

## 2 Introduction

The threat of dryland salinity is a relatively new phenomenon in the North East Catchment Management Authority (NECMA) region only manifesting itself in the last 50 or so years. Rising ground water trends through the 1990's led to an increase in sites being identified and in community and agency interest in salinity in the region (Figure 1). The Catchment Management Authority (CMA) and the Department of Primary Industries (DPI) responded to this threat by implementing the North East Salinity Strategy affectionately known as "NESSI" (Figure 2). A key focus of the NESSI was to increase community awareness of salinity, as there was a perception that salinity did not occur in the region. This action plan takes into account the achievements made under the NESS and provides direction for salinity management in the NE CMA Region for the next 30 years.

The asset based approach has been used in the development of this plan. Therefore the underlying feature of this plan is to identify and protect the assets threatened by soil and water salinity. The plan uses the technical and social information gained over the last 10 or so years in the region to identify salinity processes and to determine the required management response. A review of the NESSI program was undertaken in 2002 and it highlighted that salinity should not be seