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2002	**2004**	*5479*	*6209*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2004	**2006**	*6209*	*6939*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2006	**2008**	*6939*	*7670*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2008	**2010**	*7670*	*8401*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1

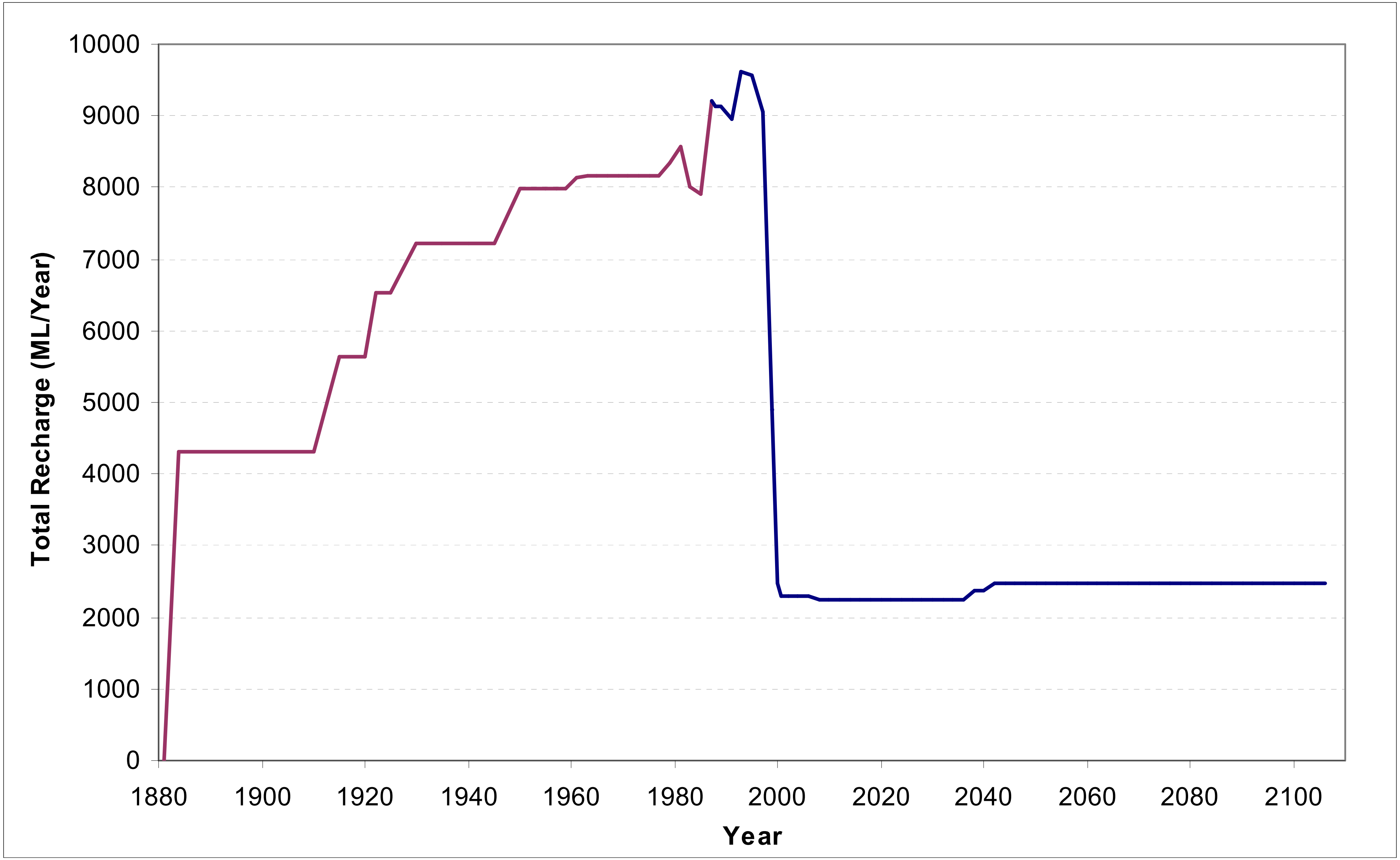
Appendix A-3-(S4-2): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-4 from 1880 to 2010 (Renmark Area) cont.

Irrigation Start year				1881	1900	1880	1985	1997	2004	1999	1995	1999	1970	1997	1999
Lag time (yrs)				0	10	35	0	0	0	35	40	40	5	0	0
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**4**	**11**	**12**	**10**	**19**	**27**	**21**	**22**	**23**	**24**	**25**	**26**
2010	**2012**	*8401*	*9131*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2012	**2014**	*9131*	*9862*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2014	**2016**	*9862*	*10592*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2016	**2018**	*10592*	*11323*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2018	**2020**	*11323*	*12053*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2020	**2022**	*12053*	*12784*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2022	**2024**	*12784*	*13514*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2024	**2026**	*13514*	*14245*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2026	**2028**	*14245*	*14975*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2028	**2030**	*14975*	*15706*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2030	**2032**	*15706*	*16436*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2032	**2034**	*16436*	*17167*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2034	**2036**	*17167*	*17897*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	0.1	0.1	44.4	44.4	44.4
2036	**2038**	*17897*	*18628*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	0.1	44.4	44.4	44.4
2038	**2040**	*18628*	*19358*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	0.1	44.4	44.4	44.4
2040	**2042**	*19358*	*20089*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2042	**2044**	*20089*	*20819*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2044	**2046**	*20819*	*21550*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2046	**2048**	*21550*	*22280*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2048	**2050**	*22280*	*23011*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2050	**2052**	*23011*	*23741*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2052	**2054**	*23741*	*24472*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2054	**2056**	*24472*	*25202*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2056	**2058**	*25202*	*25933*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2058	**2060**	*25933*	*26663*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2060	**2062**	*26663*	*27394*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2062	**2064**	*27394*	*28124*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2064	**2066**	*28124*	*28855*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2066	**2068**	*28855*	*29585*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2068	**2070**	*29585*	*30316*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2070	**2072**	*30316*	*31046*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2072	**2074**	*31046*	*31777*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2074	**2076**	*31777*	*32507*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2076	**2078**	*32507*	*33238*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2078	**2080**	*33238*	*33968*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2080	**2082**	*33968*	*34699*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2082	**2084**	*34699*	*35429*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2084	**2086**	*35429*	*36160*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2086	**2088**	*36160*	*36890*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2088	**2090**	*36890*	*37621*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2090	**2092**	*37621*	*38351*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2092	**2094**	*38351*	*39082*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2094	**2096**	*39082*	*39812*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2096	**2098**	*39812*	*40543*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2098	**2100**	*40543*	*41273*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2100	**2102**	*41273*	*42004*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2102	**2104**	*42004*	*42734*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2104	**2106**	*42734*	*43465*	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4

Appendix A-3-(S4-3): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-4 from 2010 to 2106 (Renmark Area)

Irrigation Start year				1881	1920	1940	1951	1954	1999	1995	1961	2014	2014	2014
Lag time (yrs)				0	0	5	40	5	0	0	0	0	30	40
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**57**	**5**	**6**	**8**	**9**	**17**	**18**	**20**	**58**	**59**	**60**
2010	**2012**	*8401*	*9131*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2012	**2014**	*9131*	*9862*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2014	**2016**	*9862*	*10592*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2016	**2018**	*10592*	*11323*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2018	**2020**	*11323*	*12053*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2020	**2022**	*12053*	*12784*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2022	**2024**	*12784*	*13514*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2024	**2026**	*13514*	*14245*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2026	**2028**	*14245*	*14975*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2028	**2030**	*14975*	*15706*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2030	**2032**	*15706*	*16436*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2032	**2034**	*16436*	*17167*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2034	**2036**	*17167*	*17897*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2036	**2038**	*17897*	*18628*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2038	**2040**	*18628*	*19358*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2040	**2042**	*19358*	*20089*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2042	**2044**	*20089*	*20819*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2044	**2046**	*20819*	*21550*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2046	**2048**	*21550*	*22280*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2048	**2050**	*22280*	*23011*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2050	**2052**	*23011*	*23741*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2052	**2054**	*23741*	*24472*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2054	**2056**	*24472*	*25202*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2056	**2058**	*25202*	*25933*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2058	**2060**	*25933*	*26663*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2060	**2062**	*26663*	*27394*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2062	**2064**	*27394*	*28124*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2064	**2066**	*28124*	*28855*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2066	**2068**	*28855*	*29585*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2068	**2070**	*29585*	*30316*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2070	**2072**	*30316*	*31046*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2072	**2074**	*31046*	*31777*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2074	**2076**	*31777*	*32507*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2076	**2078**	*32507*	*33238*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2078	**2080**	*33238*	*33968*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2080	**2082**	*33968*	*34699*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2082	**2084**	*34699*	*35429*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2084	**2086**	*35429*	*36160*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2086	**2088**	*36160*	*36890*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2088	**2090**	*36890*	*37621*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2090	**2092**	*37621*	*38351*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2092	**2094**	*38351*	*39082*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2094	**2096**	*39082*	*39812*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2096	**2098**	*39812*	*40543*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2098	**2100**	*40543*	*41273*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2100	**2102**	*41273*	*42004*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2102	**2104**	*42004*	*42734*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2104	**2106**	*42734*	*43465*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1

Appendix A-3-(S4-4): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-4 from 2010 to 2106 (Renmark Area) cont



Appendix A-3-(S4-5): Total recharge volume to the Loxton Sands in Scenario-4 (Renmark Area)

Irrigation Start year				1881	1900	1880	1985	1997	2004	1999	1995	1999	1970	1997	1999
Lag time (yrs)				0	10	35	0	0	0	35	40	40	5	0	0
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**4**	**11**	**12**	**10**	**19**	**27**	**21**	**22**	**23**	**24**	**25**	**26**
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1925**	*14603*	*16429*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16429*	*18255*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	176.4	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1977	**1979**	*35422*	*36152*	183.6	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1979	**1981**	*36152*	*36883*	194.6	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1981	**1983**	*36883*	*37613*	171.7	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1983	**1985**	*37613*	*38344*	171.7	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1985	**1987**	*38344*	*39074*	171.7	176.4	176.4	156.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1987	**1988**	*0*	*365*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1988	**1989**	*365*	*731*	171.7	176.4	176.4	164.4	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1989	**1991**	*731*	*1461*	171.7	176.4	176.4	154.2	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1991	**1993**	*1461*	*2192*	183.0	176.4	176.4	183.0	0.1	0.1	0.1	0.1	0.1	176.4	0.1	0.1
1993	**1995**	*2192*	*2922*	177.4	190.6	176.4	168.6	168.6	0.1	0.1	0.1	0.1	190.6	0.1	0.1
1995	**1997**	*2922*	*3653*	177.4	132.6	176.4	177.4	177.4	0.1	0.1	0.1	0.1	132.6	0.1	0.1
1997	**1999**	*3653*	*4383*	85.0	80.6	117.2	85.0	85.0	0.1	0.1	0.1	0.1	80.6	80.6	0.1
1999	**2000**	*4383*	*4749*	41.9	41.6	58.6	41.9	41.9	0.1	0.1	0.1	0.1	41.6	41.6	41.6
2000	**2002**	*4749*	*5479*	37.3	44.4	58.6	37.3	37.3	0.1	0.1	0.1	0.1	44.4	44.4	44.4
2002	**2004**	*5479*	*6209*	37.3	44.4	58.6	37.3	37.3	0.1	0.1	0.1	0.1	44.4	44.4	44.4
2004	**2006**	*6209*	*6939*	37.3	44.4	58.6	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2006	**2008**	*6939*	*7670*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2008	**2010**	*7670*	*8401*	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4

Appendix A-3-(S5-1): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-5 from 1880 to 2010 (Renmark Area).

Irrigation Start year				1881	1920	1940	1951	1954	1999	1995	1961	2014	2014	2014
Lag time (yrs)				0	0	5	40	5	0	0	0	0	30	40
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**57**	**5**	**6**	**8**	**9**	**17**	**18**	**20**	**58**	**59**	**60**
1880	**1881**	*0*	*365*	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1881	**1884**	*365*	*1460*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1884	**1910**	*1460*	*10950*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1910	**1915**	*10950*	*12776*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1915	**1920**	*12776*	*14603*	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1920	**1925**	*14603*	*16429*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1925	**1930**	*16429*	*18255*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1930	**1935**	*18255*	*20081*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1935	**1940**	*20081*	*21908*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1940	**1945**	*21908*	*23734*	176.4	176.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1945	**1950**	*23734*	*25560*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1950	**1955**	*25560*	*27386*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1955	**1957**	*27386*	*28117*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1957	**1959**	*28117*	*28847*	176.4	176.4	141.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1959	**1961**	*28847*	*29578*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	0.1	0.1	0.1	0.1
1961	**1963**	*29578*	*30308*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1963	**1965**	*30308*	*31039*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1965	**1967**	*31039*	*31769*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1967	**1969**	*31769*	*32500*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1969	**1971**	*32500*	*33230*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1971	**1973**	*33230*	*33961*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1973	**1975**	*33961*	*34691*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1975	**1977**	*34691*	*35422*	176.4	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1977	**1979**	*35422*	*36152*	183.6	176.4	141.1	0.1	141.1	0.1	0.1	176.4	0.1	0.1	0.1
1979	**1981**	*36152*	*36883*	194.6	169.3	141.1	0.1	135.4	0.1	0.1	176.4	0.1	0.1	0.1
1981	**1983**	*36883*	*37613*	171.7	168.9	141.1	0.1	135.1	0.1	0.1	176.4	0.1	0.1	0.1
1983	**1985**	*37613*	*38344*	171.7	156.2	135.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1985	**1987**	*38344*	*39074*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1987	**1988**	*0*	*365*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1988	**1989**	*365*	*731*	171.7	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1989	**1991**	*731*	*1461*	0.1	156.2	146.4	0.1	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1991	**1993**	*1461*	*2192*	0.1	156.2	146.4	156.2	125.0	0.1	0.1	176.4	0.1	0.1	0.1
1993	**1995**	*2192*	*2922*	0.1	156.2	146.4	156.2	125.0	0.1	0.1	190.6	0.1	0.1	0.1
1995	**1997**	*2922*	*3653*	0.1	132.6	142.0	132.6	106.1	0.1	132.6	132.6	0.1	0.1	0.1
1997	**1999**	*3653*	*4383*	0.1	80.6	85.0	80.6	64.5	0.1	80.6	80.6	0.1	0.1	0.1
1999	**2000**	*4383*	*4749*	0.1	41.9	41.9	41.9	41.6	41.6	41.6	41.6	0.1	0.1	0.1
2000	**2002**	*4749*	*5479*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2002	**2004**	*5479*	*6209*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2004	**2006**	*6209*	*6939*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2006	**2008**	*6939*	*7670*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2008	**2010**	*7670*	*8401*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1

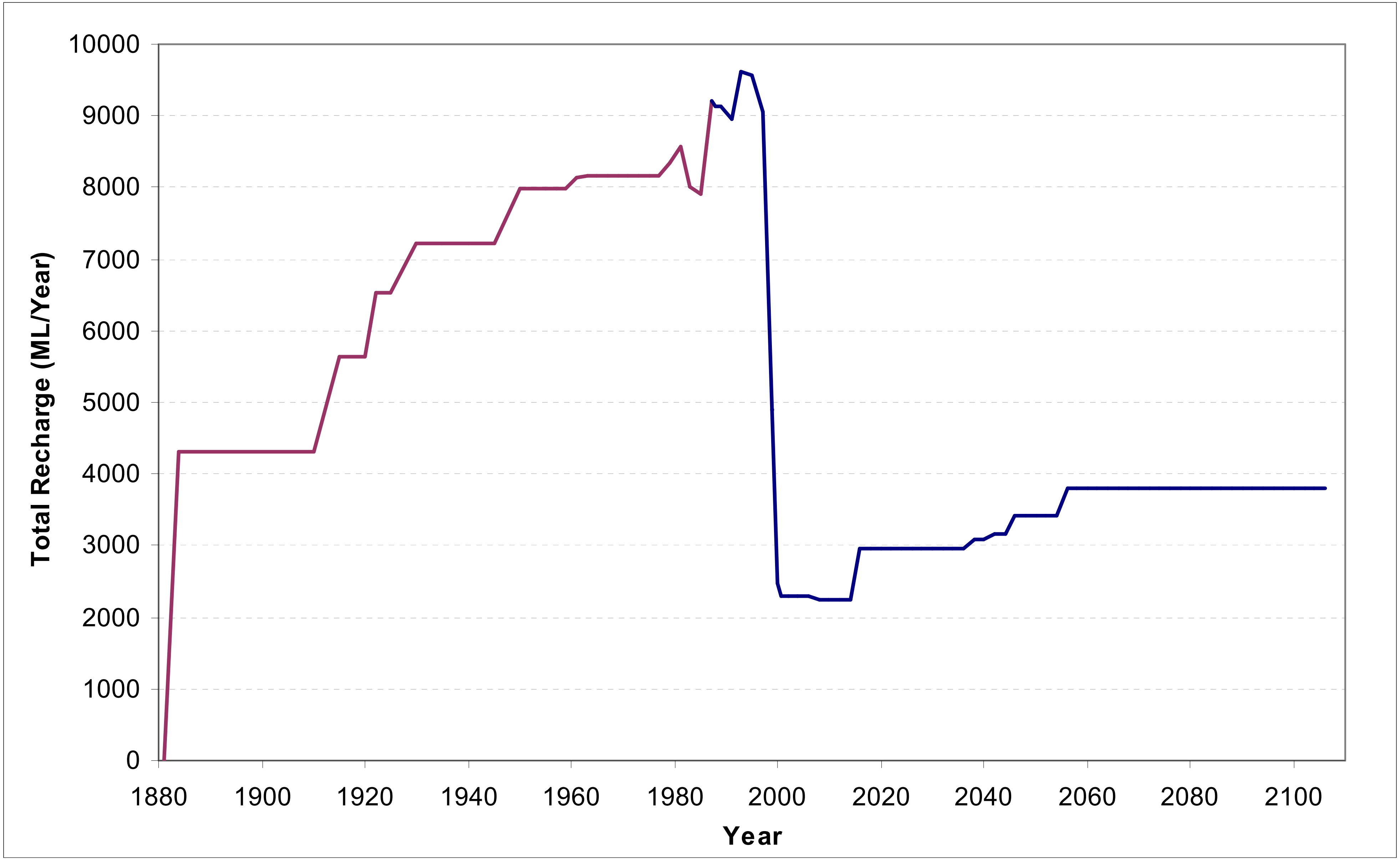
Appendix A-3-(S5-2): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-5 from 1880 to 2010 (Renmark Area) cont.

Irrigation Start year				1881	1900	1880	1985	1997	2004	1999	1995	1999	1970	1997	1999
Lag time (yrs)				0	10	35	0	0	0	35	40	40	5	0	0
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**4**	**11**	**12**	**10**	**19**	**27**	**21**	**22**	**23**	**24**	**25**	**26**
2010	2012	8401	9131	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2012	2014	9131	9862	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2014	2016	9862	10592	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2016	2018	10592	11323	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2018	2020	11323	12053	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2020	2022	12053	12784	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2022	2024	12784	13514	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2024	2026	13514	14245	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2026	2028	14245	14975	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2028	2030	14975	15706	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2030	2032	15706	16436	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2032	2034	16436	17167	37.3	44.4	44.4	37.3	37.3	44.4	0.1	0.1	0.1	44.4	44.4	44.4
2034	2036	17167	17897	37.3	44.4	44.4	37.3	37.3	44.4	44.4	0.1	0.1	44.4	44.4	44.4
2036	2038	17897	18628	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	0.1	44.4	44.4	44.4
2038	2040	18628	19358	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	0.1	44.4	44.4	44.4
2040	2042	19358	20089	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2042	2044	20089	20819	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2044	2046	20819	21550	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2046	2048	21550	22280	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2048	2050	22280	23011	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2050	2052	23011	23741	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2052	2054	23741	24472	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2054	2056	24472	25202	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2056	2058	25202	25933	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2058	2060	25933	26663	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2060	2062	26663	27394	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2062	2064	27394	28124	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2064	2066	28124	28855	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2066	2068	28855	29585	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2068	2070	29585	30316	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2070	2072	30316	31046	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2072	2074	31046	31777	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2074	2076	31777	32507	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2076	2078	32507	33238	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2078	2080	33238	33968	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2080	2082	33968	34699	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2082	2084	34699	35429	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2084	2086	35429	36160	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2086	2088	36160	36890	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2088	2090	36890	37621	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2090	2092	37621	38351	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2092	2094	38351	39082	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2094	2096	39082	39812	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2096	2098	39812	40543	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2098	2100	40543	41273	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2100	2102	41273	42004	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2102	2104	42004	42734	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4
2104	2106	42734	43465	37.3	44.4	44.4	37.3	37.3	44.4	44.4	44.4	44.4	44.4	44.4	44.4

Appendix A-3-(S5-3): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-5 from 2010 to 2106 (Renmark Area)

Irrigation Start year				1881	1920	1940	1951	1954	1999	1995	1961	2014	2014	2014
Lag time (yrs)				0	0	5	40	5	0	0	0	0	30	40
Start Year	**Stop Year**	**Start (day)**	**Stop (day)**	**57**	**5**	**6**	**8**	**9**	**17**	**18**	**20**	**58**	**59**	**60**
2010	**2012**	*8401*	*9131*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2012	**2014**	*9131*	*9862*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	0.1	0.1	0.1
2014	**2016**	*9862*	*10592*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2016	**2018**	*10592*	*11323*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2018	**2020**	*11323*	*12053*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2020	**2022**	*12053*	*12784*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2022	**2024**	*12784*	*13514*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2024	**2026**	*13514*	*14245*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2026	**2028**	*14245*	*14975*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2028	**2030**	*14975*	*15706*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2030	**2032**	*15706*	*16436*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2032	**2034**	*16436*	*17167*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2034	**2036**	*17167*	*17897*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2036	**2038**	*17897*	*18628*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2038	**2040**	*18628*	*19358*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2040	**2042**	*19358*	*20089*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2042	**2044**	*20089*	*20819*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	0.1	0.1
2044	**2046**	*20819*	*21550*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	0.1
2046	**2048**	*21550*	*22280*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	0.1
2048	**2050**	*22280*	*23011*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	0.1
2050	**2052**	*23011*	*23741*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	0.1
2052	**2054**	*23741*	*24472*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	0.1
2054	**2056**	*24472*	*25202*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2056	**2058**	*25202*	*25933*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2058	**2060**	*25933*	*26663*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2060	**2062**	*26663*	*27394*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2062	**2064**	*27394*	*28124*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2064	**2066**	*28124*	*28855*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2066	**2068**	*28855*	*29585*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2068	**2070**	*29585*	*30316*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2070	**2072**	*30316*	*31046*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2072	**2074**	*31046*	*31777*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2074	**2076**	*31777*	*32507*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2076	**2078**	*32507*	*33238*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2078	**2080**	*33238*	*33968*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2080	**2082**	*33968*	*34699*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2082	**2084**	*34699*	*35429*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2084	**2086**	*35429*	*36160*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2086	**2088**	*36160*	*36890*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2088	**2090**	*36890*	*37621*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2090	**2092**	*37621*	*38351*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2092	**2094**	*38351*	*39082*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2094	**2096**	*39082*	*39812*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2096	**2098**	*39812*	*40543*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2098	**2100**	*40543*	*41273*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2100	**2102**	*41273*	*42004*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2102	**2104**	*42004*	*42734*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0
2104	**2106**	*42734*	*43465*	0.1	37.3	37.3	37.3	44.4	44.4	44.4	44.4	37.3	100.0	100.0

Appendix A-3-(S5-4): Model recharge zones, irrigation start time, lag time and recharge rates (mm/yr) in Scenario-5 from 2010 to 2106 (Renmark Area) cont



Appendix A-3-(S5-5): Total recharge volume to the Loxton Sands in Scenario-5 (Renmark Area)

Region	Well name	Time activated		Drain level	Cond
		Days	date	(mAHD)	(m^2/d)
Renmark South	Ren 1 - 4 & 6	4976	2001	13	2000
Renmark North	Ren 5	4376	1999	14	5000
	Ren14	4376	1999	16	2000
Renmark North-east	Ren 7 - 13	Caissons deactivated in model			
Chaffey	Ren15-16	4749	2000	14	3000
	Ren 17	3653	1997	16.5	2000

Note: Caissons have been assumed to be part of Irrigation Efficiency Improvements (i.e. Caissons are inactive for scenario 3a)

Appendix A-3-(S3B, S3C, S4 & S5): Modelled Caisson Specifications for the Renmark Area

Appendix B-1
Model Output - Berri Area

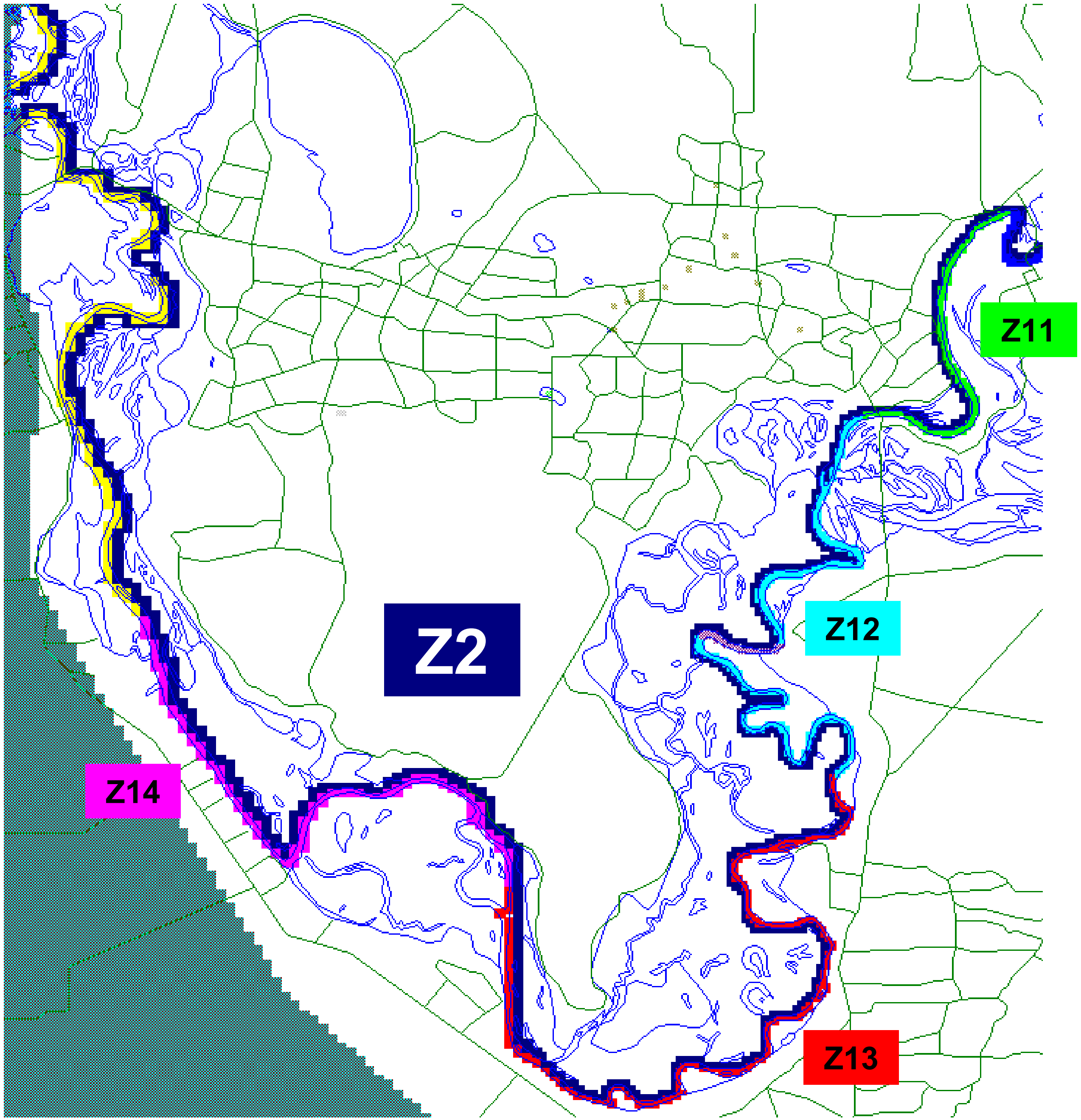
-Flow budget zones
-Modelled groundwater flux (m^3/day)
-Modelled Salt load (tonnes/day)

(All Scenarios)

Scenario	Name	Model Run	Irrigation development area	IIP[1]	RH[2]	SIS[3]
S–1	Natural system	Steady State	None	–	–	–
S–2	Mallee clearance	1920 – 2105	None (but includes Mallee clearance area)	–	–	–
S–3A	Pre-1988, no IIP, no RH	1988 – 2105	Pre-1988	No	No	–
S–3B	Pre-1988, with IIP, no RH	1988 – 2105	Pre-1988	Yes	No	–
S–3C	Pre-1988, with IIP and with RH	1988 – 2105	Pre-1988	Yes	Yes	–
S–4	Current irrigation	2005 – 2105	Pre-1988 + Post-1988	Yes	Yes	No
S–5	Current plus future irrigation	2005 – 2105	Pre-1988 + Post-1988 + Future development	Yes	Yes	No

1 Improved Irrigation Practices 2 Rehabilitation 3 Salt Interception Scheme

Appendix B-1: Model Scenario conditions



Appendix B-1: Model flow budget zones in the Berri Area (layer 1)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1921	23	343	0	3	**368**
3650	1930	23	349	0	6	**378**
7300	1940	23	349	0	25	**397**
10950	1950	23	349	0	36	**408**
14600	1960	23	350	0	43	**415**
18250	1970	23	350	0	48	**421**
21900	1980	24	350	0	53	**426**
24820	1988	25	350	0	55	**430**
25186	1989	25	350	0	56	**431**
25550	1990	25	350	0	56	**431**
25916	1991	26	350	0	57	**432**
26647	1993	26	350	0	57	**433**
27377	1995	26	350	0	58	**434**
28108	1997	27	350	0	58	**435**
28838	1999	27	350	0	59	**435**
29200	2000	27	350	0	59	**436**
29431	2001	28	350	0	59	**437**
29934	2002	28	350	0	60	**438**
30664	2004	28	350	0	60	**439**
31394	2006	29	350	0	61	**439**
32125	2008	29	350	0	61	**440**
32850	2010	30	350	0	62	**441**
33586	2012	31	350	0	63	**443**
34317	2014	31	350	0	64	**444**
35047	2016	32	350	0	64	**445**
35778	2018	32	350	0	65	**446**
36500	2020	33	350	0	65	**447**
37239	2022	34	350	0	66	**450**
37969	2024	35	350	0	67	**451**
38700	2026	35	350	0	67	**452**
39430	2028	36	350	0	68	**453**
40150	2030	36	350	0	68	**454**
40891	2032	38	350	0	70	**457**
41622	2034	39	350	0	70	**459**
42352	2036	39	350	0	71	**460**

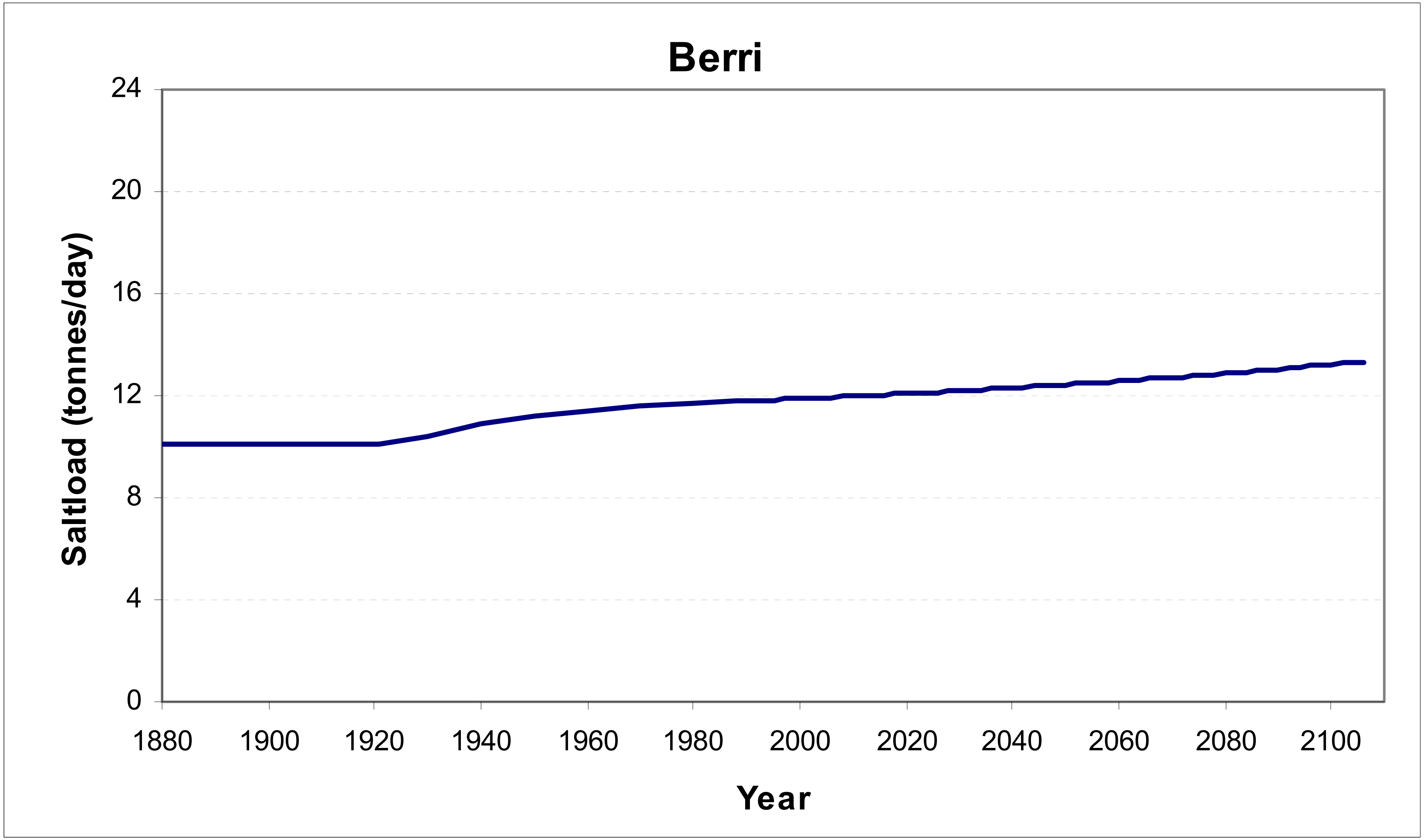
Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
43083	2038	40	350	0	71	**461**
43465	2039	41	350	0	72	**462**
43800	2040	41	350	0	72	**463**
44544	2042	43	350	0	73	**466**
45274	2044	45	350	0	74	**468**
46005	2046	46	350	0	74	**471**
46735	2048	48	350	0	75	**473**
47450	2050	49	350	0	75	**474**
48196	2052	51	350	0	76	**478**
48927	2054	53	350	0	77	**480**
49657	2056	55	350	0	78	**483**
50388	2058	56	350	0	79	**485**
51100	2060	58	350	0	79	**487**
51849	2062	60	350	0	80	**491**
52579	2064	62	350	0	81	**494**
53310	2066	64	350	0	82	**496**
54040	2068	66	350	0	83	**499**
54750	2070	68	350	0	84	**502**
55501	2072	70	350	0	85	**505**
56232	2074	72	350	0	86	**509**
56962	2076	75	351	0	86	**512**
57693	2078	77	351	0	87	**515**
58400	2080	79	351	0	88	**517**
59154	2082	81	351	0	89	**521**
59884	2084	84	351	0	90	**524**
60615	2086	86	351	0	91	**528**
61345	2088	88	351	0	92	**531**
62050	2090	90	351	0	93	**534**
62806	2092	92	351	0	94	**537**
63537	2094	95	351	0	95	**541**
64267	2096	97	351	0	96	**544**
64998	2098	99	351	0	97	**547**
65700	2100	101	351	0	98	**550**
66459	2102	104	351	0	99	**554**
67189	2104	106	351	0	100	**557**
67920	2106	108	351	0	102	**560**

Appendix B-1-(S2-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-2 (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1921	0.1	10.0	0.0	0.1	***10.1***
3650	1930	0.1	10.1	0.0	0.2	***10.4***
7300	1940	0.1	10.1	0.0	0.7	***10.9***
10950	1950	0.1	10.1	0.0	1.0	***11.2***
14600	1960	0.1	10.1	0.0	1.2	***11.4***
18250	1970	0.1	10.1	0.0	1.4	***11.6***
21900	1980	0.1	10.2	0.0	1.5	***11.7***
24820	1988	0.1	10.2	0.0	1.6	***11.8***
25186	1989	0.1	10.2	0.0	1.6	***11.8***
25550	1990	0.1	10.2	0.0	1.6	***11.8***
25916	1991	0.1	10.2	0.0	1.6	***11.8***
26647	1993	0.1	10.2	0.0	1.6	***11.8***
27377	1995	0.1	10.2	0.0	1.6	***11.8***
28108	1997	0.1	10.2	0.0	1.6	***11.9***
28838	1999	0.1	10.2	0.0	1.6	***11.9***
29200	2000	0.1	10.2	0.0	1.7	***11.9***
29431	2001	0.1	10.2	0.0	1.7	***11.9***
29934	2002	0.1	10.2	0.0	1.7	***11.9***
30664	2004	0.1	10.2	0.0	1.7	***11.9***
31394	2006	0.1	10.2	0.0	1.7	***11.9***
32125	2008	0.1	10.2	0.0	1.7	***12.0***
32850	2010	0.1	10.2	0.0	1.7	***12.0***
33586	2012	0.1	10.2	0.0	1.8	***12.0***
34317	2014	0.1	10.2	0.0	1.8	***12.0***
35047	2016	0.1	10.2	0.0	1.8	***12.0***
35778	2018	0.1	10.2	0.0	1.8	***12.1***
36500	2020	0.1	10.2	0.0	1.8	***12.1***
37239	2022	0.1	10.2	0.0	1.9	***12.1***
37969	2024	0.1	10.2	0.0	1.9	***12.1***
38700	2026	0.1	10.2	0.0	1.9	***12.1***
39430	2028	0.1	10.2	0.0	1.9	***12.2***
40150	2030	0.1	10.2	0.0	1.9	***12.2***
40891	2032	0.1	10.2	0.0	2.0	***12.2***
41622	2034	0.1	10.2	0.0	2.0	***12.2***
42352	2036	0.1	10.2	0.0	2.0	***12.3***
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
43083	2038	0.1	10.2	0.0	2.0	***12.3***
43465	2039	0.1	10.2	0.0	2.0	***12.3***
43800	2040	0.1	10.2	0.0	2.0	***12.3***
44544	2042	0.1	10.2	0.0	2.1	***12.3***
45274	2044	0.1	10.2	0.0	2.1	***12.4***
46005	2046	0.1	10.2	0.0	2.1	***12.4***
46735	2048	0.1	10.2	0.0	2.1	***12.4***
47450	2050	0.1	10.2	0.0	2.1	***12.4***
48196	2052	0.1	10.2	0.0	2.1	***12.5***
48927	2054	0.1	10.2	0.0	2.2	***12.5***
49657	2056	0.1	10.2	0.0	2.2	***12.5***
50388	2058	0.2	10.2	0.0	2.2	***12.5***
51100	2060	0.2	10.2	0.0	2.2	***12.6***
51849	2062	0.2	10.2	0.0	2.3	***12.6***
52579	2064	0.2	10.2	0.0	2.3	***12.6***
53310	2066	0.2	10.2	0.0	2.3	***12.7***
54040	2068	0.2	10.2	0.0	2.3	***12.7***
54750	2070	0.2	10.2	0.0	2.3	***12.7***
55501	2072	0.2	10.2	0.0	2.4	***12.7***
56232	2074	0.2	10.2	0.0	2.4	***12.8***
56962	2076	0.2	10.2	0.0	2.4	***12.8***
57693	2078	0.2	10.2	0.0	2.5	***12.8***
58400	2080	0.2	10.2	0.0	2.5	***12.9***
59154	2082	0.2	10.2	0.0	2.5	***12.9***
59884	2084	0.2	10.2	0.0	2.5	***12.9***
60615	2086	0.2	10.2	0.0	2.6	***13.0***
61345	2088	0.2	10.2	0.0	2.6	***13.0***
62050	2090	0.2	10.2	0.0	2.6	***13.0***
62806	2092	0.3	10.2	0.0	2.7	***13.1***
63537	2094	0.3	10.2	0.0	2.7	***13.1***
64267	2096	0.3	10.2	0.0	2.7	***13.2***
64998	2098	0.3	10.2	0.0	2.7	***13.2***
65700	2100	0.3	10.2	0.0	2.8	***13.2***
66459	2102	0.3	10.2	0.0	2.8	***13.3***
67189	2104	0.3	10.2	0.0	2.8	***13.3***
67920	2106	0.3	10.2	0.0	2.9	***13.3***
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Appendix B-1-(S2-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-2 (Berri Area)



Appendix B-1-(S2-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-2 (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	22	343	0	3	**367**
1460	1884	21	349	0	0	**370**
10950	1910	22	350	0	35	**407**
12776	1915	23	350	0	39	**412**
14603	1920	24	350	0	42	**416**
15333	1922	25	350	0	43	**417**
16429	1925	25	350	0	45	**420**
18255	1930	85	350	0	47	**482**
20081	1935	119	350	0	49	**518**
21908	1940	136	350	0	51	**537**
23734	1945	151	350	0	53	**555**
25560	1950	166	351	0	56	**573**
27386	1955	181	351	0	59	**592**
28117	1957	187	352	0	60	**599**
28847	1959	193	352	0	61	**606**
29578	1961	200	352	0	62	**614**
30308	1963	208	352	0	63	**624**
31039	1965	220	353	0	65	**637**
31769	1967	231	353	0	66	**650**
32500	1969	242	353	0	67	**663**
33230	1971	254	354	0	69	**676**
33961	1973	265	354	0	70	**689**
34691	1975	275	354	0	72	**701**
35422	1977	273	355	0	73	**701**
36152	1979	276	355	0	74	**706**
36883	1981	281	355	0	76	**712**
37613	1983	287	356	0	77	**720**
38344	1985	293	356	0	79	**728**
39074	1987	300	356	0	80	**736**
365	1988	310	356	0	82	**748**
731	1989	313	356	0	83	**752**
1461	1991	319	357	0	85	**760**
2192	1993	325	357	0	86	**768**
2922	1995	331	357	0	87	**775**
3653	1997	336	357	0	89	**782**
4383	1999	341	357	0	90	**789**
4749	2000	344	357	0	91	**792**
5479	2002	349	358	0	92	**798**
6209	2004	353	358	0	94	**804**
6939	2006	357	358	0	95	**810**
7670	2008	361	358	0	97	**816**
8401	2010	365	358	0	98	**821**
9131	2012	368	358	0	99	**826**
9862	2014	372	358	0	101	**831**
10592	2016	375	358	0	102	**835**

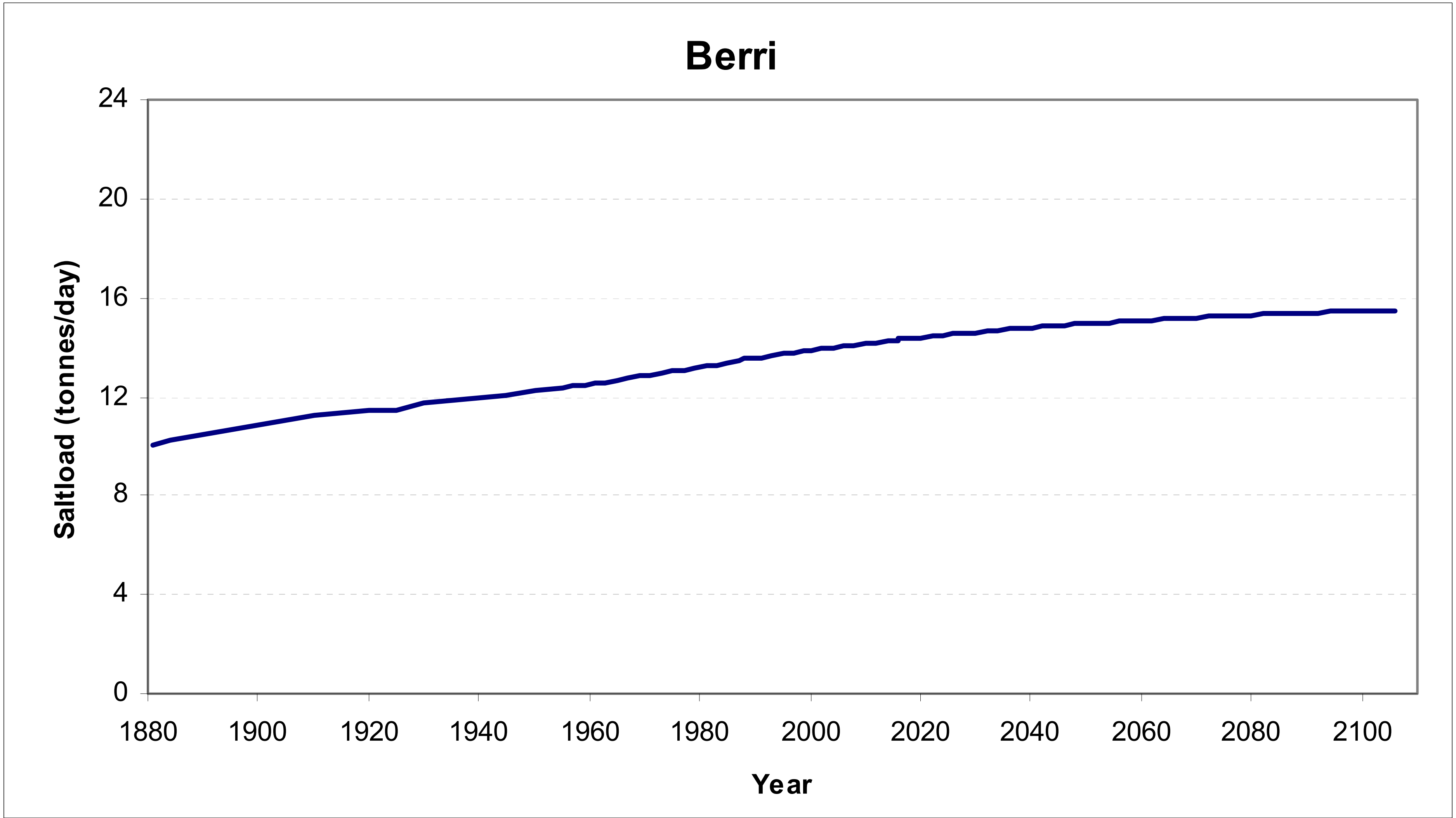
Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	378	358	0	103	**840**
12053	2020	381	358	0	105	**844**
12784	2022	383	358	0	106	**848**
13514	2024	386	358	0	107	**851**
14245	2026	388	358	0	108	**855**
14975	2028	390	359	0	110	**858**
15706	2030	392	359	0	111	**862**
16436	2032	394	359	0	112	**865**
17167	2034	396	359	0	113	**868**
17897	2036	398	359	0	114	**871**
18628	2038	399	359	0	115	**873**
19358	2040	401	359	0	116	**876**
20089	2042	402	359	0	117	**879**
20819	2044	404	359	0	118	**881**
21550	2046	405	359	0	119	**883**
22280	2048	406	359	0	120	**886**
23011	2050	408	359	0	121	**888**
23741	2052	409	359	0	122	**890**
24472	2054	410	359	0	123	**892**
25202	2056	411	359	0	124	**894**
25933	2058	412	359	0	125	**896**
26663	2060	413	359	0	126	**898**
27394	2062	414	359	0	126	**899**
28124	2064	415	359	0	127	**901**
28855	2066	416	359	0	128	**903**
29585	2068	417	359	0	129	**904**
30316	2070	418	359	0	129	**906**
31046	2072	418	359	0	130	**907**
31777	2074	419	359	0	131	**909**
32507	2076	420	359	0	131	**910**
33238	2078	421	359	0	132	**912**
33968	2080	421	359	0	133	**913**
34699	2082	422	359	0	133	**914**
35429	2084	423	359	0	134	**916**
36160	2086	423	359	0	134	**917**
36890	2088	424	359	0	135	**918**
37621	2090	425	359	0	135	**919**
38351	2092	425	359	0	136	**920**
39082	2094	426	359	0	136	**921**
39812	2096	426	359	0	137	**922**
40543	2098	427	359	0	137	**923**
41273	2100	428	359	0	138	**924**
42004	2102	428	359	0	138	**925**
42734	2104	429	359	0	138	**926**
43465	2106	429	359	0	139	**927**

Appendix B-1-(S3A-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-3A (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	0.1	10.0	0.0	0.1	**10.1**
1460	1884	0.1	10.1	0.0	0.0	**10.2**
10950	1910	0.1	10.1	0.0	1.0	**11.2**
12776	1915	0.1	10.1	0.0	1.1	**11.3**
14603	1920	0.1	10.2	0.0	1.2	**11.4**
15333	1922	0.1	10.2	0.0	1.2	**11.4**
16429	1925	0.1	10.2	0.0	1.3	**11.5**
18255	1930	0.2	10.2	0.0	1.3	**11.7**
20081	1935	0.3	10.2	0.0	1.4	**11.9**
21908	1940	0.4	10.2	0.0	1.4	**12.0**
23734	1945	0.4	10.2	0.0	1.5	**12.1**
25560	1950	0.5	10.2	0.0	1.6	**12.2**
27386	1955	0.5	10.2	0.0	1.6	**12.3**
28117	1957	0.5	10.2	0.0	1.7	**12.4**
28847	1959	0.5	10.2	0.0	1.7	**12.5**
29578	1961	0.5	10.2	0.0	1.7	**12.5**
30308	1963	0.6	10.2	0.0	1.8	**12.6**
31039	1965	0.6	10.2	0.0	1.8	**12.7**
31769	1967	0.6	10.2	0.0	1.9	**12.7**
32500	1969	0.7	10.3	0.0	1.9	**12.8**
33230	1971	0.7	10.3	0.0	1.9	**12.9**
33961	1973	0.7	10.3	0.0	2.0	**13.0**
34691	1975	0.8	10.3	0.0	2.0	**13.1**
35422	1977	0.7	10.3	0.0	2.1	**13.1**
36152	1979	0.8	10.3	0.0	2.1	**13.2**
36883	1981	0.8	10.3	0.0	2.1	**13.2**
37613	1983	0.8	10.3	0.0	2.2	**13.3**
38344	1985	0.8	10.3	0.0	2.2	**13.3**
39074	1987	0.8	10.3	0.0	2.3	**13.4**
365	1988	0.8	10.3	0.0	2.3	**13.5**
731	1989	0.9	10.3	0.0	2.3	**13.5**
1461	1991	0.9	10.4	0.0	2.4	**13.6**
2192	1993	0.9	10.4	0.0	2.4	**13.7**
2922	1995	0.9	10.4	0.0	2.5	**13.7**
3653	1997	0.9	10.4	0.0	2.5	**13.8**
4383	1999	0.9	10.4	0.0	2.5	**13.8**
4749	2000	0.9	10.4	0.0	2.6	**13.9**
5479	2002	1.0	10.4	0.0	2.6	**13.9**
6209	2004	1.0	10.4	0.0	2.6	**14.0**
6939	2006	1.0	10.4	0.0	2.7	**14.0**
7670	2008	1.0	10.4	0.0	2.7	**14.1**
8401	2010	1.0	10.4	0.0	2.8	**14.1**
9131	2012	1.0	10.4	0.0	2.8	**14.2**
9862	2014	1.0	10.4	0.0	2.8	**14.2**
10592	2016	1.0	10.4	0.0	2.9	**14.3**
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	1.0	10.4	0.0	2.9	**14.3**
12053	2020	1.0	10.4	0.0	2.9	**14.4**
12784	2022	1.0	10.4	0.0	3.0	**14.4**
13514	2024	1.1	10.4	0.0	3.0	**14.5**
14245	2026	1.1	10.4	0.0	3.0	**14.5**
14975	2028	1.1	10.4	0.0	3.1	**14.6**
15706	2030	1.1	10.4	0.0	3.1	**14.6**
16436	2032	1.1	10.4	0.0	3.1	**14.6**
17167	2034	1.1	10.4	0.0	3.2	**14.7**
17897	2036	1.1	10.4	0.0	3.2	**14.7**
18628	2038	1.1	10.4	0.0	3.2	**14.7**
19358	2040	1.1	10.4	0.0	3.3	**14.8**
20089	2042	1.1	10.4	0.0	3.3	**14.8**
20819	2044	1.1	10.4	0.0	3.3	**14.8**
21550	2046	1.1	10.4	0.0	3.4	**14.9**
22280	2048	1.1	10.4	0.0	3.4	**14.9**
23011	2050	1.1	10.4	0.0	3.4	**14.9**
23741	2052	1.1	10.4	0.0	3.4	**15.0**
24472	2054	1.1	10.4	0.0	3.5	**15.0**
25202	2056	1.1	10.4	0.0	3.5	**15.0**
25933	2058	1.1	10.4	0.0	3.5	**15.1**
26663	2060	1.1	10.4	0.0	3.5	**15.1**
27394	2062	1.1	10.4	0.0	3.6	**15.1**
28124	2064	1.1	10.4	0.0	3.6	**15.1**
28855	2066	1.1	10.4	0.0	3.6	**15.2**
29585	2068	1.1	10.4	0.0	3.6	**15.2**
30316	2070	1.1	10.4	0.0	3.6	**15.2**
31046	2072	1.1	10.4	0.0	3.7	**15.2**
31777	2074	1.1	10.4	0.0	3.7	**15.2**
32507	2076	1.1	10.4	0.0	3.7	**15.3**
33238	2078	1.1	10.4	0.0	3.7	**15.3**
33968	2080	1.1	10.4	0.0	3.7	**15.3**
34699	2082	1.2	10.4	0.0	3.7	**15.3**
35429	2084	1.2	10.4	0.0	3.8	**15.3**
36160	2086	1.2	10.4	0.0	3.8	**15.4**
36890	2088	1.2	10.4	0.0	3.8	**15.4**
37621	2090	1.2	10.4	0.0	3.8	**15.4**
38351	2092	1.2	10.4	0.0	3.8	**15.4**
39082	2094	1.2	10.4	0.0	3.8	**15.4**
39812	2096	1.2	10.4	0.0	3.8	**15.4**
40543	2098	1.2	10.4	0.0	3.9	**15.4**
41273	2100	1.2	10.4	0.0	3.9	**15.5**
42004	2102	1.2	10.4	0.0	3.9	**15.5**
42734	2104	1.2	10.4	0.0	3.9	**15.5**
43465	2106	1.2	10.4	0.0	3.9	**15.5**
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Appendix B-1-(S3A-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-3A (Berri Area)



Appendix B-1-(S3A-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-3A (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	**1881**	22	343	0	3	**367**
1460	**1884**	21	349	0	0	**370**
10950	**1910**	22	350	0	35	**407**
12776	**1915**	23	350	0	39	**412**
14603	**1920**	24	350	0	42	**416**
15333	**1922**	25	350	0	43	**417**
16429	**1925**	25	350	0	45	**420**
18255	**1930**	85	350	0	47	**482**
20081	**1935**	119	350	0	49	**518**
21908	**1940**	136	350	0	51	**537**
23734	**1945**	151	350	0	53	**555**
25560	**1950**	166	351	0	56	**573**
27386	**1955**	181	351	0	59	**592**
28117	**1957**	187	352	0	60	**599**
28847	**1959**	193	352	0	61	**606**
29578	**1961**	200	352	0	62	**614**
30308	**1963**	208	352	0	63	**624**
31039	**1965**	220	353	0	65	**637**
31769	**1967**	231	353	0	66	**650**
32500	**1969**	242	353	0	67	**663**
33230	**1971**	254	354	0	69	**676**
33961	**1973**	265	354	0	70	**689**
34691	**1975**	275	354	0	72	**701**
35422	**1977**	273	355	0	73	**701**
36152	**1979**	276	355	0	74	**706**
36883	**1981**	281	355	0	76	**712**
37613	**1983**	287	356	0	77	**720**
38344	**1985**	293	356	0	79	**728**
39074	**1987**	300	356	0	80	**736**
365	**1988**	303	356	0	81	**740**
731	**1989**	306	356	0	82	**744**
1461	**1991**	312	356	0	83	**751**
2192	**1993**	317	357	0	85	**758**
2922	**1995**	323	357	0	86	**765**
3653	**1997**	328	357	0	87	**772**
4383	**1999**	333	357	0	89	**779**
4749	**2000**	335	357	0	89	**782**
5479	**2002**	339	357	0	91	**788**
6209	**2004**	344	357	0	92	**793**
6939	**2006**	347	358	0	94	**799**
7670	**2008**	351	358	0	95	**804**
8401	**2010**	355	358	0	97	**809**
9131	**2012**	358	358	0	98	**814**
9862	**2014**	361	358	0	99	**818**
10592	**2016**	364	358	0	101	**822**

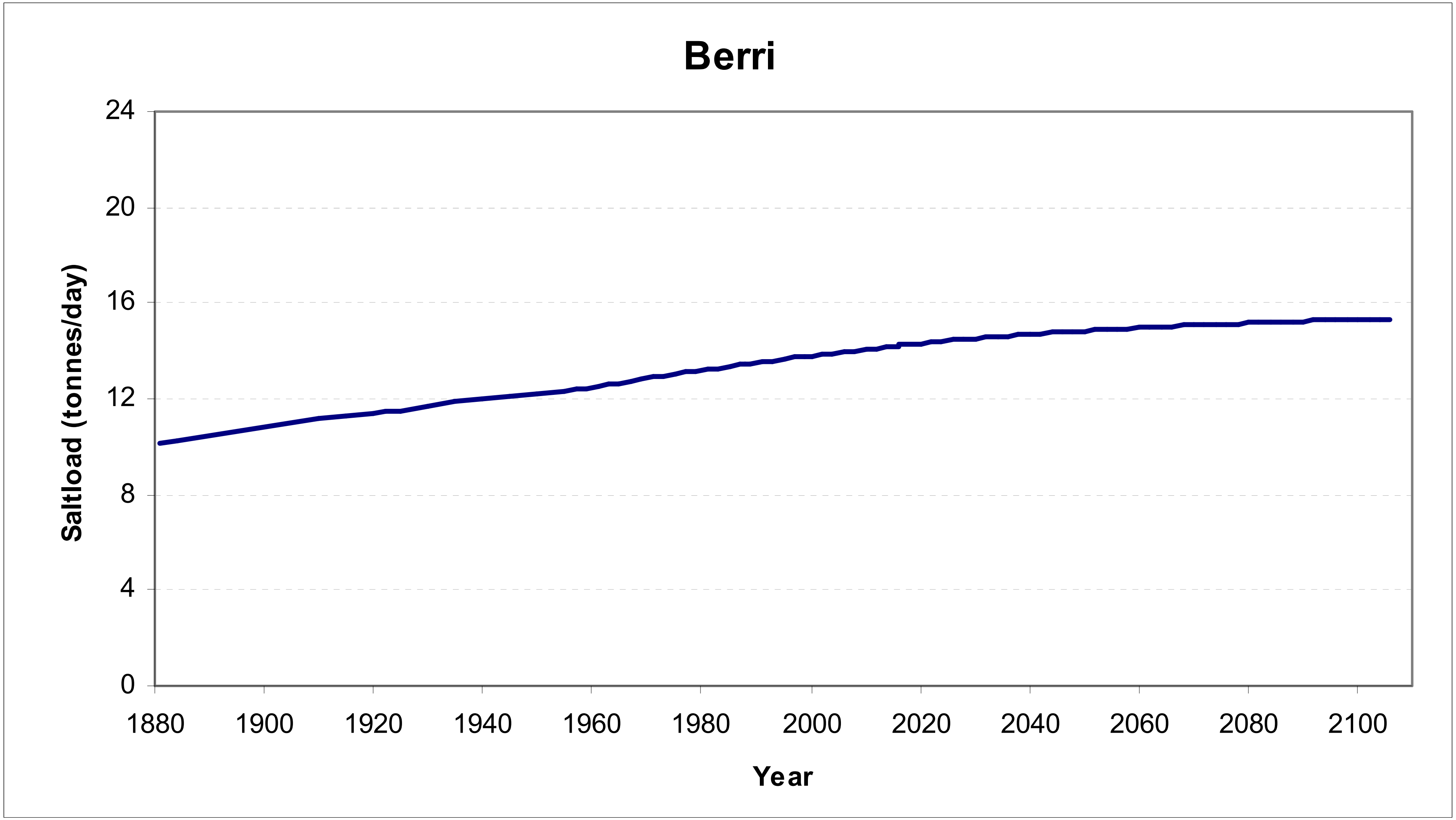
Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	**2018**	367	358	0	102	**826**
12053	**2020**	369	358	0	103	**830**
12784	**2022**	371	358	0	104	**834**
13514	**2024**	374	358	0	106	**837**
14245	**2026**	376	358	0	107	**841**
14975	**2028**	377	358	0	108	**844**
15706	**2030**	379	358	0	109	**847**
16436	**2032**	381	358	0	110	**850**
17167	**2034**	382	358	0	112	**852**
17897	**2036**	384	358	0	113	**855**
18628	**2038**	385	358	0	114	**857**
19358	**2040**	386	358	0	115	**860**
20089	**2042**	388	358	0	116	**862**
20819	**2044**	389	358	0	117	**864**
21550	**2046**	390	358	0	118	**866**
22280	**2048**	391	359	0	119	**868**
23011	**2050**	391	359	0	120	**870**
23741	**2052**	392	359	0	120	**871**
24472	**2054**	393	359	0	121	**873**
25202	**2056**	394	359	0	122	**874**
25933	**2058**	394	359	0	123	**876**
26663	**2060**	395	359	0	124	**877**
27394	**2062**	396	359	0	125	**879**
28124	**2064**	396	359	0	125	**880**
28855	**2066**	397	359	0	126	**881**
29585	**2068**	397	359	0	127	**883**
30316	**2070**	398	359	0	127	**884**
31046	**2072**	398	359	0	128	**885**
31777	**2074**	399	359	0	129	**886**
32507	**2076**	399	359	0	129	**887**
33238	**2078**	400	359	0	130	**888**
33968	**2080**	400	359	0	130	**889**
34699	**2082**	401	359	0	131	**890**
35429	**2084**	401	359	0	131	**891**
36160	**2086**	401	359	0	132	**892**
36890	**2088**	402	359	0	132	**893**
37621	**2090**	402	359	0	133	**894**
38351	**2092**	402	359	0	133	**894**
39082	**2094**	403	359	0	134	**895**
39812	**2096**	403	359	0	134	**896**
40543	**2098**	403	359	0	135	**897**
41273	**2100**	403	359	0	135	**897**
42004	**2102**	404	359	0	135	**898**
42734	**2104**	404	359	0	136	**899**
43465	**2106**	404	359	0	136	**899**

Appendix B-1-(S3B-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-3B (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	0.1	10.0	0.0	0.1	**10.1**
1460	1884	0.1	10.1	0.0	0.0	**10.2**
10950	1910	0.1	10.1	0.0	1.0	**11.2**
12776	1915	0.1	10.1	0.0	1.1	**11.3**
14603	1920	0.1	10.2	0.0	1.2	**11.4**
15333	1922	0.1	10.2	0.0	1.2	**11.4**
16429	1925	0.1	10.2	0.0	1.3	**11.5**
18255	1930	0.2	10.2	0.0	1.3	**11.7**
20081	1935	0.3	10.2	0.0	1.4	**11.9**
21908	1940	0.4	10.2	0.0	1.4	**12.0**
23734	1945	0.4	10.2	0.0	1.5	**12.1**
25560	1950	0.5	10.2	0.0	1.6	**12.2**
27386	1955	0.5	10.2	0.0	1.6	**12.3**
28117	1957	0.5	10.2	0.0	1.7	**12.4**
28847	1959	0.5	10.2	0.0	1.7	**12.5**
29578	1961	0.5	10.2	0.0	1.7	**12.5**
30308	1963	0.6	10.2	0.0	1.8	**12.6**
31039	1965	0.6	10.2	0.0	1.8	**12.7**
31769	1967	0.6	10.2	0.0	1.9	**12.7**
32500	1969	0.7	10.3	0.0	1.9	**12.8**
33230	1971	0.7	10.3	0.0	1.9	**12.9**
33961	1973	0.7	10.3	0.0	2.0	**13.0**
34691	1975	0.8	10.3	0.0	2.0	**13.1**
35422	1977	0.7	10.3	0.0	2.1	**13.1**
36152	1979	0.8	10.3	0.0	2.1	**13.2**
36883	1981	0.8	10.3	0.0	2.1	**13.2**
37613	1983	0.8	10.3	0.0	2.2	**13.3**
38344	1985	0.8	10.3	0.0	2.2	**13.3**
39074	1987	0.8	10.3	0.0	2.3	**13.4**
365	1988	0.8	10.3	0.0	2.3	**13.4**
731	1989	0.8	10.3	0.0	2.3	**13.5**
1461	1991	0.9	10.3	0.0	2.3	**13.5**
2192	1993	0.9	10.4	0.0	2.4	**13.6**
2922	1995	0.9	10.4	0.0	2.4	**13.7**
3653	1997	0.9	10.4	0.0	2.5	**13.7**
4383	1999	0.9	10.4	0.0	2.5	**13.8**
4749	2000	0.9	10.4	0.0	2.5	**13.8**
5479	2002	0.9	10.4	0.0	2.6	**13.9**
6209	2004	0.9	10.4	0.0	2.6	**13.9**
6939	2006	0.9	10.4	0.0	2.6	**14.0**
7670	2008	1.0	10.4	0.0	2.7	**14.0**
8401	2010	1.0	10.4	0.0	2.7	**14.1**
9131	2012	1.0	10.4	0.0	2.8	**14.1**
9862	2014	1.0	10.4	0.0	2.8	**14.2**
10592	2016	1.0	10.4	0.0	2.8	**14.2**
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	1.0	10.4	0.0	2.9	**14.3**
12053	2020	1.0	10.4	0.0	2.9	**14.3**
12784	2022	1.0	10.4	0.0	2.9	**14.3**
13514	2024	1.0	10.4	0.0	3.0	**14.4**
14245	2026	1.0	10.4	0.0	3.0	**14.4**
14975	2028	1.0	10.4	0.0	3.0	**14.5**
15706	2030	1.0	10.4	0.0	3.1	**14.5**
16436	2032	1.0	10.4	0.0	3.1	**14.5**
17167	2034	1.0	10.4	0.0	3.1	**14.6**
17897	2036	1.0	10.4	0.0	3.2	**14.6**
18628	2038	1.1	10.4	0.0	3.2	**14.7**
19358	2040	1.1	10.4	0.0	3.2	**14.7**
20089	2042	1.1	10.4	0.0	3.3	**14.7**
20819	2044	1.1	10.4	0.0	3.3	**14.8**
21550	2046	1.1	10.4	0.0	3.3	**14.8**
22280	2048	1.1	10.4	0.0	3.3	**14.8**
23011	2050	1.1	10.4	0.0	3.4	**14.8**
23741	2052	1.1	10.4	0.0	3.4	**14.9**
24472	2054	1.1	10.4	0.0	3.4	**14.9**
25202	2056	1.1	10.4	0.0	3.4	**14.9**
25933	2058	1.1	10.4	0.0	3.5	**14.9**
26663	2060	1.1	10.4	0.0	3.5	**15.0**
27394	2062	1.1	10.4	0.0	3.5	**15.0**
28124	2064	1.1	10.4	0.0	3.5	**15.0**
28855	2066	1.1	10.4	0.0	3.5	**15.0**
29585	2068	1.1	10.4	0.0	3.6	**15.1**
30316	2070	1.1	10.4	0.0	3.6	**15.1**
31046	2072	1.1	10.4	0.0	3.6	**15.1**
31777	2074	1.1	10.4	0.0	3.6	**15.1**
32507	2076	1.1	10.4	0.0	3.6	**15.1**
33238	2078	1.1	10.4	0.0	3.6	**15.2**
33968	2080	1.1	10.4	0.0	3.7	**15.2**
34699	2082	1.1	10.4	0.0	3.7	**15.2**
35429	2084	1.1	10.4	0.0	3.7	**15.2**
36160	2086	1.1	10.4	0.0	3.7	**15.2**
36890	2088	1.1	10.4	0.0	3.7	**15.2**
37621	2090	1.1	10.4	0.0	3.7	**15.2**
38351	2092	1.1	10.4	0.0	3.7	**15.3**
39082	2094	1.1	10.4	0.0	3.8	**15.3**
39812	2096	1.1	10.4	0.0	3.8	**15.3**
40543	2098	1.1	10.4	0.0	3.8	**15.3**
41273	2100	1.1	10.4	0.0	3.8	**15.3**
42004	2102	1.1	10.4	0.0	3.8	**15.3**
42734	2104	1.1	10.4	0.0	3.8	**15.3**
43465	2106	1.1	10.4	0.0	3.8	**15.3**
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Appendix B-1-(S3B-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-3B (Berri Area)



Appendix B-1-(S3B-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-3B (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	22	343	0	3	367
1460	1884	21	349	0	0	370
10950	1910	22	350	0	35	407
12776	1915	23	350	0	39	412
14603	1920	24	350	0	42	416
15333	1922	25	350	0	43	417
16429	1925	25	350	0	45	420
18255	1930	85	350	0	47	482
20081	1935	119	350	0	49	518
21908	1940	136	350	0	51	537
23734	1945	151	350	0	53	555
25560	1950	166	351	0	56	573
27386	1955	181	351	0	59	592
28117	1957	187	352	0	60	599
28847	1959	193	352	0	61	606
29578	1961	200	352	0	62	614
30308	1963	208	352	0	63	624
31039	1965	220	353	0	65	637
31769	1967	231	353	0	66	650
32500	1969	242	353	0	67	663
33230	1971	254	354	0	69	676
33961	1973	265	354	0	70	689
34691	1975	275	354	0	72	701
35422	1977	273	355	0	73	701
36152	1979	276	355	0	74	706
36883	1981	281	355	0	76	712
37613	1983	287	356	0	77	720
38344	1985	293	356	0	79	728
39074	1987	300	356	0	80	736
365	1988	303	356	0	81	740
731	1989	306	356	0	82	744
1461	1991	312	356	0	83	751
2192	1993	317	357	0	85	758
2922	1995	323	357	0	86	765
3653	1997	328	357	0	87	772
4383	1999	330	357	0	89	776
4749	2000	331	357	0	89	777
5479	2002	333	357	0	91	781
6209	2004	335	357	0	92	785
6939	2006	338	357	0	94	789
7670	2008	340	357	0	95	793
8401	2010	343	357	0	96	797
9131	2012	345	357	0	98	800
9862	2014	347	358	0	99	804
10592	2016	350	358	0	100	808

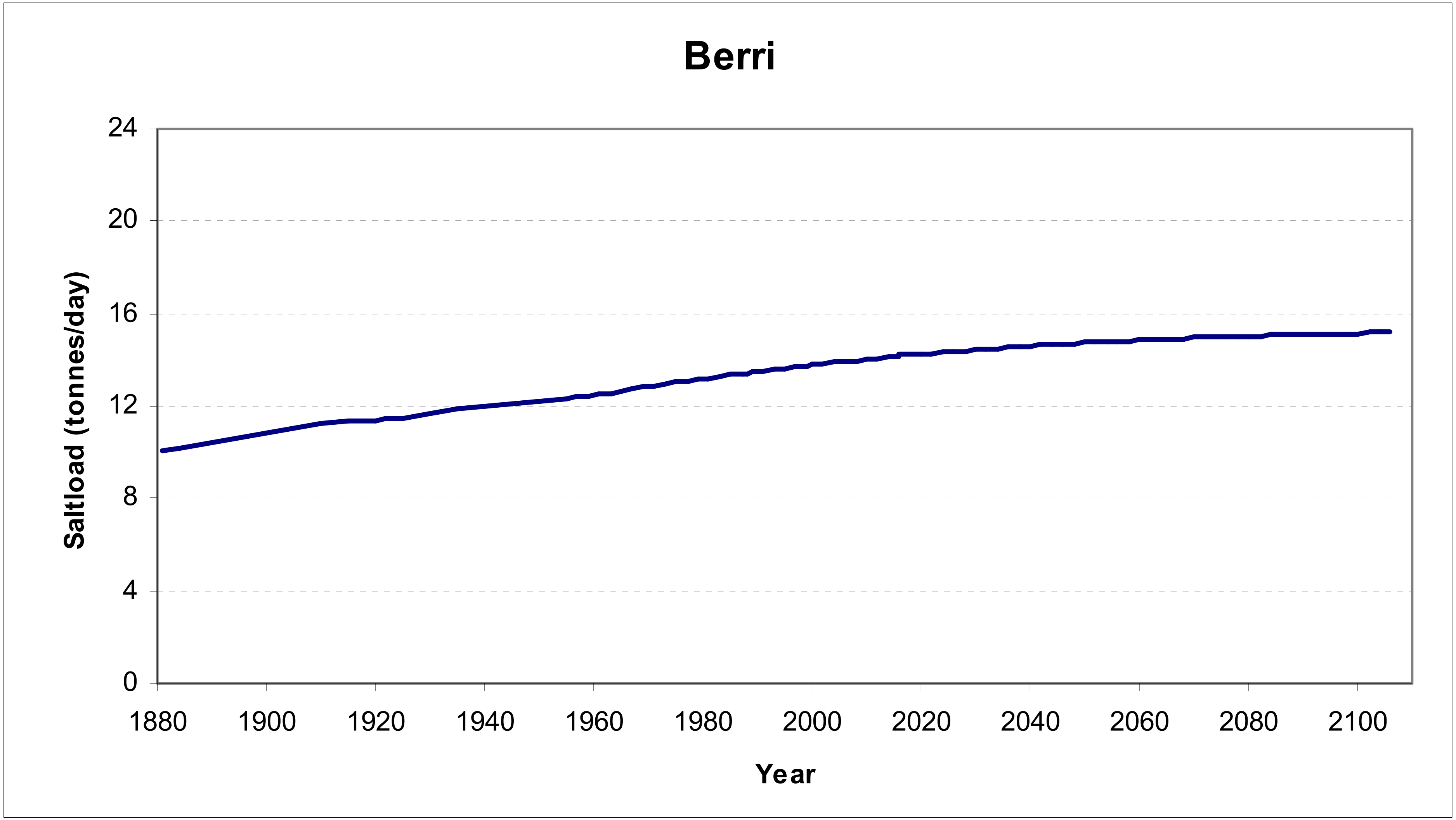
Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	352	358	0	102	811
12053	2020	354	358	0	103	814
12784	2022	355	358	0	104	817
13514	2024	357	358	0	105	820
14245	2026	359	358	0	107	823
14975	2028	360	358	0	108	825
15706	2030	361	358	0	109	828
16436	2032	363	358	0	110	830
17167	2034	364	358	0	111	833
17897	2036	365	358	0	112	835
18628	2038	366	358	0	113	837
19358	2040	367	358	0	114	839
20089	2042	368	358	0	115	841
20819	2044	369	358	0	116	843
21550	2046	370	358	0	117	844
22280	2048	371	358	0	118	846
23011	2050	371	358	0	119	848
23741	2052	372	358	0	119	849
24472	2054	373	358	0	120	851
25202	2056	373	358	0	121	852
25933	2058	374	358	0	122	853
26663	2060	374	358	0	122	855
27394	2062	375	358	0	123	856
28124	2064	375	358	0	124	857
28855	2066	376	358	0	124	858
29585	2068	376	358	0	125	859
30316	2070	377	358	0	126	860
31046	2072	377	358	0	126	861
31777	2074	377	358	0	127	862
32507	2076	378	358	0	127	863
33238	2078	378	358	0	128	864
33968	2080	379	358	0	128	865
34699	2082	379	358	0	129	866
35429	2084	379	358	0	129	866
36160	2086	380	358	0	130	867
36890	2088	380	358	0	130	868
37621	2090	380	358	0	131	869
38351	2092	380	358	0	131	869
39082	2094	381	358	0	131	870
39812	2096	381	358	0	132	871
40543	2098	381	358	0	132	871
41273	2100	382	358	0	132	872
42004	2102	382	358	0	133	872
42734	2104	382	358	0	133	873
43465	2106	382	358	0	133	873

Appendix B-1-(S3C-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-3C (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	0.1	10.0	0.0	0.1	10.1
1460	1884	0.1	10.1	0.0	0.0	10.2
10950	1910	0.1	10.1	0.0	1.0	11.2
12776	1915	0.1	10.1	0.0	1.1	11.3
14603	1920	0.1	10.2	0.0	1.2	11.4
15333	1922	0.1	10.2	0.0	1.2	11.4
16429	1925	0.1	10.2	0.0	1.3	11.5
18255	1930	0.2	10.2	0.0	1.3	11.7
20081	1935	0.3	10.2	0.0	1.4	11.9
21908	1940	0.4	10.2	0.0	1.4	12.0
23734	1945	0.4	10.2	0.0	1.5	12.1
25560	1950	0.5	10.2	0.0	1.6	12.2
27386	1955	0.5	10.2	0.0	1.6	12.3
28117	1957	0.5	10.2	0.0	1.7	12.4
28847	1959	0.5	10.2	0.0	1.7	12.5
29578	1961	0.5	10.2	0.0	1.7	12.5
30308	1963	0.6	10.2	0.0	1.8	12.6
31039	1965	0.6	10.2	0.0	1.8	12.7
31769	1967	0.6	10.2	0.0	1.9	12.7
32500	1969	0.7	10.3	0.0	1.9	12.8
33230	1971	0.7	10.3	0.0	1.9	12.9
33961	1973	0.7	10.3	0.0	2.0	13.0
34691	1975	0.8	10.3	0.0	2.0	13.1
35422	1977	0.7	10.3	0.0	2.1	13.1
36152	1979	0.8	10.3	0.0	2.1	13.2
36883	1981	0.8	10.3	0.0	2.1	13.2
37613	1983	0.8	10.3	0.0	2.2	13.3
38344	1985	0.8	10.3	0.0	2.2	13.3
39074	1987	0.8	10.3	0.0	2.3	13.4
365	1988	0.8	10.3	0.0	2.3	13.4
731	1989	0.8	10.3	0.0	2.3	13.5
1461	1991	0.9	10.3	0.0	2.3	13.5
2192	1993	0.9	10.4	0.0	2.4	13.6
2922	1995	0.9	10.4	0.0	2.4	13.7
3653	1997	0.9	10.4	0.0	2.5	13.7
4383	1999	0.9	10.4	0.0	2.5	13.8
4749	2000	0.9	10.4	0.0	2.5	13.8
5479	2002	0.9	10.4	0.0	2.6	13.8
6209	2004	0.9	10.4	0.0	2.6	13.9
6939	2006	0.9	10.4	0.0	2.6	13.9
7670	2008	0.9	10.4	0.0	2.7	14.0
8401	2010	0.9	10.4	0.0	2.7	14.0
9131	2012	0.9	10.4	0.0	2.7	14.1
9862	2014	0.9	10.4	0.0	2.8	14.1
10592	2016	1.0	10.4	0.0	2.8	14.2
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	1.0	10.4	0.0	2.9	14.2
12053	2020	1.0	10.4	0.0	2.9	14.2
12784	2022	1.0	10.4	0.0	2.9	14.3
13514	2024	1.0	10.4	0.0	3.0	14.3
14245	2026	1.0	10.4	0.0	3.0	14.4
14975	2028	1.0	10.4	0.0	3.0	14.4
15706	2030	1.0	10.4	0.0	3.1	14.4
16436	2032	1.0	10.4	0.0	3.1	14.5
17167	2034	1.0	10.4	0.0	3.1	14.5
17897	2036	1.0	10.4	0.0	3.2	14.5
18628	2038	1.0	10.4	0.0	3.2	14.6
19358	2040	1.0	10.4	0.0	3.2	14.6
20089	2042	1.0	10.4	0.0	3.2	14.6
20819	2044	1.0	10.4	0.0	3.3	14.7
21550	2046	1.0	10.4	0.0	3.3	14.7
22280	2048	1.0	10.4	0.0	3.3	14.7
23011	2050	1.0	10.4	0.0	3.3	14.7
23741	2052	1.0	10.4	0.0	3.4	14.8
24472	2054	1.0	10.4	0.0	3.4	14.8
25202	2056	1.0	10.4	0.0	3.4	14.8
25933	2058	1.0	10.4	0.0	3.4	14.8
26663	2060	1.0	10.4	0.0	3.4	14.9
27394	2062	1.0	10.4	0.0	3.5	14.9
28124	2064	1.0	10.4	0.0	3.5	14.9
28855	2066	1.0	10.4	0.0	3.5	14.9
29585	2068	1.0	10.4	0.0	3.5	14.9
30316	2070	1.0	10.4	0.0	3.5	15.0
31046	2072	1.0	10.4	0.0	3.5	15.0
31777	2074	1.0	10.4	0.0	3.6	15.0
32507	2076	1.0	10.4	0.0	3.6	15.0
33238	2078	1.0	10.4	0.0	3.6	15.0
33968	2080	1.0	10.4	0.0	3.6	15.0
34699	2082	1.0	10.4	0.0	3.6	15.0
35429	2084	1.0	10.4	0.0	3.6	15.1
36160	2086	1.0	10.4	0.0	3.6	15.1
36890	2088	1.0	10.4	0.0	3.7	15.1
37621	2090	1.0	10.4	0.0	3.7	15.1
38351	2092	1.0	10.4	0.0	3.7	15.1
39082	2094	1.0	10.4	0.0	3.7	15.1
39812	2096	1.0	10.4	0.0	3.7	15.1
40543	2098	1.0	10.4	0.0	3.7	15.1
41273	2100	1.0	10.4	0.0	3.7	15.2
42004	2102	1.0	10.4	0.0	3.7	15.2
42734	2104	1.0	10.4	0.0	3.7	15.2
43465	2106	1.0	10.4	0.0	3.7	15.2
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Appendix B-1-(S3C-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-3C (Berri Area)



Appendix B-1-(S3C-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-3C (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	22	343	0	3	367
1460	1884	21	349	0	0	370
10950	1910	22	350	0	35	407
12776	1915	23	350	0	39	412
14603	1920	24	350	0	42	416
15333	1922	25	350	0	43	417
16429	1925	25	350	0	45	420
18255	1930	85	350	0	47	482
20081	1935	119	350	0	49	518
21908	1940	136	350	0	51	537
23734	1945	151	350	0	53	555
25560	1950	166	351	0	56	573
27386	1955	181	351	0	59	592
28117	1957	187	352	0	60	599
28847	1959	193	352	0	61	606
29578	1961	200	352	0	62	614
30308	1963	208	352	0	63	624
31039	1965	220	353	0	65	637
31769	1967	231	353	0	66	650
32500	1969	242	353	0	67	663
33230	1971	254	354	0	69	676
33961	1973	265	354	0	70	689
34691	1975	275	354	0	72	701
35422	1977	273	355	0	73	701
36152	1979	276	355	0	74	706
36883	1981	281	355	0	76	712
37613	1983	287	356	0	77	720
38344	1985	293	356	0	79	728
39074	1987	300	356	0	80	736
365	1988	303	356	0	81	740
731	1989	306	356	0	82	744
1461	1991	312	356	0	83	751
2192	1993	351	357	0	85	792
2922	1995	362	357	0	86	804
3653	1997	376	357	0	87	820
4383	1999	378	357	0	89	824
4749	2000	380	357	0	89	826
5479	2002	383	357	0	91	831
6209	2004	387	357	0	92	837
6939	2006	390	357	0	94	841
7670	2008	393	358	0	95	846
8401	2010	396	358	0	96	850
9131	2012	399	358	0	98	854
9862	2014	401	358	0	99	858
10592	2016	404	358	0	100	862

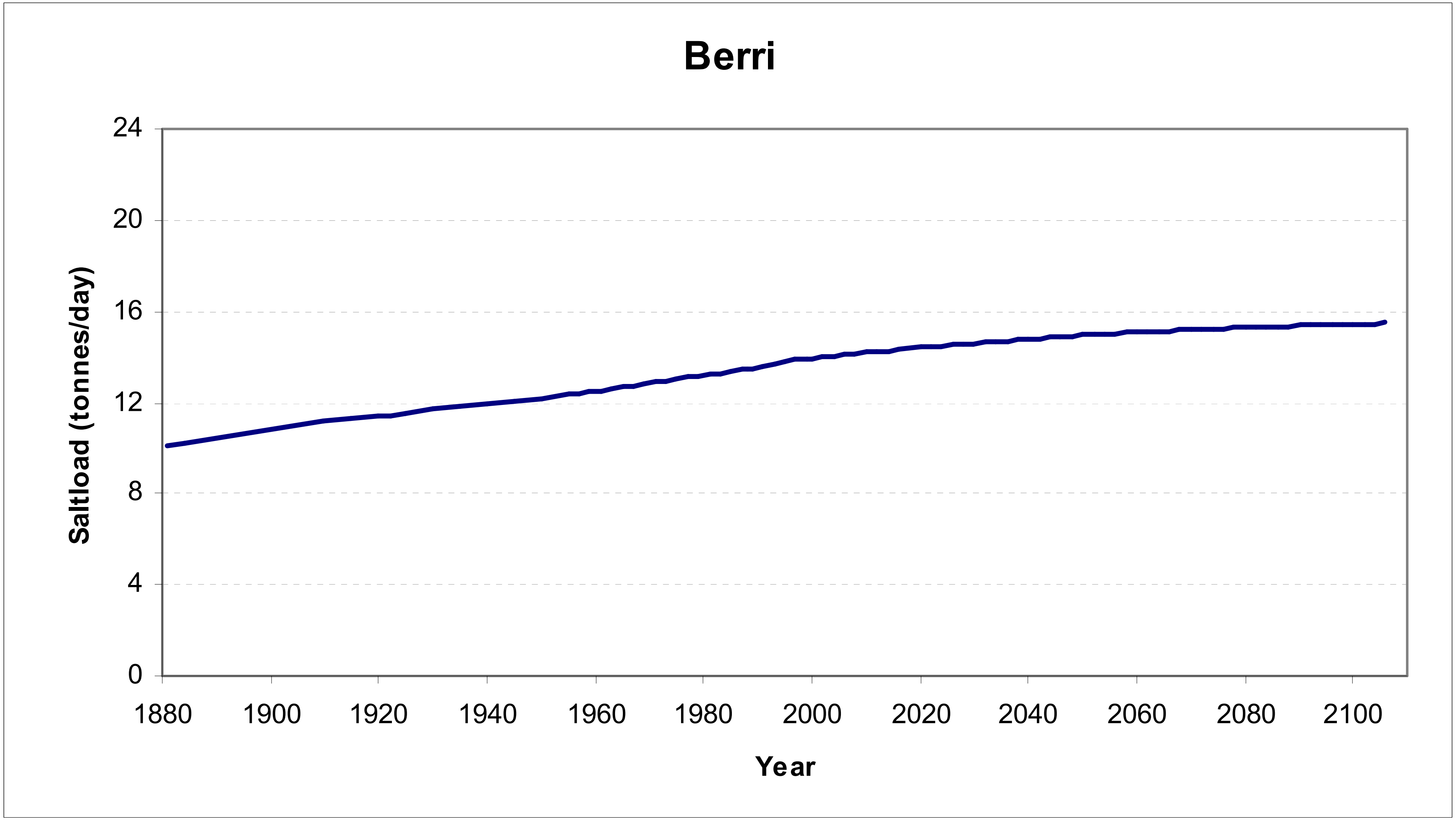
Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	406	358	0	102	866
12053	2020	408	358	0	103	869
12784	2022	410	358	0	104	873
13514	2024	412	358	0	106	876
14245	2026	414	358	0	107	879
14975	2028	416	358	0	108	882
15706	2030	418	358	0	109	885
16436	2032	419	358	0	110	888
17167	2034	421	358	0	111	890
17897	2036	422	358	0	112	893
18628	2038	424	358	0	113	895
19358	2040	425	358	0	114	898
20089	2042	426	358	0	116	900
20819	2044	428	358	0	117	902
21550	2046	429	358	0	117	905
22280	2048	430	358	0	118	907
23011	2050	431	358	0	119	909
23741	2052	432	358	0	120	911
24472	2054	433	358	0	121	912
25202	2056	434	358	0	122	914
25933	2058	435	358	0	123	916
26663	2060	436	358	0	124	918
27394	2062	437	358	0	124	919
28124	2064	437	358	0	125	921
28855	2066	438	359	0	126	922
29585	2068	439	359	0	127	924
30316	2070	440	359	0	127	925
31046	2072	440	359	0	128	927
31777	2074	441	359	0	129	928
32507	2076	441	359	0	129	929
33238	2078	442	359	0	130	930
33968	2080	443	359	0	130	932
34699	2082	443	359	0	131	933
35429	2084	444	359	0	131	934
36160	2086	444	359	0	132	935
36890	2088	445	359	0	132	936
37621	2090	445	359	0	133	937
38351	2092	446	359	0	133	938
39082	2094	446	359	0	134	939
39812	2096	447	359	0	134	940
40543	2098	447	359	0	135	941
41273	2100	448	359	0	135	942
42004	2102	448	359	0	136	943
42734	2104	449	359	0	136	943
43465	2106	449	359	0	136	944

Appendix B-1-(S4-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-4 (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	0.1	10.0	0.0	0.1	10.1
1460	1884	0.1	10.1	0.0	0.0	10.2
10950	1910	0.1	10.1	0.0	1.0	11.2
12776	1915	0.1	10.1	0.0	1.1	11.3
14603	1920	0.1	10.2	0.0	1.2	11.4
15333	1922	0.1	10.2	0.0	1.2	11.4
16429	1925	0.1	10.2	0.0	1.3	11.5
18255	1930	0.2	10.2	0.0	1.3	11.7
20081	1935	0.3	10.2	0.0	1.4	11.9
21908	1940	0.4	10.2	0.0	1.4	12.0
23734	1945	0.4	10.2	0.0	1.5	12.1
25560	1950	0.5	10.2	0.0	1.6	12.2
27386	1955	0.5	10.2	0.0	1.6	12.3
28117	1957	0.5	10.2	0.0	1.7	12.4
28847	1959	0.5	10.2	0.0	1.7	12.5
29578	1961	0.5	10.2	0.0	1.7	12.5
30308	1963	0.6	10.2	0.0	1.8	12.6
31039	1965	0.6	10.2	0.0	1.8	12.7
31769	1967	0.6	10.2	0.0	1.9	12.7
32500	1969	0.7	10.3	0.0	1.9	12.8
33230	1971	0.7	10.3	0.0	1.9	12.9
33961	1973	0.7	10.3	0.0	2.0	13.0
34691	1975	0.8	10.3	0.0	2.0	13.1
35422	1977	0.7	10.3	0.0	2.1	13.1
36152	1979	0.8	10.3	0.0	2.1	13.2
36883	1981	0.8	10.3	0.0	2.1	13.2
37613	1983	0.8	10.3	0.0	2.2	13.3
38344	1985	0.8	10.3	0.0	2.2	13.3
39074	1987	0.8	10.3	0.0	2.3	13.4
365	1988	0.8	10.3	0.0	2.3	13.4
731	1989	0.8	10.3	0.0	2.3	13.5
1461	1991	0.9	10.3	0.0	2.3	13.5
2192	1993	1.0	10.4	0.0	2.4	13.7
2922	1995	1.0	10.4	0.0	2.4	13.8
3653	1997	1.0	10.4	0.0	2.5	13.8
4383	1999	1.0	10.4	0.0	2.5	13.9
4749	2000	1.0	10.4	0.0	2.5	13.9
5479	2002	1.0	10.4	0.0	2.6	14.0
6209	2004	1.1	10.4	0.0	2.6	14.0
6939	2006	1.1	10.4	0.0	2.6	14.1
7670	2008	1.1	10.4	0.0	2.7	14.1
8401	2010	1.1	10.4	0.0	2.7	14.2
9131	2012	1.1	10.4	0.0	2.7	14.2
9862	2014	1.1	10.4	0.0	2.8	14.3
10592	2016	1.1	10.4	0.0	2.8	14.3
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	1.1	10.4	0.0	2.9	14.4
12053	2020	1.1	10.4	0.0	2.9	14.4
12784	2022	1.1	10.4	0.0	2.9	14.4
13514	2024	1.1	10.4	0.0	3.0	14.5
14245	2026	1.1	10.4	0.0	3.0	14.5
14975	2028	1.1	10.4	0.0	3.0	14.6
15706	2030	1.1	10.4	0.0	3.1	14.6
16436	2032	1.1	10.4	0.0	3.1	14.6
17167	2034	1.1	10.4	0.0	3.1	14.7
17897	2036	1.2	10.4	0.0	3.2	14.7
18628	2038	1.2	10.4	0.0	3.2	14.7
19358	2040	1.2	10.4	0.0	3.2	14.8
20089	2042	1.2	10.4	0.0	3.2	14.8
20819	2044	1.2	10.4	0.0	3.3	14.8
21550	2046	1.2	10.4	0.0	3.3	14.9
22280	2048	1.2	10.4	0.0	3.3	14.9
23011	2050	1.2	10.4	0.0	3.4	14.9
23741	2052	1.2	10.4	0.0	3.4	15.0
24472	2054	1.2	10.4	0.0	3.4	15.0
25202	2056	1.2	10.4	0.0	3.4	15.0
25933	2058	1.2	10.4	0.0	3.5	15.0
26663	2060	1.2	10.4	0.0	3.5	15.1
27394	2062	1.2	10.4	0.0	3.5	15.1
28124	2064	1.2	10.4	0.0	3.5	15.1
28855	2066	1.2	10.4	0.0	3.5	15.1
29585	2068	1.2	10.4	0.0	3.6	15.2
30316	2070	1.2	10.4	0.0	3.6	15.2
31046	2072	1.2	10.4	0.0	3.6	15.2
31777	2074	1.2	10.4	0.0	3.6	15.2
32507	2076	1.2	10.4	0.0	3.6	15.2
33238	2078	1.2	10.4	0.0	3.6	15.3
33968	2080	1.2	10.4	0.0	3.7	15.3
34699	2082	1.2	10.4	0.0	3.7	15.3
35429	2084	1.2	10.4	0.0	3.7	15.3
36160	2086	1.2	10.4	0.0	3.7	15.3
36890	2088	1.2	10.4	0.0	3.7	15.4
37621	2090	1.2	10.4	0.0	3.7	15.4
38351	2092	1.2	10.4	0.0	3.8	15.4
39082	2094	1.2	10.4	0.0	3.8	15.4
39812	2096	1.2	10.4	0.0	3.8	15.4
40543	2098	1.2	10.4	0.0	3.8	15.4
41273	2100	1.2	10.4	0.0	3.8	15.4
42004	2102	1.2	10.4	0.0	3.8	15.5
42734	2104	1.2	10.4	0.0	3.8	15.5
43465	2106	1.2	10.4	0.0	3.8	15.5
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Appendix B-1-(S4-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-4 (Berri Area)



Appendix B-1-(S4-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-4 (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	22	343	0	3	367
1460	1884	21	349	0	0	370
10950	1910	22	350	0	35	407
12776	1915	23	350	0	39	412
14603	1920	24	350	0	42	416
15333	1922	25	350	0	43	417
16429	1925	25	350	0	45	420
18255	1930	85	350	0	47	482
20081	1935	119	350	0	49	518
21908	1940	136	350	0	51	537
23734	1945	151	350	0	53	555
25560	1950	166	351	0	56	573
27386	1955	181	351	0	59	592
28117	1957	187	352	0	60	599
28847	1959	193	352	0	61	606
29578	1961	200	352	0	62	614
30308	1963	208	352	0	63	624
31039	1965	220	353	0	65	637
31769	1967	231	353	0	66	650
32500	1969	242	353	0	67	663
33230	1971	254	354	0	69	676
33961	1973	265	354	0	70	689
34691	1975	275	354	0	72	701
35422	1977	273	355	0	73	701
36152	1979	276	355	0	74	706
36883	1981	281	355	0	76	712
37613	1983	287	356	0	77	720
38344	1985	293	356	0	79	728
39074	1987	300	356	0	80	736
365	1988	303	356	0	81	740
731	1989	306	356	0	82	744
1461	1991	312	356	0	83	751
2192	1993	351	357	0	85	792
2922	1995	362	357	0	86	804
3653	1997	376	357	0	87	820
4383	1999	378	357	0	89	824
4749	2000	380	357	0	89	826
5479	2002	383	357	0	91	831
6209	2004	387	357	0	92	837
6939	2006	390	357	0	94	841
7670	2008	393	358	0	95	846
8401	2010	396	358	0	96	850
9131	2012	399	358	0	98	854
9862	2014	401	358	0	99	858
10592	2016	404	358	0	100	862

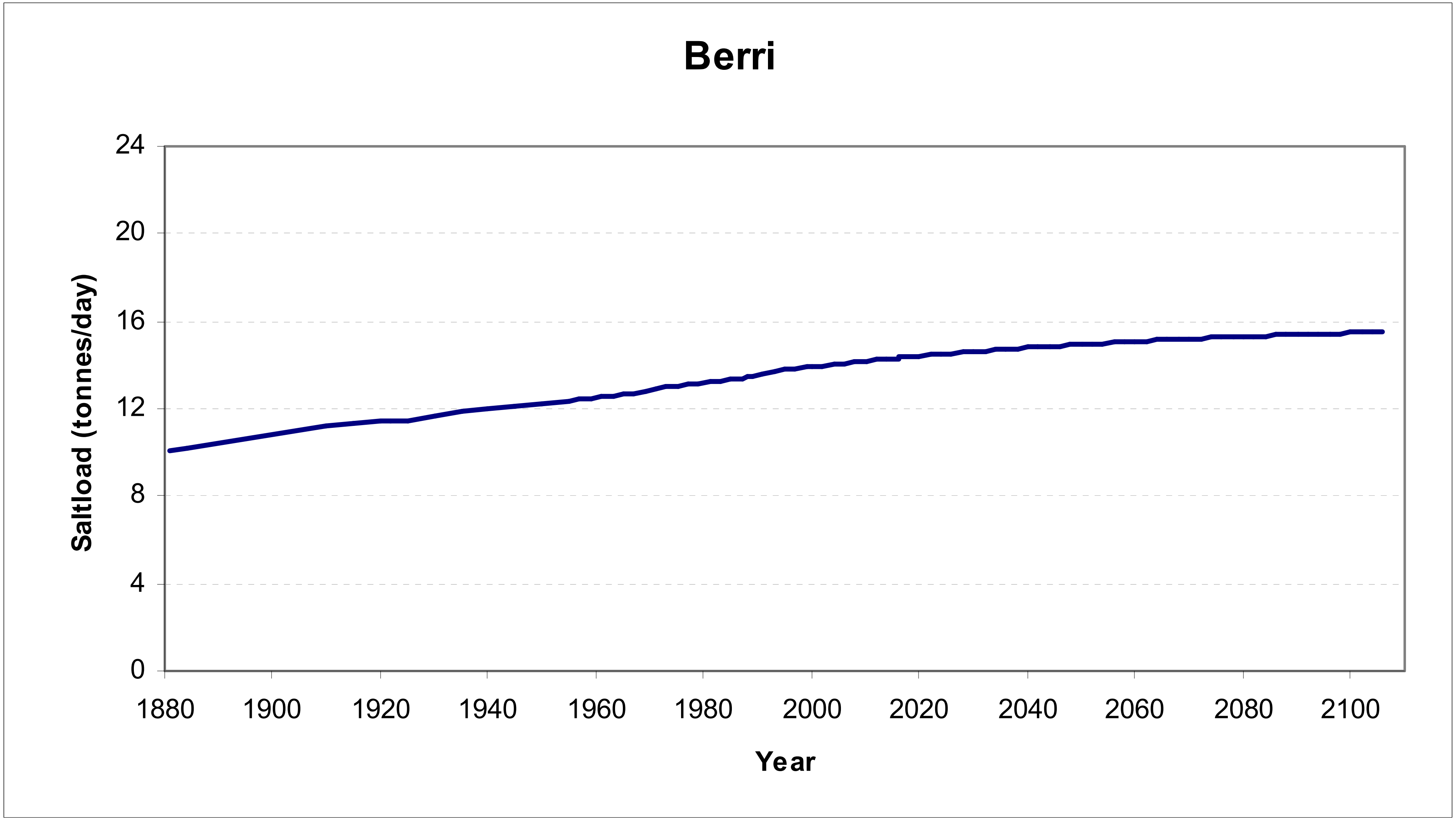
Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	406	358	0	102	866
12053	2020	408	358	0	103	869
12784	2022	410	358	0	104	873
13514	2024	412	358	0	106	876
14245	2026	414	358	0	107	879
14975	2028	416	358	0	108	882
15706	2030	418	358	0	109	885
16436	2032	419	358	0	110	888
17167	2034	421	358	0	111	890
17897	2036	423	358	0	112	893
18628	2038	424	358	0	113	896
19358	2040	425	358	0	114	898
20089	2042	427	358	0	116	901
20819	2044	428	358	0	116	903
21550	2046	429	358	0	117	905
22280	2048	431	358	0	118	907
23011	2050	432	358	0	119	909
23741	2052	433	358	0	120	911
24472	2054	434	358	0	121	913
25202	2056	435	358	0	122	915
25933	2058	436	358	0	123	917
26663	2060	437	358	0	124	919
27394	2062	438	358	0	124	921
28124	2064	439	358	0	125	923
28855	2066	440	359	0	126	924
29585	2068	441	359	0	127	926
30316	2070	442	359	0	127	928
31046	2072	443	359	0	128	930
31777	2074	444	359	0	129	931
32507	2076	445	359	0	129	933
33238	2078	446	359	0	130	934
33968	2080	447	359	0	130	936
34699	2082	448	359	0	131	938
35429	2084	449	359	0	131	939
36160	2086	450	359	0	132	941
36890	2088	451	359	0	133	942
37621	2090	452	359	0	133	944
38351	2092	453	359	0	133	945
39082	2094	454	359	0	134	947
39812	2096	455	359	0	134	948
40543	2098	456	359	0	135	950
41273	2100	457	359	0	135	951
42004	2102	458	359	0	136	953
42734	2104	459	359	0	136	954
43465	2106	460	359	0	136	956

Appendix B-1-(S5-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-5 (Berri Area)

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
365	1881	0.1	10.0	0.0	0.1	**10.1**
1460	1884	0.1	10.1	0.0	0.0	**10.2**
10950	1910	0.1	10.1	0.0	1.0	**11.2**
12776	1915	0.1	10.1	0.0	1.1	**11.3**
14603	1920	0.1	10.2	0.0	1.2	**11.4**
15333	1922	0.1	10.2	0.0	1.2	**11.4**
16429	1925	0.1	10.2	0.0	1.3	**11.5**
18255	1930	0.2	10.2	0.0	1.3	**11.7**
20081	1935	0.3	10.2	0.0	1.4	**11.9**
21908	1940	0.4	10.2	0.0	1.4	**12.0**
23734	1945	0.4	10.2	0.0	1.5	**12.1**
25560	1950	0.5	10.2	0.0	1.6	**12.2**
27386	1955	0.5	10.2	0.0	1.6	**12.3**
28117	1957	0.5	10.2	0.0	1.7	**12.4**
28847	1959	0.5	10.2	0.0	1.7	**12.5**
29578	1961	0.5	10.2	0.0	1.7	**12.5**
30308	1963	0.6	10.2	0.0	1.8	**12.6**
31039	1965	0.6	10.2	0.0	1.8	**12.7**
31769	1967	0.6	10.2	0.0	1.9	**12.7**
32500	1969	0.7	10.3	0.0	1.9	**12.8**
33230	1971	0.7	10.3	0.0	1.9	**12.9**
33961	1973	0.7	10.3	0.0	2.0	**13.0**
34691	1975	0.8	10.3	0.0	2.0	**13.1**
35422	1977	0.7	10.3	0.0	2.1	**13.1**
36152	1979	0.8	10.3	0.0	2.1	**13.2**
36883	1981	0.8	10.3	0.0	2.1	**13.2**
37613	1983	0.8	10.3	0.0	2.2	**13.3**
38344	1985	0.8	10.3	0.0	2.2	**13.3**
39074	1987	0.8	10.3	0.0	2.3	**13.4**
365	1988	0.8	10.3	0.0	2.3	**13.4**
731	1989	0.8	10.3	0.0	2.3	**13.5**
1461	1991	0.9	10.3	0.0	2.3	**13.5**
2192	1993	1.0	10.4	0.0	2.4	**13.7**
2922	1995	1.0	10.4	0.0	2.4	**13.8**
3653	1997	1.0	10.4	0.0	2.5	**13.8**
4383	1999	1.0	10.4	0.0	2.5	**13.9**
4749	2000	1.0	10.4	0.0	2.5	**13.9**
5479	2002	1.0	10.4	0.0	2.6	**14.0**
6209	2004	1.1	10.4	0.0	2.6	**14.0**
6939	2006	1.1	10.4	0.0	2.6	**14.1**
7670	2008	1.1	10.4	0.0	2.7	**14.1**
8401	2010	1.1	10.4	0.0	2.7	**14.2**
9131	2012	1.1	10.4	0.0	2.7	**14.2**
9862	2014	1.1	10.4	0.0	2.8	**14.3**
10592	2016	1.1	10.4	0.0	2.8	**14.3**
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Day	Year	Z2 to Z11	Z2 to Z12	Z2 to Z13	Z2 to Z14	Total
11323	2018	1.1	10.4	0.0	2.9	**14.4**
12053	2020	1.1	10.4	0.0	2.9	**14.4**
12784	2022	1.1	10.4	0.0	2.9	**14.4**
13514	2024	1.1	10.4	0.0	3.0	**14.5**
14245	2026	1.1	10.4	0.0	3.0	**14.5**
14975	2028	1.1	10.4	0.0	3.0	**14.6**
15706	2030	1.1	10.4	0.0	3.1	**14.6**
16436	2032	1.1	10.4	0.0	3.1	**14.6**
17167	2034	1.1	10.4	0.0	3.1	**14.7**
17897	2036	1.2	10.4	0.0	3.2	**14.7**
18628	2038	1.2	10.4	0.0	3.2	**14.7**
19358	2040	1.2	10.4	0.0	3.2	**14.8**
20089	2042	1.2	10.4	0.0	3.2	**14.8**
20819	2044	1.2	10.4	0.0	3.3	**14.8**
21550	2046	1.2	10.4	0.0	3.3	**14.9**
22280	2048	1.2	10.4	0.0	3.3	**14.9**
23011	2050	1.2	10.4	0.0	3.4	**14.9**
23741	2052	1.2	10.4	0.0	3.4	**15.0**
24472	2054	1.2	10.4	0.0	3.4	**15.0**
25202	2056	1.2	10.4	0.0	3.4	**15.0**
25933	2058	1.2	10.4	0.0	3.5	**15.0**
26663	2060	1.2	10.4	0.0	3.5	**15.1**
27394	2062	1.2	10.4	0.0	3.5	**15.1**
28124	2064	1.2	10.4	0.0	3.5	**15.1**
28855	2066	1.2	10.4	0.0	3.5	**15.1**
29585	2068	1.2	10.4	0.0	3.6	**15.2**
30316	2070	1.2	10.4	0.0	3.6	**15.2**
31046	2072	1.2	10.4	0.0	3.6	**15.2**
31777	2074	1.2	10.4	0.0	3.6	**15.2**
32507	2076	1.2	10.4	0.0	3.6	**15.3**
33238	2078	1.2	10.4	0.0	3.6	**15.3**
33968	2080	1.2	10.4	0.0	3.7	**15.3**
34699	2082	1.2	10.4	0.0	3.7	**15.3**
35429	2084	1.2	10.4	0.0	3.7	**15.3**
36160	2086	1.2	10.4	0.0	3.7	**15.4**
36890	2088	1.2	10.4	0.0	3.7	**15.4**
37621	2090	1.2	10.4	0.0	3.7	**15.4**
38351	2092	1.2	10.4	0.0	3.8	**15.4**
39082	2094	1.2	10.4	0.0	3.8	**15.4**
39812	2096	1.2	10.4	0.0	3.8	**15.4**
40543	2098	1.2	10.4	0.0	3.8	**15.5**
41273	2100	1.2	10.4	0.0	3.8	**15.5**
42004	2102	1.3	10.4	0.0	3.8	**15.5**
42734	2104	1.3	10.4	0.0	3.8	**15.5**
43465	2106	1.3	10.4	0.0	3.8	**15.5**
Salinity (mg/L)		*2,729*	*29,037*	*25,000*	*28,117*	

Appendix B-1-(S5-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-5 (Berri Area)



Appendix B-1-(S5-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-5 (Berri Area)

Appendix B-2
Model Output - Renmark Area

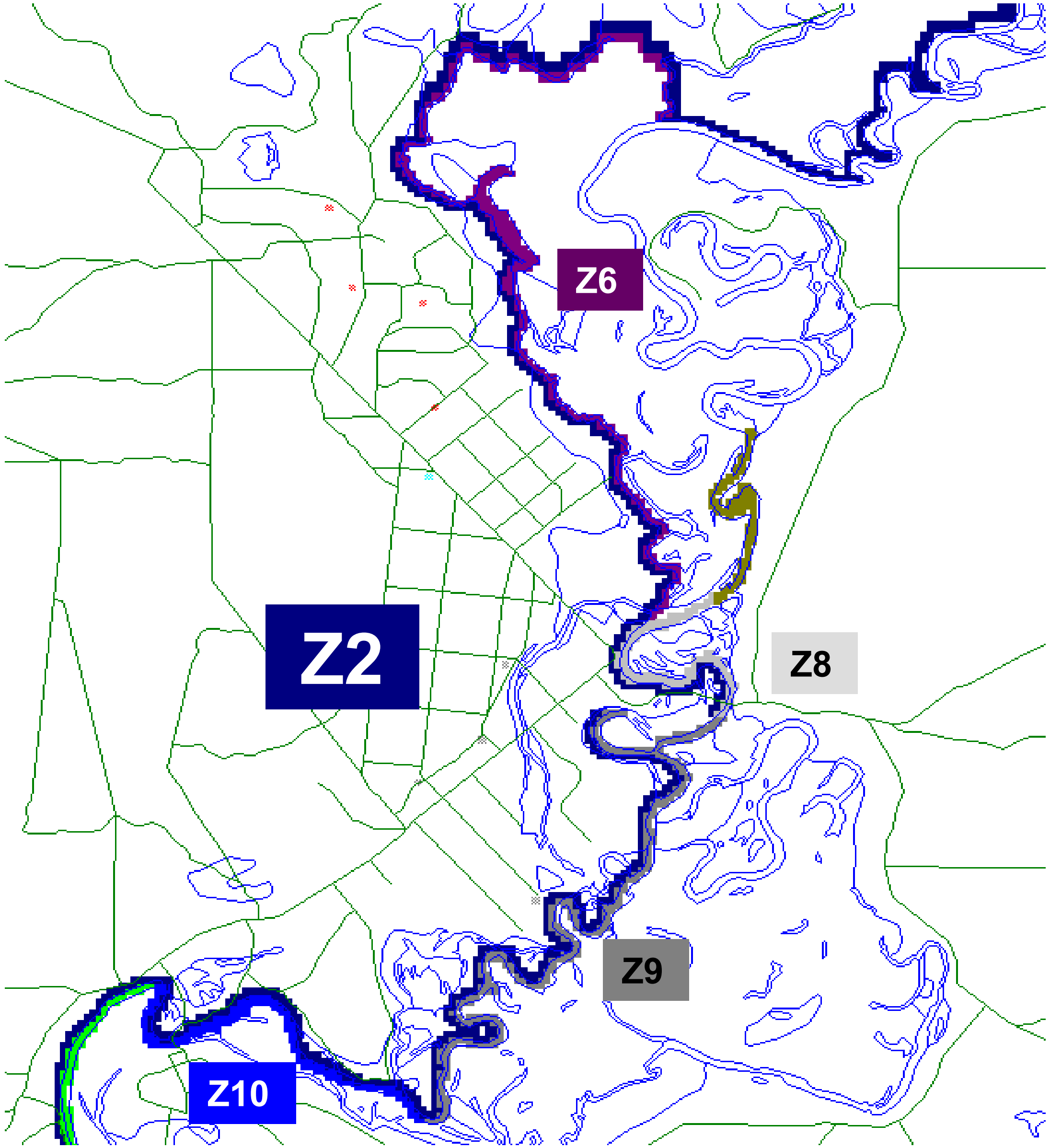
-Flow budget zones
-Modelled groundwater flux (m^3/day)
-Modelled Salt load (tonnes/day)

(All Scenarios)

Scenario	Name	Model Run	Irrigation development area	IIP[1]	RH[2]	SIS[3]
S–1	Natural system	Steady State	None	–	–	–
S–2	Mallee clearance	1920 – 2105	None (but includes Mallee clearance area)	–	–	–
S–3A	Pre-1988, no IIP, no RH	1988 – 2105	Pre-1988	No	No	–
S–3B	Pre-1988, with IIP, no RH	1988 – 2105	Pre-1988	Yes	No	–
S–3C	Pre-1988, with IIP and with RH	1988 – 2105	Pre-1988	Yes	Yes	–
S–4	Current irrigation	2005 – 2105	Pre-1988 + Post-1988	Yes	Yes	No
S–5	Current plus future irrigation	2005 – 2105	Pre-1988 + Post-1988 + Future development	Yes	Yes	No

1 Improved Irrigation Practices 2 Rehabilitation 3 Salt Interception Scheme

Appendix B-2: Model Scenario conditions



Appendix B-2: Model flow budget zones in the Renmark Area (layer 1)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1921	344	0	525	88	**956**
3650	1930	344	0	529	89	**961**
7300	1940	325	0	532	89	**946**
10950	1950	323	0	537	91	**951**
14600	1960	325	0	542	95	**961**
18250	1970	330	0	547	99	**976**
21900	1980	335	0	552	104	**991**
24820	1988	339	0	556	108	**1003**
25186	1989	339	0	556	109	**1005**
25550	1990	340	0	557	109	**1006**
25916	1991	340	0	557	110	**1007**
26647	1993	341	0	558	111	**1010**
27377	1995	342	0	559	112	**1013**
28108	1997	342	0	560	113	**1015**
28838	1999	343	0	561	114	**1018**
29200	2000	343	0	561	114	**1019**
29431	2001	343	0	561	115	**1019**
29934	2002	344	0	562	115	**1021**
30664	2004	344	0	563	117	**1024**
31394	2006	345	0	563	118	**1026**
32125	2008	345	0	564	118	**1028**
32850	2010	346	0	565	119	**1030**
33586	2012	346	0	566	120	**1032**
34317	2014	347	0	566	121	**1035**
35047	2016	347	0	567	122	**1037**
35778	2018	348	0	568	123	**1039**
36500	2020	348	0	568	124	**1041**
37239	2022	349	0	569	125	**1043**
37969	2024	349	0	570	126	**1045**
38700	2026	349	0	570	127	**1047**
39430	2028	350	0	571	128	**1049**
40150	2030	350	0	572	129	**1051**
40891	2032	351	0	572	130	**1053**
41622	2034	351	0	573	131	**1056**
42352	2036	352	0	574	133	**1058**

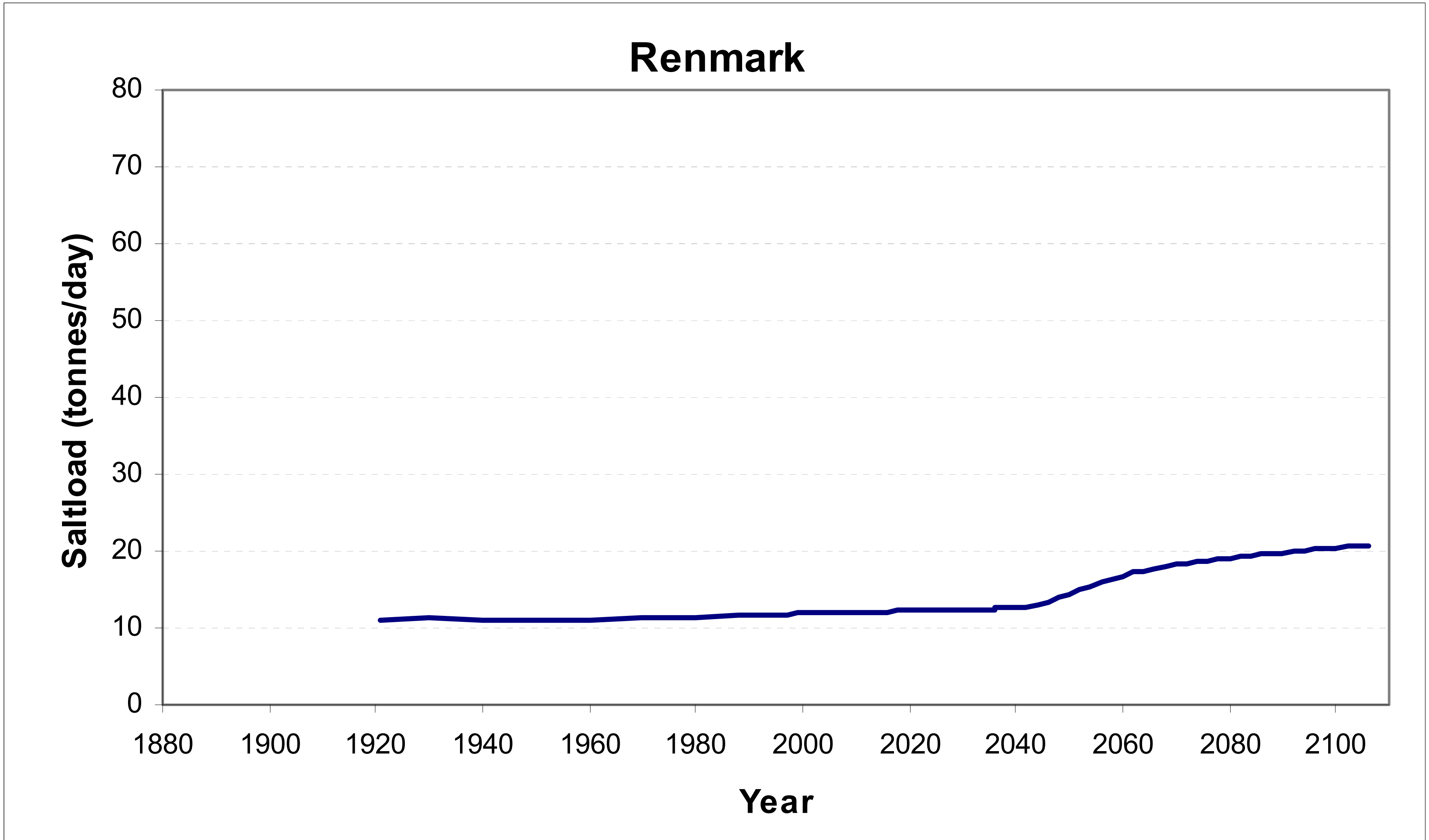
Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
43083	2038	352	0	574	134	**1060**
43465	2039	353	0	575	134	**1061**
43800	2040	353	0	575	135	**1063**
44544	2042	364	0	576	136	**1076**
45274	2044	378	0	577	137	**1091**
46005	2046	395	0	577	138	**1110**
46735	2048	418	0	578	139	**1136**
47450	2050	444	0	579	141	**1163**
48196	2052	472	0	579	142	**1193**
48927	2054	502	0	580	143	**1226**
49657	2056	530	0	581	145	**1255**
50388	2058	552	0	582	146	**1280**
51100	2060	571	0	582	147	**1300**
51849	2062	588	0	583	149	**1320**
52579	2064	602	0	584	150	**1337**
53310	2066	615	0	585	152	**1351**
54040	2068	625	0	586	154	**1364**
54750	2070	634	0	586	155	**1376**
55501	2072	644	0	587	157	**1388**
56232	2074	653	0	588	158	**1399**
56962	2076	660	0	589	160	**1409**
57693	2078	667	0	590	162	**1419**
58400	2080	673	0	591	163	**1427**
59154	2082	681	0	592	165	**1437**
59884	2084	687	0	592	167	**1446**
60615	2086	693	0	593	168	**1454**
61345	2088	698	0	594	170	**1462**
62050	2090	703	0	595	172	**1469**
62806	2092	709	0	596	173	**1478**
63537	2094	714	0	597	175	**1486**
64267	2096	719	0	598	177	**1493**
64998	2098	723	0	598	178	**1500**
65700	2100	727	0	599	180	**1507**
66459	2102	733	0	600	182	**1514**
67189	2104	737	0	601	183	**1521**
67920	2106	741	0	602	185	**1528**

Appendix B-2-(S2-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-2 (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1921	6.3	0.0	3.1	1.2	***10.6***
3650	1930	6.3	0.0	3.1	1.2	***10.7***
7300	1940	6.0	0.0	3.2	1.2	***10.3***
10950	1950	5.9	0.0	3.2	1.2	***10.4***
14600	1960	6.0	0.0	3.2	1.3	***10.5***
18250	1970	6.1	0.0	3.2	1.3	***10.6***
21900	1980	6.2	0.0	3.3	1.4	***10.8***
24820	1988	6.2	0.0	3.3	1.5	***11.0***
25186	1989	6.2	0.0	3.3	1.5	***11.0***
25550	1990	6.2	0.0	3.3	1.5	***11.0***
25916	1991	6.2	0.0	3.3	1.5	***11.0***
26647	1993	6.3	0.0	3.3	1.5	***11.1***
27377	1995	6.3	0.0	3.3	1.5	***11.1***
28108	1997	6.3	0.0	3.3	1.5	***11.1***
28838	1999	6.3	0.0	3.3	1.6	***11.2***
29200	2000	6.3	0.0	3.3	1.6	***11.2***
29431	2001	6.3	0.0	3.3	1.6	***11.2***
29934	2002	6.3	0.0	3.3	1.6	***11.2***
30664	2004	6.3	0.0	3.3	1.6	***11.3***
31394	2006	6.3	0.0	3.3	1.6	***11.3***
32125	2008	6.3	0.0	3.3	1.6	***11.3***
32850	2010	6.4	0.0	3.4	1.6	***11.3***
33586	2012	6.4	0.0	3.4	1.6	***11.4***
34317	2014	6.4	0.0	3.4	1.7	***11.4***
35047	2016	6.4	0.0	3.4	1.7	***11.4***
35778	2018	6.4	0.0	3.4	1.7	***11.4***
36500	2020	6.4	0.0	3.4	1.7	***11.5***
37239	2022	6.4	0.0	3.4	1.7	***11.5***
37969	2024	6.4	0.0	3.4	1.7	***11.5***
38700	2026	6.4	0.0	3.4	1.7	***11.5***
39430	2028	6.4	0.0	3.4	1.7	***11.6***
40150	2030	6.4	0.0	3.4	1.8	***11.6***
40891	2032	6.4	0.0	3.4	1.8	***11.6***
41622	2034	6.4	0.0	3.4	1.8	***11.6***
42352	2036	6.5	0.0	3.4	1.8	***11.7***
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
43083	2038	6.5	0.0	3.4	1.8	***11.7***
43465	2039	6.5	0.0	3.4	1.8	***11.7***
43800	2040	6.5	0.0	3.4	1.8	***11.7***
44544	2042	6.7	0.0	3.4	1.9	***12.0***
45274	2044	6.9	0.0	3.4	1.9	***12.2***
46005	2046	7.3	0.0	3.4	1.9	***12.6***
46735	2048	7.7	0.0	3.4	1.9	***13.0***
47450	2050	8.2	0.0	3.4	1.9	***13.5***
48196	2052	8.7	0.0	3.4	1.9	***14.0***
48927	2054	9.2	0.0	3.4	2.0	***14.6***
49657	2056	9.7	0.0	3.4	2.0	***15.1***
50388	2058	10.1	0.0	3.4	2.0	***15.6***
51100	2060	10.5	0.0	3.5	2.0	***15.9***
51849	2062	10.8	0.0	3.5	2.0	***16.3***
52579	2064	11.1	0.0	3.5	2.1	***16.6***
53310	2066	11.3	0.0	3.5	2.1	***16.8***
54040	2068	11.5	0.0	3.5	2.1	***17.0***
54750	2070	11.6	0.0	3.5	2.1	***17.2***
55501	2072	11.8	0.0	3.5	2.1	***17.5***
56232	2074	12.0	0.0	3.5	2.2	***17.6***
56962	2076	12.1	0.0	3.5	2.2	***17.8***
57693	2078	12.3	0.0	3.5	2.2	***18.0***
58400	2080	12.4	0.0	3.5	2.2	***18.1***
59154	2082	12.5	0.0	3.5	2.2	***18.3***
59884	2084	12.6	0.0	3.5	2.3	***18.4***
60615	2086	12.7	0.0	3.5	2.3	***18.5***
61345	2088	12.8	0.0	3.5	2.3	***18.7***
62050	2090	12.9	0.0	3.5	2.3	***18.8***
62806	2092	13.0	0.0	3.5	2.4	***18.9***
63537	2094	13.1	0.0	3.5	2.4	***19.0***
64267	2096	13.2	0.0	3.5	2.4	***19.2***
64998	2098	13.3	0.0	3.5	2.4	***19.3***
65700	2100	13.4	0.0	3.6	2.5	***19.4***
66459	2102	13.5	0.0	3.6	2.5	***19.5***
67189	2104	13.5	0.0	3.6	2.5	***19.6***
67920	2106	13.6	0.0	3.6	2.5	***19.7***
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Appendix B-2-(S2-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-2 (Renmark Area)



Appendix B-2-(S2-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-2 (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	727	0	525	31	1283
1460	1884	1234	0	676	24	1934
10950	1910	2216	0	1216	100	3532
12776	1915	2244	0	1236	108	3588
14603	1920	2272	0	1249	113	3634
15333	1922	2654	0	1252	115	4021
16429	1925	2960	0	1256	117	4333
18255	1930	3123	0	1262	120	4505
20081	1935	3183	0	1267	122	4572
21908	1940	3212	0	1271	125	4608
23734	1945	2560	0	1161	121	3842
25560	1950	2584	0	1116	112	3812
27386	1955	2657	0	1100	105	3863
28117	1957	2678	0	1096	104	3878
28847	1959	2693	0	1094	103	3889
29578	1961	2857	0	1092	102	4050
30308	1963	2904	0	1091	101	4095
31039	1965	2927	0	1090	101	4117
31769	1967	2942	0	1089	101	4131
32500	1969	2951	0	1088	101	4140
33230	1971	2959	0	1088	101	4147
33961	1973	2964	0	1088	101	4152
34691	1975	2969	0	1088	101	4157
35422	1977	2972	0	1088	101	4161
36152	1979	2998	0	1092	102	4191
36883	1981	3021	0	1101	102	4223
37613	1983	2951	0	1094	103	4148
38344	1985	2909	0	1088	103	4100
39074	1987	2999	0	1767	104	4869
365	1988	3008	0	1919	105	5032
731	1989	2993	0	1931	106	5031
1461	1991	2986	0	1943	109	5038
2192	1993	2986	0	1949	111	5046
2922	1995	2987	0	1953	112	5052
3653	1997	2988	0	1955	113	5056
4383	1999	2989	0	1956	114	5060
4749	2000	2990	0	1957	114	5061
5479	2002	2991	0	1958	115	5063
6209	2004	2991	0	1959	116	5065
6939	2006	2992	0	1959	116	5067
7670	2008	2993	0	1960	116	5068
8401	2010	2993	0	1960	117	5070
9131	2012	2994	0	1960	117	5071
9862	2014	2994	0	1961	117	5072
10592	2016	2995	0	1961	117	5073

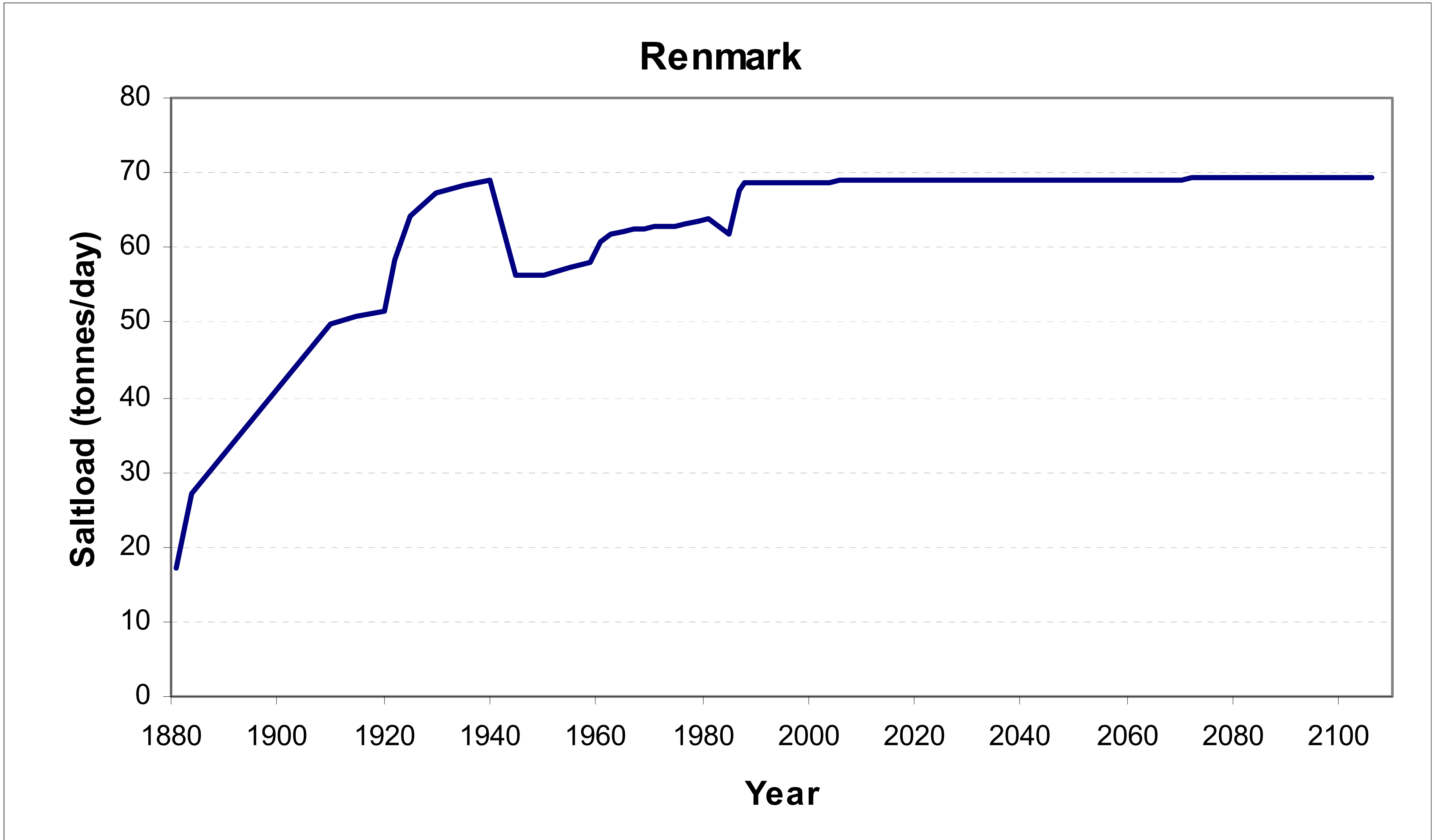
Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	2995	0	1961	118	5074
12053	2020	2996	0	1962	118	5075
12784	2022	2996	0	1962	118	5076
13514	2024	2996	0	1962	118	5077
14245	2026	2997	0	1962	119	5077
14975	2028	2997	0	1963	119	5078
15706	2030	2997	0	1963	119	5079
16436	2032	2998	0	1963	119	5080
17167	2034	2998	0	1963	119	5080
17897	2036	2998	0	1963	120	5081
18628	2038	2998	0	1964	120	5082
19358	2040	2999	0	1964	120	5082
20089	2042	2999	0	1964	120	5083
20819	2044	2999	0	1964	120	5083
21550	2046	2999	0	1964	120	5084
22280	2048	3000	0	1965	121	5085
23011	2050	3000	0	1965	121	5085
23741	2052	3000	0	1965	121	5086
24472	2054	3000	0	1965	121	5086
25202	2056	3000	0	1965	121	5087
25933	2058	3001	0	1965	121	5087
26663	2060	3001	0	1966	121	5088
27394	2062	3001	0	1966	122	5088
28124	2064	3001	0	1966	122	5089
28855	2066	3001	0	1966	122	5089
29585	2068	3002	0	1966	122	5090
30316	2070	3002	0	1966	122	5090
31046	2072	3002	0	1967	122	5090
31777	2074	3002	0	1967	122	5091
32507	2076	3002	0	1967	122	5091
33238	2078	3002	0	1967	122	5092
33968	2080	3003	0	1967	123	5092
34699	2082	3003	0	1967	123	5092
35429	2084	3003	0	1967	123	5093
36160	2086	3003	0	1967	123	5093
36890	2088	3003	0	1968	123	5094
37621	2090	3003	0	1968	123	5094
38351	2092	3003	0	1968	123	5094
39082	2094	3004	0	1968	123	5095
39812	2096	3004	0	1968	123	5095
40543	2098	3004	0	1968	123	5095
41273	2100	3004	0	1968	124	5096
42004	2102	3004	0	1968	124	5096
42734	2104	3004	0	1968	124	5096
43465	2106	3004	0	1969	124	5096

Appendix B-2-(S3A-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-3A (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	13.3	0.0	3.1	0.4	*16.9*
1460	1884	22.7	0.0	4.0	0.3	*27.0*
10950	1910	40.7	0.0	7.2	1.4	*49.3*
12776	1915	41.2	0.0	7.3	1.5	*50.0*
14603	1920	41.7	0.0	7.4	1.5	*50.7*
15333	1922	48.7	0.0	7.4	1.6	*57.7*
16429	1925	54.4	0.0	7.5	1.6	*63.4*
18255	1930	57.3	0.0	7.5	1.6	*66.5*
20081	1935	58.4	0.0	7.5	1.7	*67.6*
21908	1940	59.0	0.0	7.5	1.7	*68.2*
23734	1945	47.0	0.0	6.9	1.7	*55.6*
25560	1950	47.5	0.0	6.6	1.5	*55.6*
27386	1955	48.8	0.0	6.5	1.4	*56.8*
28117	1957	49.2	0.0	6.5	1.4	*57.1*
28847	1959	49.5	0.0	6.5	1.4	*57.3*
29578	1961	52.5	0.0	6.5	1.4	*60.3*
30308	1963	53.3	0.0	6.5	1.4	*61.2*
31039	1965	53.8	0.0	6.5	1.4	*61.6*
31769	1967	54.0	0.0	6.5	1.4	*61.8*
32500	1969	54.2	0.0	6.5	1.4	*62.0*
33230	1971	54.3	0.0	6.5	1.4	*62.2*
33961	1973	54.4	0.0	6.5	1.4	*62.3*
34691	1975	54.5	0.0	6.5	1.4	*62.3*
35422	1977	54.6	0.0	6.5	1.4	*62.4*
36152	1979	55.1	0.0	6.5	1.4	*62.9*
36883	1981	55.5	0.0	6.5	1.4	*63.4*
37613	1983	54.2	0.0	6.5	1.4	*62.1*
38344	1985	53.4	0.0	6.5	1.4	*61.3*
39074	1987	55.1	0.0	10.5	1.4	*67.0*
365	1988	55.2	0.0	11.4	1.4	*68.1*
731	1989	55.0	0.0	11.5	1.5	*67.9*
1461	1991	54.8	0.0	11.5	1.5	*67.8*
2192	1993	54.8	0.0	11.6	1.5	*67.9*
2922	1995	54.9	0.0	11.6	1.5	*68.0*
3653	1997	54.9	0.0	11.6	1.5	*68.0*
4383	1999	54.9	0.0	11.6	1.6	*68.1*
4749	2000	54.9	0.0	11.6	1.6	*68.1*
5479	2002	54.9	0.0	11.6	1.6	*68.1*
6209	2004	54.9	0.0	11.6	1.6	*68.1*
6939	2006	54.9	0.0	11.6	1.6	*68.1*
7670	2008	55.0	0.0	11.6	1.6	*68.2*
8401	2010	55.0	0.0	11.6	1.6	*68.2*
9131	2012	55.0	0.0	11.6	1.6	*68.2*
9862	2014	55.0	0.0	11.6	1.6	*68.2*
10592	2016	55.0	0.0	11.6	1.6	*68.2*
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	55.0	0.0	11.6	1.6	*68.2*
12053	2020	55.0	0.0	11.6	1.6	*68.3*
12784	2022	55.0	0.0	11.6	1.6	*68.3*
13514	2024	55.0	0.0	11.6	1.6	*68.3*
14245	2026	55.0	0.0	11.6	1.6	*68.3*
14975	2028	55.0	0.0	11.6	1.6	*68.3*
15706	2030	55.0	0.0	11.6	1.6	*68.3*
16436	2032	55.0	0.0	11.6	1.6	*68.3*
17167	2034	55.1	0.0	11.6	1.6	*68.3*
17897	2036	55.1	0.0	11.6	1.6	*68.3*
18628	2038	55.1	0.0	11.6	1.6	*68.3*
19358	2040	55.1	0.0	11.6	1.6	*68.3*
20089	2042	55.1	0.0	11.6	1.6	*68.4*
20819	2044	55.1	0.0	11.6	1.6	*68.4*
21550	2046	55.1	0.0	11.7	1.6	*68.4*
22280	2048	55.1	0.0	11.7	1.6	*68.4*
23011	2050	55.1	0.0	11.7	1.6	*68.4*
23741	2052	55.1	0.0	11.7	1.6	*68.4*
24472	2054	55.1	0.0	11.7	1.6	*68.4*
25202	2056	55.1	0.0	11.7	1.7	*68.4*
25933	2058	55.1	0.0	11.7	1.7	*68.4*
26663	2060	55.1	0.0	11.7	1.7	*68.4*
27394	2062	55.1	0.0	11.7	1.7	*68.4*
28124	2064	55.1	0.0	11.7	1.7	*68.4*
28855	2066	55.1	0.0	11.7	1.7	*68.4*
29585	2068	55.1	0.0	11.7	1.7	*68.4*
30316	2070	55.1	0.0	11.7	1.7	*68.4*
31046	2072	55.1	0.0	11.7	1.7	*68.5*
31777	2074	55.1	0.0	11.7	1.7	*68.5*
32507	2076	55.1	0.0	11.7	1.7	*68.5*
33238	2078	55.1	0.0	11.7	1.7	*68.5*
33968	2080	55.1	0.0	11.7	1.7	*68.5*
34699	2082	55.1	0.0	11.7	1.7	*68.5*
35429	2084	55.1	0.0	11.7	1.7	*68.5*
36160	2086	55.1	0.0	11.7	1.7	*68.5*
36890	2088	55.1	0.0	11.7	1.7	*68.5*
37621	2090	55.2	0.0	11.7	1.7	*68.5*
38351	2092	55.2	0.0	11.7	1.7	*68.5*
39082	2094	55.2	0.0	11.7	1.7	*68.5*
39812	2096	55.2	0.0	11.7	1.7	*68.5*
40543	2098	55.2	0.0	11.7	1.7	*68.5*
41273	2100	55.2	0.0	11.7	1.7	*68.5*
42004	2102	55.2	0.0	11.7	1.7	*68.5*
42734	2104	55.2	0.0	11.7	1.7	*68.5*
43465	2106	55.2	0.0	11.7	1.7	*68.5*
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Appendix B-2-(S3A-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-3A (Renmark Area)



Appendix B-2-(S3A-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-3A (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	727	0	525	31	**1283**
1460	1884	1234	0	676	24	**1934**
10950	1910	2216	0	1216	100	**3532**
12776	1915	2244	0	1236	108	**3588**
14603	1920	2272	0	1249	113	**3634**
15333	1922	2654	0	1252	115	**4021**
16429	1925	2960	0	1256	117	**4333**
18255	1930	3123	0	1262	120	**4505**
20081	1935	3183	0	1267	122	**4572**
21908	1940	3212	0	1271	125	**4608**
23734	1945	2560	0	1161	121	**3842**
25560	1950	2584	0	1116	112	**3812**
27386	1955	2657	0	1100	105	**3863**
28117	1957	2678	0	1096	104	**3878**
28847	1959	2693	0	1094	103	**3889**
29578	1961	2857	0	1092	102	**4050**
30308	1963	2904	0	1091	101	**4095**
31039	1965	2927	0	1090	101	**4117**
31769	1967	2942	0	1089	101	**4131**
32500	1969	2951	0	1088	101	**4140**
33230	1971	2959	0	1088	101	**4147**
33961	1973	2964	0	1088	101	**4152**
34691	1975	2969	0	1088	101	**4157**
35422	1977	2972	0	1088	101	**4161**
36152	1979	2998	0	1092	102	**4191**
36883	1981	3021	0	1101	102	**4223**
37613	1983	2951	0	1094	103	**4148**
38344	1985	2909	0	1088	103	**4100**
39074	1987	2999	0	1767	104	**4869**
365	1988	2993	0	1862	104	**4958**
731	1989	2985	0	1900	105	**4990**
1461	1991	2980	0	1886	106	**4972**
2192	1993	3026	0	2026	109	**5160**
2922	1995	3014	0	1985	111	**5110**
3653	1997	2960	0	2023	112	**5095**
4376	1999	2440	0	1571	114	**4125**
4749	2000	2153	0	1348	113	**3615**
5479	2002	1744	0	1053	111	**2908**
6209	2004	1468	0	973	107	**2547**
6939	2006	1290	0	925	101	**2316**
7670	2008	1174	0	891	95	**2159**
8401	2010	1096	0	865	89	**2050**
9131	2012	1044	0	846	84	**1973**
9862	2014	1008	0	830	80	**1918**
10592	2016	982	0	818	76	**1877**

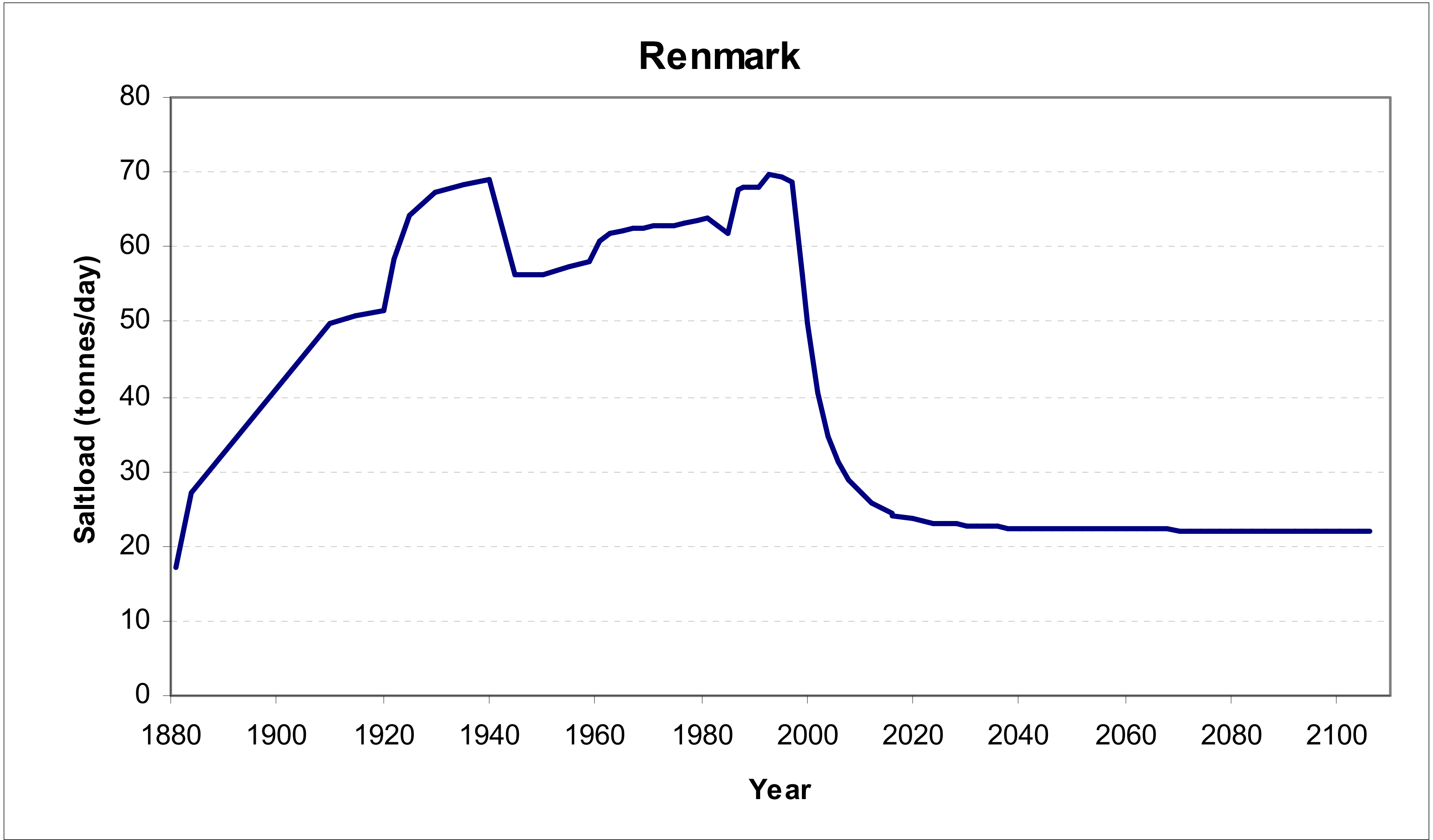
Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	964	0	809	73	**1846**
12053	2020	951	0	801	70	**1822**
12784	2022	941	0	795	68	**1804**
13514	2024	933	0	790	67	**1790**
14245	2026	927	0	786	65	**1778**
14975	2028	923	0	782	64	**1769**
15706	2030	919	0	779	63	**1761**
16436	2032	916	0	777	62	**1755**
17167	2034	914	0	775	61	**1750**
17897	2036	912	0	773	60	**1745**
18628	2038	910	0	771	60	**1741**
19358	2040	909	0	770	59	**1738**
20089	2042	907	0	769	59	**1735**
20819	2044	906	0	768	59	**1733**
21550	2046	905	0	767	58	**1730**
22280	2048	904	0	766	58	**1729**
23011	2050	904	0	765	58	**1727**
23741	2052	903	0	765	57	**1725**
24472	2054	902	0	764	57	**1724**
25202	2056	902	0	764	57	**1723**
25933	2058	901	0	763	57	**1722**
26663	2060	901	0	763	57	**1721**
27394	2062	901	0	763	57	**1720**
28124	2064	900	0	762	56	**1719**
28855	2066	900	0	762	56	**1719**
29585	2068	900	0	762	56	**1718**
30316	2070	899	0	762	56	**1717**
31046	2072	899	0	761	56	**1717**
31777	2074	899	0	761	56	**1716**
32507	2076	899	0	761	56	**1716**
33238	2078	899	0	761	56	**1716**
33968	2080	898	0	761	56	**1715**
34699	2082	898	0	761	56	**1715**
35429	2084	898	0	761	56	**1715**
36160	2086	898	0	761	56	**1715**
36890	2088	898	0	761	56	**1715**
37621	2090	898	0	761	56	**1714**
38351	2092	898	0	760	56	**1714**
39082	2094	898	0	760	56	**1714**
39812	2096	898	0	760	56	**1714**
40543	2098	898	0	760	56	**1714**
41273	2100	898	0	760	56	**1714**
42004	2102	897	0	760	56	**1714**
42734	2104	897	0	760	56	**1714**
43465	2106	897	0	760	56	**1714**

Appendix B-2-(S3B-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-3B (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	13.3	0.0	3.1	0.4	***16.9***
1460	1884	22.7	0.0	4.0	0.3	***27.0***
10950	1910	40.7	0.0	7.2	1.4	***49.3***
12776	1915	41.2	0.0	7.3	1.5	***50.0***
14603	1920	41.7	0.0	7.4	1.5	***50.7***
15333	1922	48.7	0.0	7.4	1.6	***57.7***
16429	1925	54.4	0.0	7.5	1.6	***63.4***
18255	1930	57.3	0.0	7.5	1.6	***66.5***
20081	1935	58.4	0.0	7.5	1.7	***67.6***
21908	1940	59.0	0.0	7.5	1.7	***68.2***
23734	1945	47.0	0.0	6.9	1.7	***55.6***
25560	1950	47.5	0.0	6.6	1.5	***55.6***
27386	1955	48.8	0.0	6.5	1.4	***56.8***
28117	1957	49.2	0.0	6.5	1.4	***57.1***
28847	1959	49.5	0.0	6.5	1.4	***57.3***
29578	1961	52.5	0.0	6.5	1.4	***60.3***
30308	1963	53.3	0.0	6.5	1.4	***61.2***
31039	1965	53.8	0.0	6.5	1.4	***61.6***
31769	1967	54.0	0.0	6.5	1.4	***61.8***
32500	1969	54.2	0.0	6.5	1.4	***62.0***
33230	1971	54.3	0.0	6.5	1.4	***62.2***
33961	1973	54.4	0.0	6.5	1.4	***62.3***
34691	1975	54.5	0.0	6.5	1.4	***62.3***
35422	1977	54.6	0.0	6.5	1.4	***62.4***
36152	1979	55.1	0.0	6.5	1.4	***62.9***
36883	1981	55.5	0.0	6.5	1.4	***63.4***
37613	1983	54.2	0.0	6.5	1.4	***62.1***
38344	1985	53.4	0.0	6.5	1.4	***61.3***
39074	1987	55.1	0.0	10.5	1.4	***67.0***
365	1988	55.0	0.0	11.0	1.4	***67.4***
731	1989	54.8	0.0	11.3	1.4	***67.5***
1461	1991	54.7	0.0	11.2	1.5	***67.4***
2192	1993	55.6	0.0	12.0	1.5	***69.1***
2922	1995	55.4	0.0	11.8	1.5	***68.6***
3653	1997	54.4	0.0	12.0	1.5	***67.9***
4376	1999	44.8	0.0	9.3	1.5	***55.7***
4749	2000	39.5	0.0	8.0	1.5	***49.1***
5479	2002	32.0	0.0	6.2	1.5	***39.8***
6209	2004	27.0	0.0	5.8	1.5	***34.2***
6939	2006	23.7	0.0	5.5	1.4	***30.5***
7670	2008	21.6	0.0	5.3	1.3	***28.1***
8401	2010	20.1	0.0	5.1	1.2	***26.5***
9131	2012	19.2	0.0	5.0	1.1	***25.3***
9862	2014	18.5	0.0	4.9	1.1	***24.5***
10592	2016	18.0	0.0	4.9	1.0	***23.9***
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	17.7	0.0	4.8	1.0	***23.5***
12053	2020	17.5	0.0	4.8	1.0	***23.2***
12784	2022	17.3	0.0	4.7	0.9	***22.9***
13514	2024	17.1	0.0	4.7	0.9	***22.7***
14245	2026	17.0	0.0	4.7	0.9	***22.6***
14975	2028	16.9	0.0	4.6	0.9	***22.5***
15706	2030	16.9	0.0	4.6	0.9	***22.4***
16436	2032	16.8	0.0	4.6	0.8	***22.3***
17167	2034	16.8	0.0	4.6	0.8	***22.2***
17897	2036	16.7	0.0	4.6	0.8	***22.2***
18628	2038	16.7	0.0	4.6	0.8	***22.1***
19358	2040	16.7	0.0	4.6	0.8	***22.1***
20089	2042	16.7	0.0	4.6	0.8	***22.0***
20819	2044	16.6	0.0	4.6	0.8	***22.0***
21550	2046	16.6	0.0	4.5	0.8	***22.0***
22280	2048	16.6	0.0	4.5	0.8	***21.9***
23011	2050	16.6	0.0	4.5	0.8	***21.9***
23741	2052	16.6	0.0	4.5	0.8	***21.9***
24472	2054	16.6	0.0	4.5	0.8	***21.9***
25202	2056	16.6	0.0	4.5	0.8	***21.9***
25933	2058	16.6	0.0	4.5	0.8	***21.9***
26663	2060	16.5	0.0	4.5	0.8	***21.8***
27394	2062	16.5	0.0	4.5	0.8	***21.8***
28124	2064	16.5	0.0	4.5	0.8	***21.8***
28855	2066	16.5	0.0	4.5	0.8	***21.8***
29585	2068	16.5	0.0	4.5	0.8	***21.8***
30316	2070	16.5	0.0	4.5	0.8	***21.8***
31046	2072	16.5	0.0	4.5	0.8	***21.8***
31777	2074	16.5	0.0	4.5	0.8	***21.8***
32507	2076	16.5	0.0	4.5	0.8	***21.8***
33238	2078	16.5	0.0	4.5	0.8	***21.8***
33968	2080	16.5	0.0	4.5	0.8	***21.8***
34699	2082	16.5	0.0	4.5	0.8	***21.8***
35429	2084	16.5	0.0	4.5	0.8	***21.8***
36160	2086	16.5	0.0	4.5	0.8	***21.8***
36890	2088	16.5	0.0	4.5	0.8	***21.8***
37621	2090	16.5	0.0	4.5	0.8	***21.8***
38351	2092	16.5	0.0	4.5	0.8	***21.8***
39082	2094	16.5	0.0	4.5	0.8	***21.8***
39812	2096	16.5	0.0	4.5	0.8	***21.8***
40543	2098	16.5	0.0	4.5	0.8	***21.8***
41273	2100	16.5	0.0	4.5	0.8	***21.8***
42004	2102	16.5	0.0	4.5	0.8	***21.8***
42734	2104	16.5	0.0	4.5	0.8	***21.8***
43465	2106	16.5	0.0	4.5	0.8	***21.8***
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Appendix B-2-(S3B-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-3B (Renmark Area)



Appendix B-2-(S3B-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-3B (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	727	0	525	31	1283
1460	1884	1234	0	676	24	1934
10950	1910	2216	0	1216	100	3532
12776	1915	2244	0	1236	108	3588
14603	1920	2272	0	1249	113	3634
15333	1922	2654	0	1252	115	4021
16429	1925	2960	0	1256	117	4333
18255	1930	3123	0	1262	120	4505
20081	1935	3183	0	1267	122	4572
21908	1940	3212	0	1271	125	4608
23734	1945	2560	0	1161	121	3842
25560	1950	2584	0	1116	112	3812
27386	1955	2657	0	1100	105	3863
28117	1957	2678	0	1096	104	3878
28847	1959	2693	0	1094	103	3889
29578	1961	2857	0	1092	102	4050
30308	1963	2904	0	1091	101	4095
31039	1965	2927	0	1090	101	4117
31769	1967	2942	0	1089	101	4131
32500	1969	2951	0	1088	101	4140
33230	1971	2959	0	1088	101	4147
33961	1973	2964	0	1088	101	4152
34691	1975	2969	0	1088	101	4157
35422	1977	2972	0	1088	101	4161
36152	1979	2998	0	1092	102	4191
36883	1981	3021	0	1101	102	4223
37613	1983	2951	0	1094	103	4148
38344	1985	2909	0	1088	103	4100
39074	1987	2999	0	1767	104	4869
365	1988	2993	0	1862	104	4958
731	1989	2985	0	1900	105	4990
1461	1991	2980	0	1886	106	4972
2192	1993	3026	0	2026	109	5160
2922	1995	3014	0	1985	111	5110
3653	1997	2960	0	2023	112	5095
4376	1999	2440	0	1571	114	4125
4749	2000	2153	0	1348	113	3615
5479	2002	1744	0	1053	111	2908
6209	2004	1468	0	973	107	2547
6939	2006	1290	0	925	101	2316
7670	2008	1174	0	891	94	2159
8401	2010	1096	0	865	89	2050
9131	2012	1044	0	846	84	1973
9862	2014	1008	0	830	79	1917
10592	2016	982	0	818	76	1877

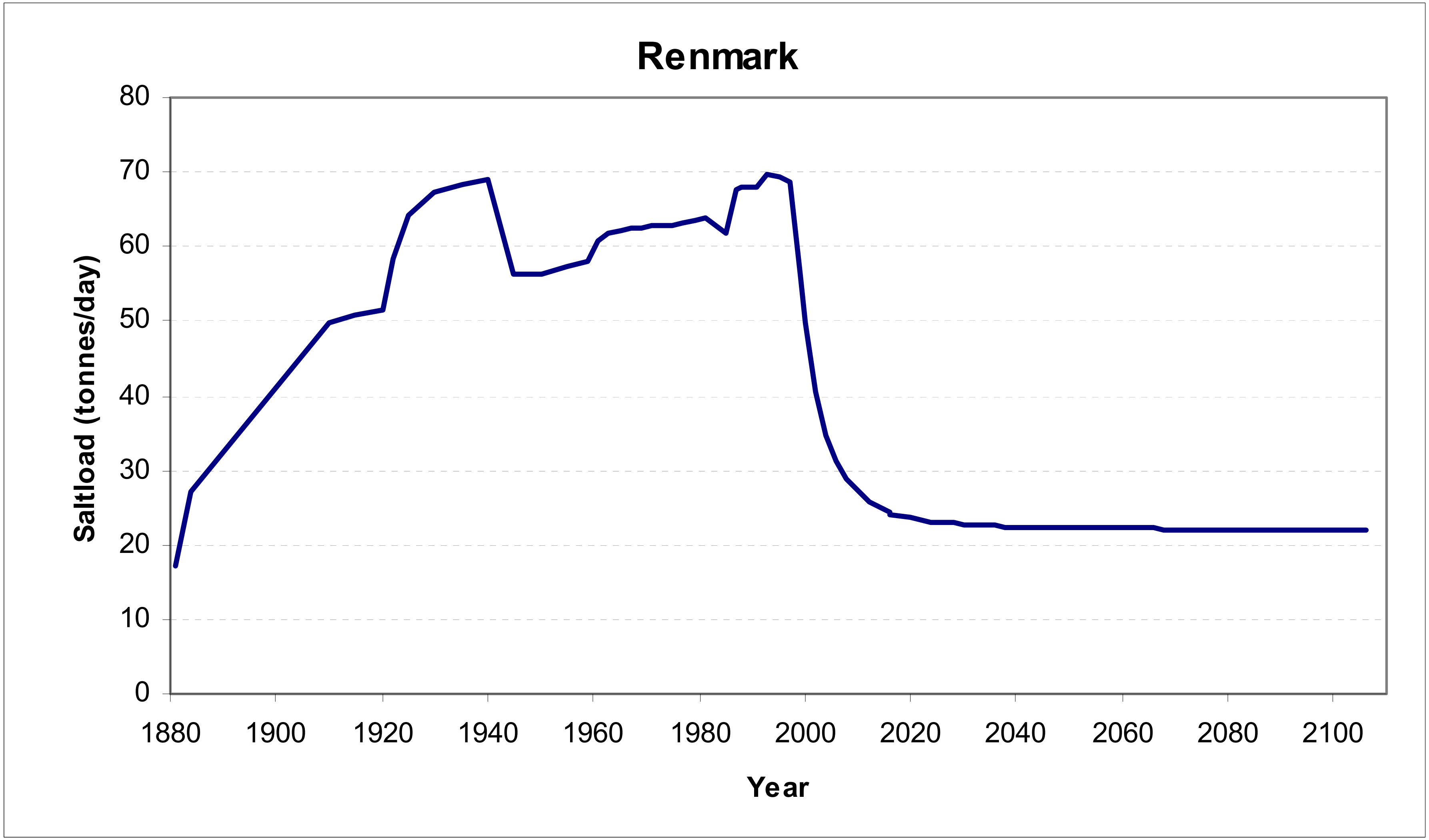
Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	964	0	809	73	1846
12053	2020	951	0	801	70	1822
12784	2022	941	0	795	68	1804
13514	2024	933	0	790	67	1790
14245	2026	927	0	786	65	1778
14975	2028	923	0	782	64	1769
15706	2030	919	0	779	63	1761
16436	2032	916	0	777	62	1755
17167	2034	914	0	775	61	1749
17897	2036	912	0	773	60	1745
18628	2038	910	0	771	60	1741
19358	2040	909	0	770	59	1738
20089	2042	907	0	769	59	1735
20819	2044	906	0	768	58	1732
21550	2046	905	0	767	58	1730
22280	2048	904	0	766	58	1728
23011	2050	904	0	765	57	1726
23741	2052	903	0	765	57	1725
24472	2054	902	0	764	57	1724
25202	2056	902	0	764	57	1722
25933	2058	901	0	763	57	1721
26663	2060	901	0	763	56	1720
27394	2062	901	0	762	56	1719
28124	2064	900	0	762	56	1719
28855	2066	900	0	762	56	1718
29585	2068	900	0	762	56	1717
30316	2070	899	0	761	56	1717
31046	2072	899	0	761	56	1716
31777	2074	899	0	761	56	1716
32507	2076	899	0	761	56	1716
33238	2078	899	0	761	56	1715
33968	2080	898	0	761	56	1715
34699	2082	898	0	761	56	1715
35429	2084	898	0	760	56	1714
36160	2086	898	0	760	56	1714
36890	2088	898	0	760	56	1714
37621	2090	898	0	760	56	1714
38351	2092	898	0	760	56	1714
39082	2094	898	0	760	56	1713
39812	2096	898	0	760	56	1713
40543	2098	898	0	760	56	1713
41273	2100	898	0	760	56	1713
42004	2102	897	0	760	56	1713
42734	2104	897	0	760	56	1713
43465	2106	897	0	760	56	1713

Appendix B-2-(S3C-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-3C (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	13.3	0.0	3.1	0.4	*16.9*
1460	1884	22.7	0.0	4.0	0.3	*27.0*
10950	1910	40.7	0.0	7.2	1.4	*49.3*
12776	1915	41.2	0.0	7.3	1.5	*50.0*
14603	1920	41.7	0.0	7.4	1.5	*50.7*
15333	1922	48.7	0.0	7.4	1.6	*57.7*
16429	1925	54.4	0.0	7.5	1.6	*63.4*
18255	1930	57.3	0.0	7.5	1.6	*66.5*
20081	1935	58.4	0.0	7.5	1.7	*67.6*
21908	1940	59.0	0.0	7.5	1.7	*68.2*
23734	1945	47.0	0.0	6.9	1.7	*55.6*
25560	1950	47.5	0.0	6.6	1.5	*55.6*
27386	1955	48.8	0.0	6.5	1.4	*56.8*
28117	1957	49.2	0.0	6.5	1.4	*57.1*
28847	1959	49.5	0.0	6.5	1.4	*57.3*
29578	1961	52.5	0.0	6.5	1.4	*60.3*
30308	1963	53.3	0.0	6.5	1.4	*61.2*
31039	1965	53.8	0.0	6.5	1.4	*61.6*
31769	1967	54.0	0.0	6.5	1.4	*61.8*
32500	1969	54.2	0.0	6.5	1.4	*62.0*
33230	1971	54.3	0.0	6.5	1.4	*62.2*
33961	1973	54.4	0.0	6.5	1.4	*62.3*
34691	1975	54.5	0.0	6.5	1.4	*62.3*
35422	1977	54.6	0.0	6.5	1.4	*62.4*
36152	1979	55.1	0.0	6.5	1.4	*62.9*
36883	1981	55.5	0.0	6.5	1.4	*63.4*
37613	1983	54.2	0.0	6.5	1.4	*62.1*
38344	1985	53.4	0.0	6.5	1.4	*61.3*
39074	1987	55.1	0.0	10.5	1.4	*67.0*
365	1988	55.0	0.0	11.0	1.4	*67.4*
731	1989	54.8	0.0	11.3	1.4	*67.5*
1461	1991	54.7	0.0	11.2	1.5	*67.4*
2192	1993	55.6	0.0	12.0	1.5	*69.1*
2922	1995	55.4	0.0	11.8	1.5	*68.6*
3653	1997	54.4	0.0	12.0	1.5	*67.9*
4376	1999	44.8	0.0	9.3	1.5	*55.7*
4749	2000	39.5	0.0	8.0	1.5	*49.1*
5479	2002	32.0	0.0	6.2	1.5	*39.8*
6209	2004	27.0	0.0	5.8	1.5	*34.2*
6939	2006	23.7	0.0	5.5	1.4	*30.5*
7670	2008	21.6	0.0	5.3	1.3	*28.1*
8401	2010	20.1	0.0	5.1	1.2	*26.5*
9131	2012	19.2	0.0	5.0	1.1	*25.3*
9862	2014	18.5	0.0	4.9	1.1	*24.5*
10592	2016	18.0	0.0	4.9	1.0	*23.9*
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	17.7	0.0	4.8	1.0	*23.5*
12053	2020	17.5	0.0	4.8	1.0	*23.2*
12784	2022	17.3	0.0	4.7	0.9	*22.9*
13514	2024	17.1	0.0	4.7	0.9	*22.7*
14245	2026	17.0	0.0	4.7	0.9	*22.6*
14975	2028	16.9	0.0	4.6	0.9	*22.5*
15706	2030	16.9	0.0	4.6	0.9	*22.4*
16436	2032	16.8	0.0	4.6	0.8	*22.3*
17167	2034	16.8	0.0	4.6	0.8	*22.2*
17897	2036	16.7	0.0	4.6	0.8	*22.1*
18628	2038	16.7	0.0	4.6	0.8	*22.1*
19358	2040	16.7	0.0	4.6	0.8	*22.1*
20089	2042	16.7	0.0	4.6	0.8	*22.0*
20819	2044	16.6	0.0	4.6	0.8	*22.0*
21550	2046	16.6	0.0	4.5	0.8	*22.0*
22280	2048	16.6	0.0	4.5	0.8	*21.9*
23011	2050	16.6	0.0	4.5	0.8	*21.9*
23741	2052	16.6	0.0	4.5	0.8	*21.9*
24472	2054	16.6	0.0	4.5	0.8	*21.9*
25202	2056	16.6	0.0	4.5	0.8	*21.9*
25933	2058	16.6	0.0	4.5	0.8	*21.9*
26663	2060	16.5	0.0	4.5	0.8	*21.8*
27394	2062	16.5	0.0	4.5	0.8	*21.8*
28124	2064	16.5	0.0	4.5	0.8	*21.8*
28855	2066	16.5	0.0	4.5	0.8	*21.8*
29585	2068	16.5	0.0	4.5	0.8	*21.8*
30316	2070	16.5	0.0	4.5	0.8	*21.8*
31046	2072	16.5	0.0	4.5	0.8	*21.8*
31777	2074	16.5	0.0	4.5	0.8	*21.8*
32507	2076	16.5	0.0	4.5	0.8	*21.8*
33238	2078	16.5	0.0	4.5	0.8	*21.8*
33968	2080	16.5	0.0	4.5	0.8	*21.8*
34699	2082	16.5	0.0	4.5	0.8	*21.8*
35429	2084	16.5	0.0	4.5	0.8	*21.8*
36160	2086	16.5	0.0	4.5	0.8	*21.8*
36890	2088	16.5	0.0	4.5	0.8	*21.8*
37621	2090	16.5	0.0	4.5	0.8	*21.8*
38351	2092	16.5	0.0	4.5	0.8	*21.8*
39082	2094	16.5	0.0	4.5	0.8	*21.8*
39812	2096	16.5	0.0	4.5	0.8	*21.7*
40543	2098	16.5	0.0	4.5	0.8	*21.7*
41273	2100	16.5	0.0	4.5	0.8	*21.7*
42004	2102	16.5	0.0	4.5	0.8	*21.7*
42734	2104	16.5	0.0	4.5	0.8	*21.7*
43465	2106	16.5	0.0	4.5	0.8	*21.7*
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Appendix B-2-(S3C-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-3C (Renmark Area)



Appendix B-2-(S3C-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-3C (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	727	0	525	31	**1283**
1460	1884	1234	0	676	24	**1934**
10950	1910	2216	0	1216	100	**3532**
12776	1915	2244	0	1236	108	**3588**
14603	1920	2272	0	1249	113	**3634**
15333	1922	2654	0	1252	115	**4021**
16429	1925	2960	0	1256	117	**4333**
18255	1930	3123	0	1262	120	**4505**
20081	1935	3183	0	1267	122	**4572**
21908	1940	3212	0	1271	125	**4608**
23734	1945	2560	0	1161	121	**3842**
25560	1950	2584	0	1116	112	**3812**
27386	1955	2657	0	1100	105	**3863**
28117	1957	2678	0	1096	104	**3878**
28847	1959	2693	0	1094	103	**3889**
29578	1961	2857	0	1092	102	**4050**
30308	1963	2904	0	1091	101	**4095**
31039	1965	2927	0	1090	101	**4117**
31769	1967	2942	0	1089	101	**4131**
32500	1969	2951	0	1088	101	**4140**
33230	1971	2959	0	1088	101	**4147**
33961	1973	2964	0	1088	101	**4152**
34691	1975	2969	0	1088	101	**4157**
35422	1977	2972	0	1088	101	**4161**
36152	1979	2998	0	1092	102	**4191**
36883	1981	3021	0	1101	102	**4223**
37613	1983	2951	0	1094	103	**4148**
38344	1985	2909	0	1088	103	**4100**
39074	1987	2999	0	1767	104	**4869**
365	1988	2993	0	1864	104	**4960**
731	1989	2985	0	1904	105	**4994**
1461	1991	2980	0	1891	106	**4977**
2192	1993	3026	0	2031	109	**5166**
2922	1995	3015	0	2055	111	**5180**
3653	1997	3050	0	2117	113	**5281**
4376	1999	2519	0	1664	115	**4298**
4749	2000	2210	0	1428	116	**3754**
5479	2002	1793	0	1112	115	**3020**
6209	2004	1517	0	1027	111	**2655**
6939	2006	1340	0	984	105	**2428**
7670	2008	1224	0	951	99	**2274**
8401	2010	1147	0	926	93	**2166**
9131	2012	1095	0	907	88	**2090**
9862	2014	1059	0	892	84	**2035**
10592	2016	1034	0	880	81	**1994**

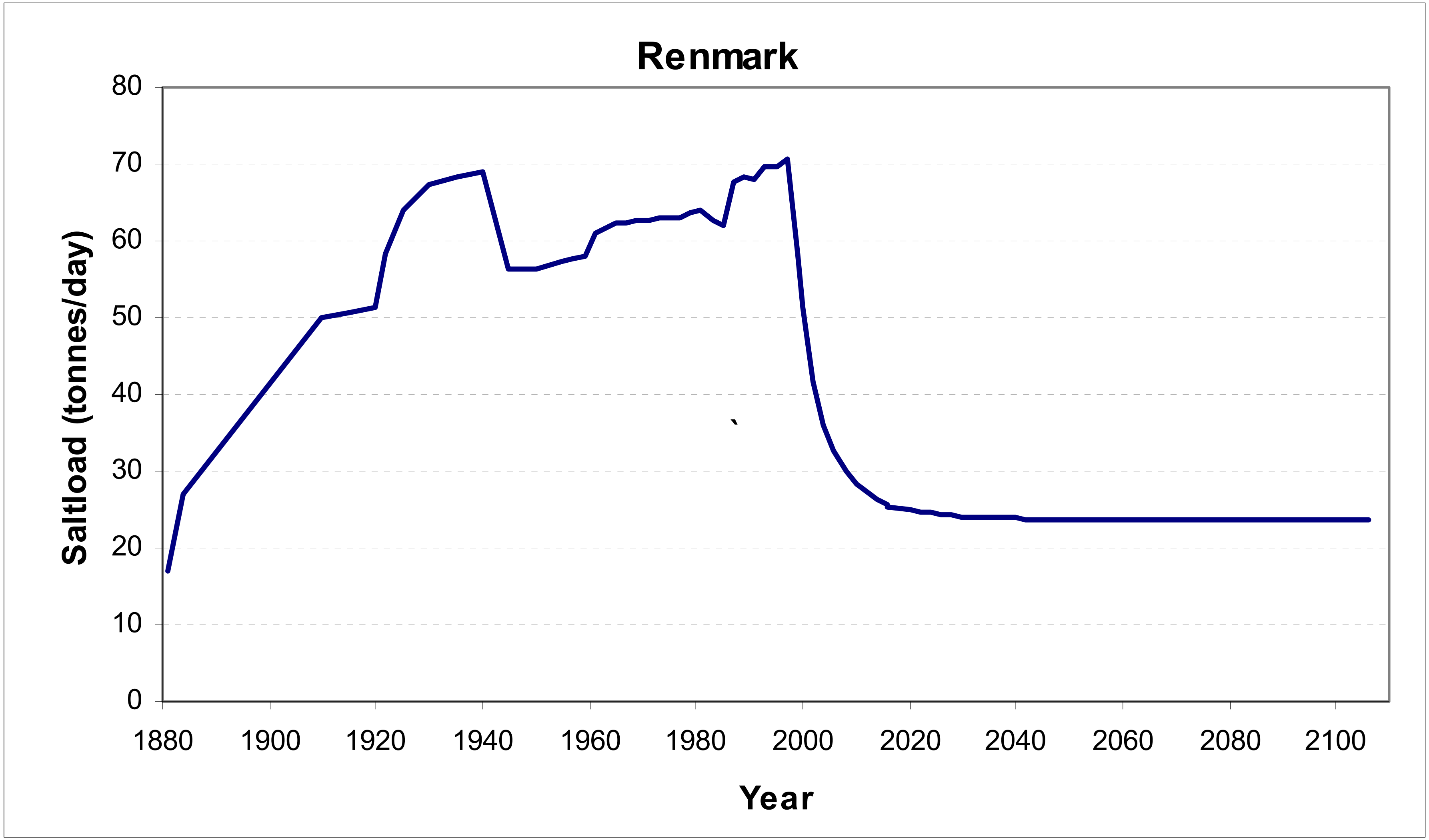
Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	1016	0	870	78	**1964**
12053	2020	1002	0	863	75	**1941**
12784	2022	992	0	857	73	**1922**
13514	2024	985	0	852	71	**1908**
14245	2026	979	0	848	70	**1897**
14975	2028	975	0	844	69	**1888**
15706	2030	971	0	841	68	**1880**
16436	2032	968	0	839	67	**1874**
17167	2034	966	0	837	66	**1869**
17897	2036	964	0	835	65	**1864**
18628	2038	962	0	834	65	**1860**
19358	2040	961	0	832	64	**1857**
20089	2042	960	0	831	64	**1855**
20819	2044	959	0	830	63	**1853**
21550	2046	958	0	829	63	**1851**
22280	2048	958	0	829	63	**1850**
23011	2050	958	0	828	63	**1849**
23741	2052	958	0	828	62	**1848**
24472	2054	958	0	827	62	**1847**
25202	2056	958	0	827	62	**1847**
25933	2058	958	0	826	62	**1846**
26663	2060	958	0	826	62	**1846**
27394	2062	958	0	826	62	**1846**
28124	2064	958	0	826	62	**1845**
28855	2066	958	0	826	62	**1845**
29585	2068	958	0	825	62	**1845**
30316	2070	958	0	825	62	**1845**
31046	2072	958	0	825	62	**1845**
31777	2074	958	0	825	62	**1845**
32507	2076	958	0	825	62	**1845**
33238	2078	958	0	825	62	**1845**
33968	2080	958	0	825	62	**1845**
34699	2082	959	0	825	62	**1846**
35429	2084	959	0	825	62	**1846**
36160	2086	959	0	825	62	**1846**
36890	2088	959	0	825	62	**1846**
37621	2090	959	0	825	62	**1846**
38351	2092	959	0	826	62	**1846**
39082	2094	959	0	826	62	**1847**
39812	2096	959	0	826	62	**1847**
40543	2098	959	0	826	62	**1847**
41273	2100	959	0	826	62	**1847**
42004	2102	959	0	826	62	**1847**
42734	2104	959	0	826	62	**1848**
43465	2106	959	0	826	62	**1848**

Appendix B-2-(S4-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-4 (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	13.3	0.0	3.1	0.4	*16.9*
1460	1884	22.7	0.0	4.0	0.3	*27.0*
10950	1910	40.7	0.0	7.2	1.4	*49.3*
12776	1915	41.2	0.0	7.3	1.5	*50.0*
14603	1920	41.7	0.0	7.4	1.5	*50.7*
15333	1922	48.7	0.0	7.4	1.6	*57.7*
16429	1925	54.4	0.0	7.5	1.6	*63.4*
18255	1930	57.3	0.0	7.5	1.6	*66.5*
20081	1935	58.4	0.0	7.5	1.7	*67.6*
21908	1940	59.0	0.0	7.5	1.7	*68.2*
23734	1945	47.0	0.0	6.9	1.7	*55.6*
25560	1950	47.5	0.0	6.6	1.5	*55.6*
27386	1955	48.8	0.0	6.5	1.4	*56.8*
28117	1957	49.2	0.0	6.5	1.4	*57.1*
28847	1959	49.5	0.0	6.5	1.4	*57.3*
29578	1961	52.5	0.0	6.5	1.4	*60.3*
30308	1963	53.3	0.0	6.5	1.4	*61.2*
31039	1965	53.8	0.0	6.5	1.4	*61.6*
31769	1967	54.0	0.0	6.5	1.4	*61.8*
32500	1969	54.2	0.0	6.5	1.4	*62.0*
33230	1971	54.3	0.0	6.5	1.4	*62.2*
33961	1973	54.4	0.0	6.5	1.4	*62.3*
34691	1975	54.5	0.0	6.5	1.4	*62.3*
35422	1977	54.6	0.0	6.5	1.4	*62.4*
36152	1979	55.1	0.0	6.5	1.4	*62.9*
36883	1981	55.5	0.0	6.5	1.4	*63.4*
37613	1983	54.2	0.0	6.5	1.4	*62.1*
38344	1985	53.4	0.0	6.5	1.4	*61.3*
39074	1987	55.1	0.0	10.5	1.4	*67.0*
365	1988	55.0	0.0	11.1	1.4	*67.4*
731	1989	54.8	0.0	11.3	1.4	*67.5*
1461	1991	54.7	0.0	11.2	1.5	*67.4*
2192	1993	55.6	0.0	12.0	1.5	*69.1*
2922	1995	55.4	0.0	12.2	1.5	*69.1*
3653	1997	56.0	0.0	12.6	1.5	*70.1*
4376	1999	46.3	0.0	9.9	1.6	*57.7*
4749	2000	40.6	0.0	8.5	1.6	*50.6*
5479	2002	32.9	0.0	6.6	1.6	*41.1*
6209	2004	27.8	0.0	6.1	1.5	*35.5*
6939	2006	24.6	0.0	5.8	1.4	*31.9*
7670	2008	22.5	0.0	5.6	1.4	*29.5*
8401	2010	21.1	0.0	5.5	1.3	*27.8*
9131	2012	20.1	0.0	5.4	1.2	*26.7*
9862	2014	19.4	0.0	5.3	1.1	*25.9*
10592	2016	19.0	0.0	5.2	1.1	*25.3*
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	18.7	0.0	5.2	1.1	*24.9*
12053	2020	18.4	0.0	5.1	1.0	*24.6*
12784	2022	18.2	0.0	5.1	1.0	*24.3*
13514	2024	18.1	0.0	5.1	1.0	*24.1*
14245	2026	18.0	0.0	5.0	1.0	*24.0*
14975	2028	17.9	0.0	5.0	0.9	*23.8*
15706	2030	17.8	0.0	5.0	0.9	*23.7*
16436	2032	17.8	0.0	5.0	0.9	*23.7*
17167	2034	17.7	0.0	5.0	0.9	*23.6*
17897	2036	17.7	0.0	5.0	0.9	*23.5*
18628	2038	17.7	0.0	4.9	0.9	*23.5*
19358	2040	17.6	0.0	4.9	0.9	*23.5*
20089	2042	17.6	0.0	4.9	0.9	*23.4*
20819	2044	17.6	0.0	4.9	0.9	*23.4*
21550	2046	17.6	0.0	4.9	0.9	*23.4*
22280	2048	17.6	0.0	4.9	0.9	*23.4*
23011	2050	17.6	0.0	4.9	0.9	*23.4*
23741	2052	17.6	0.0	4.9	0.9	*23.4*
24472	2054	17.6	0.0	4.9	0.8	*23.3*
25202	2056	17.6	0.0	4.9	0.8	*23.3*
25933	2058	17.6	0.0	4.9	0.8	*23.3*
26663	2060	17.6	0.0	4.9	0.8	*23.3*
27394	2062	17.6	0.0	4.9	0.8	*23.3*
28124	2064	17.6	0.0	4.9	0.8	*23.3*
28855	2066	17.6	0.0	4.9	0.8	*23.3*
29585	2068	17.6	0.0	4.9	0.8	*23.3*
30316	2070	17.6	0.0	4.9	0.8	*23.3*
31046	2072	17.6	0.0	4.9	0.8	*23.3*
31777	2074	17.6	0.0	4.9	0.8	*23.3*
32507	2076	17.6	0.0	4.9	0.8	*23.3*
33238	2078	17.6	0.0	4.9	0.8	*23.3*
33968	2080	17.6	0.0	4.9	0.8	*23.3*
34699	2082	17.6	0.0	4.9	0.8	*23.3*
35429	2084	17.6	0.0	4.9	0.8	*23.3*
36160	2086	17.6	0.0	4.9	0.8	*23.3*
36890	2088	17.6	0.0	4.9	0.8	*23.3*
37621	2090	17.6	0.0	4.9	0.8	*23.3*
38351	2092	17.6	0.0	4.9	0.8	*23.4*
39082	2094	17.6	0.0	4.9	0.8	*23.4*
39812	2096	17.6	0.0	4.9	0.8	*23.4*
40543	2098	17.6	0.0	4.9	0.8	*23.4*
41273	2100	17.6	0.0	4.9	0.8	*23.4*
42004	2102	17.6	0.0	4.9	0.8	*23.4*
42734	2104	17.6	0.0	4.9	0.8	*23.4*
43465	2106	17.6	0.0	4.9	0.9	*23.4*
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Appendix B-2-(S4-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-4 (Renmark Area)



Appendix B-2-(S4-3): Graph of total modelled saltload (tonnes/day) entering the River Murray in Scenario-4 (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	727	0	525	31	1283
1460	1884	1234	0	676	24	1934
10950	1910	2216	0	1216	100	3532
12776	1915	2244	0	1236	108	3588
14603	1920	2272	0	1249	113	3634
15333	1922	2654	0	1252	115	4021
16429	1925	2960	0	1256	117	4333
18255	1930	3123	0	1262	120	4505
20081	1935	3183	0	1267	122	4572
21908	1940	3212	0	1271	125	4608
23734	1945	2560	0	1161	121	3842
25560	1950	2584	0	1116	112	3812
27386	1955	2657	0	1100	105	3863
28117	1957	2678	0	1096	104	3878
28847	1959	2693	0	1094	103	3889
29578	1961	2857	0	1092	102	4050
30308	1963	2904	0	1091	101	4095
31039	1965	2927	0	1090	101	4117
31769	1967	2942	0	1089	101	4131
32500	1969	2951	0	1088	101	4140
33230	1971	2959	0	1088	101	4147
33961	1973	2964	0	1088	101	4152
34691	1975	2969	0	1088	101	4157
35422	1977	2972	0	1088	101	4161
36152	1979	2998	0	1092	102	4191
36883	1981	3021	0	1101	102	4223
37613	1983	2951	0	1094	103	4148
38344	1985	2909	0	1088	103	4100
39074	1987	2999	0	1767	104	4869
365	1988	2993	0	1864	104	4960
731	1989	2985	0	1904	105	4994
1461	1991	2980	0	1891	106	4977
2192	1993	3026	0	2031	109	5166
2922	1995	3015	0	2055	111	5180
3653	1997	3050	0	2117	113	5281
4376	1999	2519	0	1664	115	4298
4749	2000	2210	0	1428	116	3754
5479	2002	1793	0	1112	115	3020
6209	2004	1517	0	1027	111	2655
6939	2006	1340	0	984	105	2428
7670	2008	1224	0	951	99	2274
8401	2010	1147	0	926	93	2166
9131	2012	1095	0	907	88	2090
9862	2014	1059	0	892	84	2035
10592	2016	1353	0	1196	81	2630

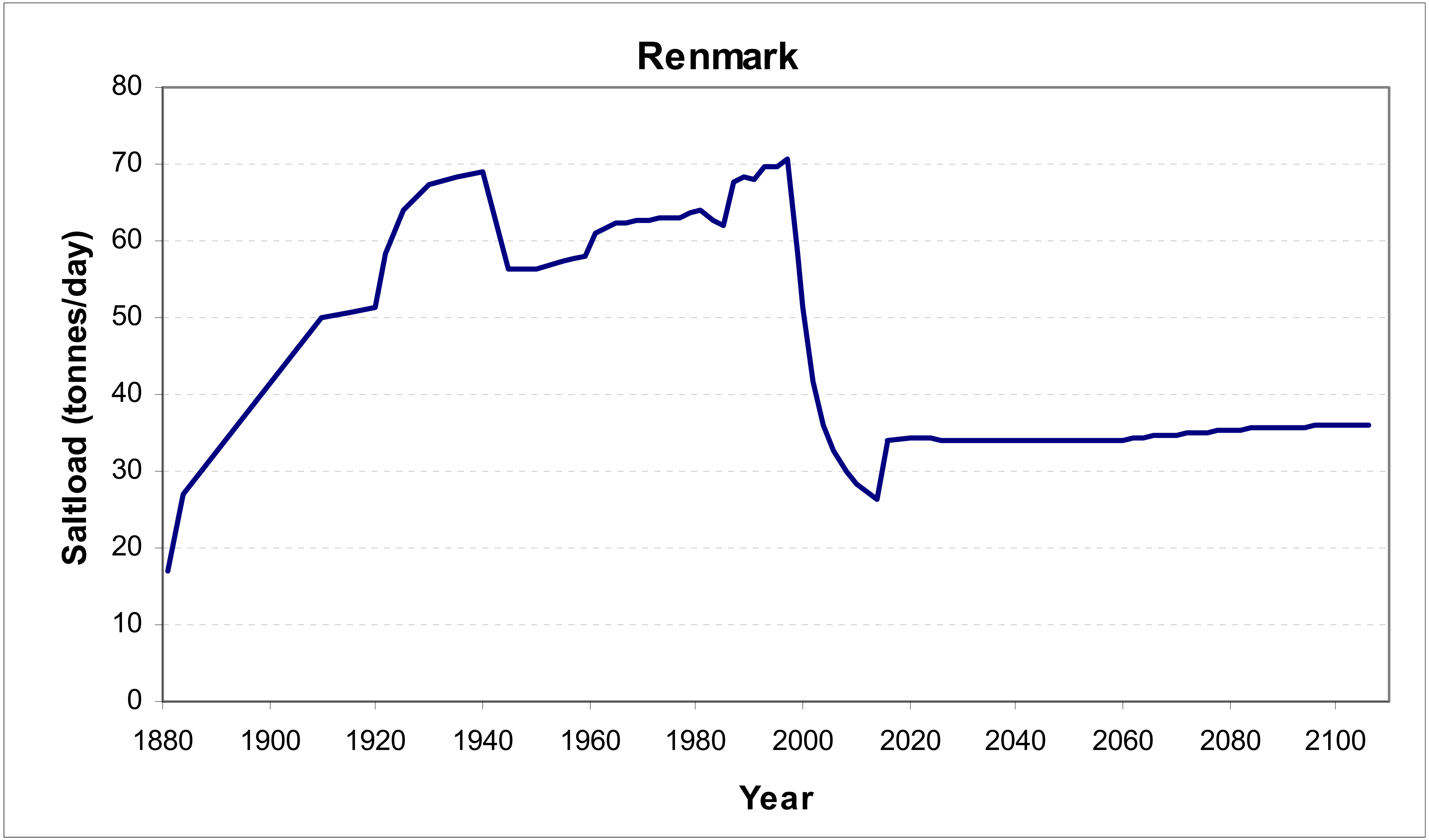
Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	1381	0	1205	78	2664
12053	2020	1390	0	1205	76	2671
12784	2022	1393	0	1205	75	2672
13514	2024	1393	0	1204	74	2671
14245	2026	1392	0	1203	73	2668
14975	2028	1390	0	1203	73	2666
15706	2030	1388	0	1202	73	2663
16436	2032	1386	0	1202	72	2661
17167	2034	1385	0	1202	72	2658
17897	2036	1383	0	1201	72	2656
18628	2038	1382	0	1201	72	2655
19358	2040	1381	0	1201	72	2653
20089	2042	1380	0	1201	72	2652
20819	2044	1380	0	1200	72	2652
21550	2046	1379	0	1200	72	2651
22280	2048	1379	0	1200	72	2651
23011	2050	1380	0	1201	72	2653
23741	2052	1381	0	1201	72	2654
24472	2054	1382	0	1202	72	2656
25202	2056	1384	0	1202	72	2658
25933	2058	1386	0	1203	73	2662
26663	2060	1391	0	1204	73	2667
27394	2062	1397	0	1205	73	2674
28124	2064	1404	0	1206	74	2683
28855	2066	1411	0	1207	74	2691
29585	2068	1418	0	1208	74	2700
30316	2070	1425	0	1209	75	2708
31046	2072	1431	0	1210	75	2716
31777	2074	1437	0	1211	76	2723
32507	2076	1442	0	1212	76	2730
33238	2078	1446	0	1213	77	2736
33968	2080	1450	0	1214	77	2742
34699	2082	1454	0	1215	78	2747
35429	2084	1457	0	1216	78	2751
36160	2086	1459	0	1217	79	2756
36890	2088	1462	0	1218	79	2760
37621	2090	1464	0	1219	80	2763
38351	2092	1466	0	1220	80	2767
39082	2094	1468	0	1221	81	2770
39812	2096	1470	0	1222	81	2773
40543	2098	1472	0	1223	82	2776
41273	2100	1473	0	1224	82	2779
42004	2102	1475	0	1224	82	2781
42734	2104	1476	0	1225	83	2784
43465	2106	1477	0	1226	83	2786

Appendix B-2-(S5-1): Modelled groundwater flux (m^3/day) from flow budget zones in Scenario-5 (Renmark Area)

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
365	1881	13.3	0.0	3.1	0.4	*16.9*
1460	1884	22.7	0.0	4.0	0.3	*27.0*
10950	1910	40.7	0.0	7.2	1.4	*49.3*
12776	1915	41.2	0.0	7.3	1.5	*50.0*
14603	1920	41.7	0.0	7.4	1.5	*50.7*
15333	1922	48.7	0.0	7.4	1.6	*57.7*
16429	1925	54.4	0.0	7.5	1.6	*63.4*
18255	1930	57.3	0.0	7.5	1.6	*66.5*
20081	1935	58.4	0.0	7.5	1.7	*67.6*
21908	1940	59.0	0.0	7.5	1.7	*68.2*
23734	1945	47.0	0.0	6.9	1.7	*55.6*
25560	1950	47.5	0.0	6.6	1.5	*55.6*
27386	1955	48.8	0.0	6.5	1.4	*56.8*
28117	1957	49.2	0.0	6.5	1.4	*57.1*
28847	1959	49.5	0.0	6.5	1.4	*57.3*
29578	1961	52.5	0.0	6.5	1.4	*60.3*
30308	1963	53.3	0.0	6.5	1.4	*61.2*
31039	1965	53.8	0.0	6.5	1.4	*61.6*
31769	1967	54.0	0.0	6.5	1.4	*61.8*
32500	1969	54.2	0.0	6.5	1.4	*62.0*
33230	1971	54.3	0.0	6.5	1.4	*62.2*
33961	1973	54.4	0.0	6.5	1.4	*62.3*
34691	1975	54.5	0.0	6.5	1.4	*62.3*
35422	1977	54.6	0.0	6.5	1.4	*62.4*
36152	1979	55.1	0.0	6.5	1.4	*62.9*
36883	1981	55.5	0.0	6.5	1.4	*63.4*
37613	1983	54.2	0.0	6.5	1.4	*62.1*
38344	1985	53.4	0.0	6.5	1.4	*61.3*
39074	1987	55.1	0.0	10.5	1.4	*67.0*
365	1988	55.0	0.0	11.1	1.4	*67.4*
731	1989	54.8	0.0	11.3	1.4	*67.5*
1461	1991	54.7	0.0	11.2	1.5	*67.4*
2192	1993	55.6	0.0	12.0	1.5	*69.1*
2922	1995	55.4	0.0	12.2	1.5	*69.1*
3653	1997	56.0	0.0	12.6	1.5	*70.1*
4376	1999	46.3	0.0	9.9	1.6	*57.7*
4749	2000	40.6	0.0	8.5	1.6	*50.6*
5479	2002	32.9	0.0	6.6	1.6	*41.1*
6209	2004	27.8	0.0	6.1	1.5	*35.5*
6939	2006	24.6	0.0	5.8	1.4	*31.9*
7670	2008	22.5	0.0	5.6	1.4	*29.5*
8401	2010	21.1	0.0	5.5	1.3	*27.8*
9131	2012	20.1	0.0	5.4	1.2	*26.7*
9862	2014	19.4	0.0	5.3	1.1	*25.9*
10592	2016	24.9	0.0	7.1	1.1	*33.0*
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Day	Year	Z2 to Z6	Z2 to Z8	Z2 to Z9	Z2 to Z10	Total
11323	2018	25.4	0.0	7.1	1.1	*33.6*
12053	2020	25.5	0.0	7.1	1.0	*33.7*
12784	2022	25.6	0.0	7.1	1.0	*33.7*
13514	2024	25.6	0.0	7.1	1.0	*33.7*
14245	2026	25.6	0.0	7.1	1.0	*33.7*
14975	2028	25.5	0.0	7.1	1.0	*33.7*
15706	2030	25.5	0.0	7.1	1.0	*33.6*
16436	2032	25.5	0.0	7.1	1.0	*33.6*
17167	2034	25.4	0.0	7.1	1.0	*33.5*
17897	2036	25.4	0.0	7.1	1.0	*33.5*
18628	2038	25.4	0.0	7.1	1.0	*33.5*
19358	2040	25.4	0.0	7.1	1.0	*33.5*
20089	2042	25.3	0.0	7.1	1.0	*33.4*
20819	2044	25.3	0.0	7.1	1.0	*33.4*
21550	2046	25.3	0.0	7.1	1.0	*33.4*
22280	2048	25.3	0.0	7.1	1.0	*33.4*
23011	2050	25.3	0.0	7.1	1.0	*33.4*
23741	2052	25.4	0.0	7.1	1.0	*33.5*
24472	2054	25.4	0.0	7.1	1.0	*33.5*
25202	2056	25.4	0.0	7.1	1.0	*33.5*
25933	2058	25.5	0.0	7.1	1.0	*33.6*
26663	2060	25.5	0.0	7.1	1.0	*33.7*
27394	2062	25.6	0.0	7.1	1.0	*33.8*
28124	2064	25.8	0.0	7.1	1.0	*33.9*
28855	2066	25.9	0.0	7.2	1.0	*34.1*
29585	2068	26.0	0.0	7.2	1.0	*34.2*
30316	2070	26.2	0.0	7.2	1.0	*34.4*
31046	2072	26.3	0.0	7.2	1.0	*34.5*
31777	2074	26.4	0.0	7.2	1.0	*34.6*
32507	2076	26.5	0.0	7.2	1.0	*34.7*
33238	2078	26.6	0.0	7.2	1.0	*34.8*
33968	2080	26.6	0.0	7.2	1.1	*34.9*
34699	2082	26.7	0.0	7.2	1.1	*35.0*
35429	2084	26.7	0.0	7.2	1.1	*35.0*
36160	2086	26.8	0.0	7.2	1.1	*35.1*
36890	2088	26.8	0.0	7.2	1.1	*35.2*
37621	2090	26.9	0.0	7.2	1.1	*35.2*
38351	2092	26.9	0.0	7.2	1.1	*35.3*
39082	2094	27.0	0.0	7.2	1.1	*35.3*
39812	2096	27.0	0.0	7.2	1.1	*35.4*
40543	2098	27.0	0.0	7.3	1.1	*35.4*
41273	2100	27.1	0.0	7.3	1.1	*35.4*
42004	2102	27.1	0.0	7.3	1.1	*35.5*
42734	2104	27.1	0.0	7.3	1.1	*35.5*
43465	2106	27.1	0.0	7.3	1.1	*35.5*
Salinity (mg/L)		*18,364*	*20,000*	*5,931*	*13,638*	

Appendix B-2-(S5-2): Modelled salt load (tonnes/day) entering the River Murray in Scenario-5 (Renmark Area)



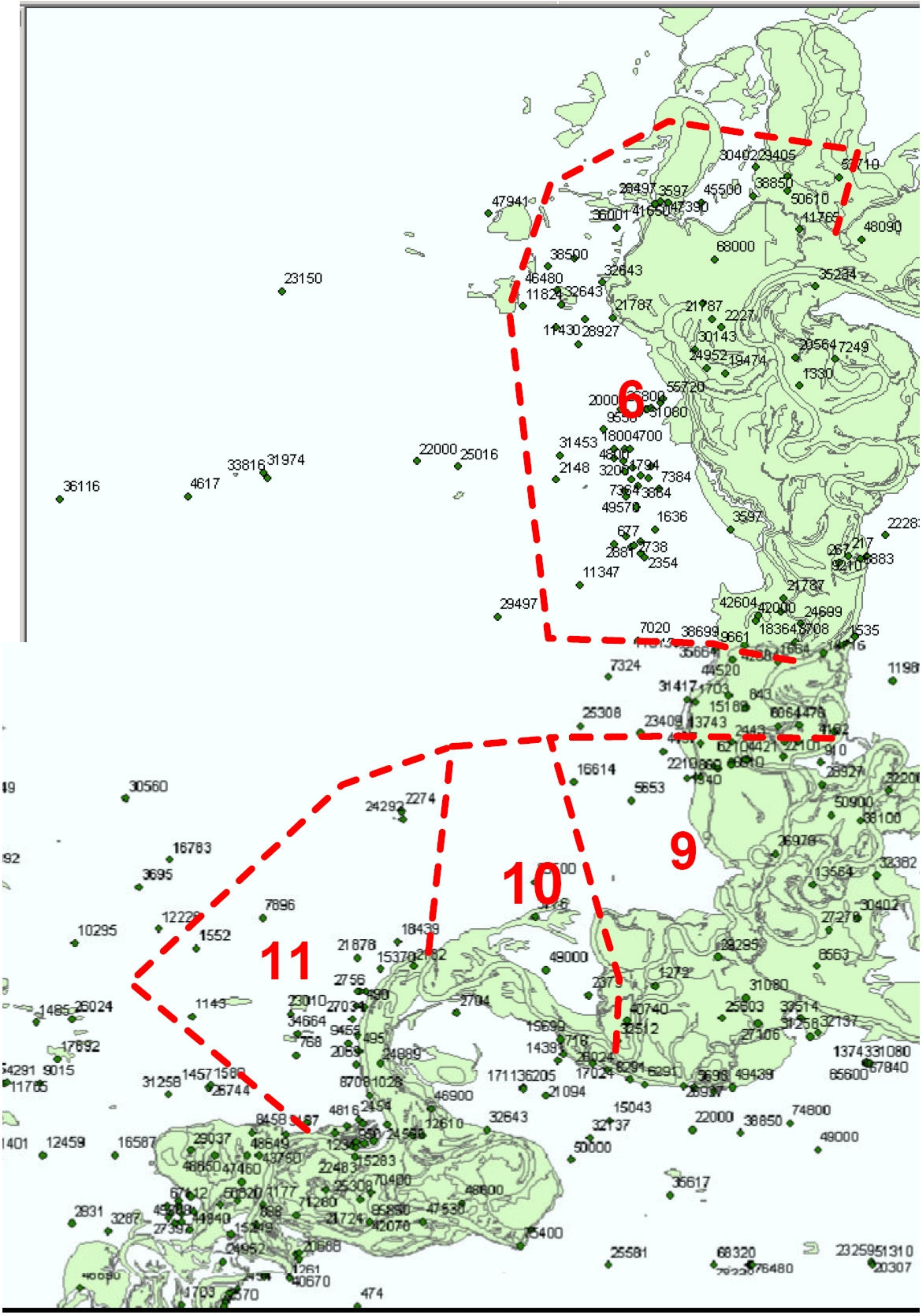
Appendix B-2-(S5-3): Graph of total modelled salt load (tonnes/day) entering the River Murray in Scenario-5 (Renmark Area)

Appendix C
Hydrogeology Data

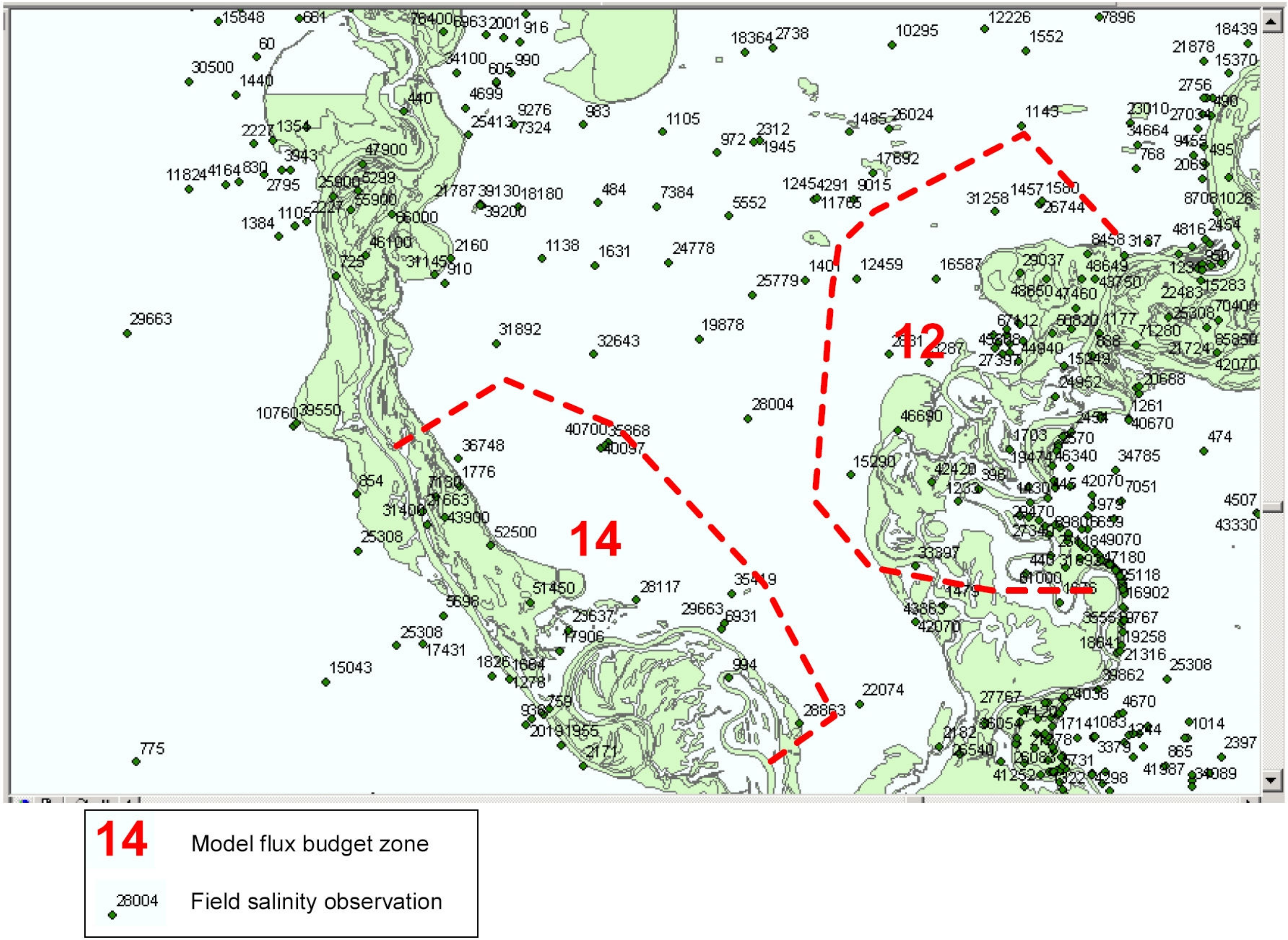
-Hydrostratigrahic units in the Berri-Renmark Region
-Location of field salinity values
-Statistical analysis of salinity zones

Age	Stratigraphic unit	Hydrostratigraphic unit	Lithology
Quaternary	Woorinen Formation	Perched aquifer where Blanchetown Clay inhibits vertical recharge.	Brown and reddish coloured aeolian silts and fine to medium ferruginous sands. Regularly containing moderate to hard calcrete horizons.
Quaternary	Coonambidgal Clay	Aquitard	Light greyish coloured moderately dense clay. Generally quite rollable with moderate plasticity.
Quaternary	Monoman Formation	Aquifer, semi-unconfined along the river valley.	Yellowish brown to greyish coloured fine to coarse sands and gravels. Clay lenses. Can be micaceous.
Quaternary	Blanchetown Clay	Aquitard.	Reddish brown silty gritty clays to light green, moderate to very dense clay with high plasticity.
Pliocene	Loxton Parilla Sands – Upper [1]	Aquifer, unconfined to semi confined in highland areas.	Yellowish orange coloured ferruginous fine to coarse sands and fine gravels.
	Loxton Parilla Sands – Lower [1]	Aquifer (as above)	Greyish coloured medium to coarse sands and fine to medium gravels. Quite micaceous, often carbonaceous and pyritic.
Pliocene	Lower Loxton Shells [1]	Aquitard. Transition from leaky zone to clay proper.	Medium greyish coloured silts and clays with interbedded shell fragments. Micaceous. Generally increasing in density and plasticity with depth.
	Lower Loxton Clays [1]		
Mio-Pliocene	Bookpurnong Beds	Aquitard. Main confining unit between Pliocene / Monoman sands and Murray Group.	Olive greyish to green coloured moderate dense, fossiliferous clay. Can be quite silty, but generally quite rollable, with high plasticity.
Miocene	Murray Group Limestone	Confined aquifer, multilayered.	Grey to off-white coloured fossiliferous, sandy limestone. Many different stratigraphic units within.

Appendix C-1: Hydrostratigraphic units in the Pike Murtho Region (Stadter, 2005)



Appendix C-2: Location of the field salinity values in the Renmark area



Appendix C-3: Location of the field salinity values in the Berri area

Field Salinity Samples

Zone 6		Zone 9	Zone 10
52710	3864	4497	23500
29405	7364	6210	3776
30402	4957	4421	49000
38850	1636	22101	2375
50610	3597	6810	
45500	677	2210	
26497	2738	860	
3597	2881	940	
47390	2354	5653	
41650	11347	16614	
36001	7020	26978	
32643	11015	1272	
38500	38699	40740	
46480	9661	32512	
11824	42604	31417	
32643	42000	13743	
21787	21787	4437	
11430	24699	1340	
28927	6708		
55720	18364		
26800	1664		
20000			
9550			
31080			
1800			
4700			
4800			
31453			
2148			
3200			
4794			
7384			

Salinity Statistics

Entire Renmark Reach	
Mean	18630.89
Standard Error	1900.549
Median	11430
Mode	3597
Standard Deviation	16459.23
Sample Variance	2.71E+08
Kurtosis	-0.979017
Skewness	0.613468
Range	55043
Minimum	677
Maximum	55720
Sum	1397317
Count	75

Zone 9	
Mean	12375.28
Standard Error	3032.819
Median	5931.5
Mode	#N/A
Standard Deviation	12867.16
Sample Variance	1.66E+08
Kurtosis	-0.280496
Skewness	1.025564
Range	39880
Minimum	860
Maximum	40740
Sum	222755
Count	18

Zone 6	
Mean	20677.57
Standard Error	2323.226
Median	18364
Mode	3597
Standard Deviation	16913.34
Sample Variance	2.86E+08
Kurtosis	-1.186701
Skewness	0.449804
Range	55043
Minimum	677
Maximum	55720
Sum	1095911
Count	53

Zone 10	
Mean	19662.75
Standard Error	10903.57
Median	13638
Mode	#N/A
Standard Deviation	21807.14
Sample Variance	4.76E+08
Kurtosis	-0.322876
Skewness	1.036921
Range	46625
Minimum	2375
Maximum	49000
Sum	78651
Count	4

Appendix C-4: Field salinity values and statistical analysis of salinity zones in the Renmark area

Field Salinity Samples

Zone 11	Zone 12		Zone 14
768	1457	15290	1776
1743	1580	2831	15938
2245	12202	3287	19258
2693	26604		21316
21878	26744		23472
23010	29037		28117
34664	33397		28863
1552	39277		35419
7896	44331		36748
24292	44940		51450
2274	45808		52500
1143	46690		40700
21878	48650		35868
18439	50789		40097
15370	64444		29663
2182	64622		6931
2756	67112		994
490	12459		23637
2703	16587		17906
9455	31258		43900
495	8458		21663
23010	48649		7130
34664	43750		31400
768	47460		
2069	56820		
8708	15248		
1028	24952		
2454	1703		
4816	9474		
24598	396		
950	1233		
3187	42420		

Salinity Statistics

Entire Berri Reach	
Mean	21654.26
Standard Error	1958.623
Median	20287
Mode	768
Standard Deviation	18581.13
Sample Variance	3.45E+08
Kurtosis	-0.719011
Skewness	0.564465
Range	66716
Minimum	396
Maximum	67112
Sum	1948883
Count	90

Zone 12	
Mean	29427.4
Standard Error	3556.68
Median	29037
Mode	#N/A
Standard Deviation	21041.6
Sample Variance	4.43E+08
Kurtosis	-1.261559
Skewness	0.099533
Range	66716
Minimum	396
Maximum	67112
Sum	1029959
Count	35

Zone 11	
Mean	9505.563
Standard Error	1909.796
Median	2729.5
Mode	768
Standard Deviation	10803.44
Sample Variance	1.17E+08
Kurtosis	-0.174623
Skewness	1.07361
Range	34174
Minimum	490
Maximum	34664
Sum	304178
Count	32

Zone 14	
Mean	26728.09
Standard Error	3023.818
Median	28117
Mode	#N/A
Standard Deviation	14501.72
Sample Variance	2.1E+08
Kurtosis	-0.557255
Skewness	-0.091466
Range	51506
Minimum	994
Maximum	52500
Sum	614746
Count	23

Appendix C-5: Field salinity values and statistical analysis of salinity zones in the Berri area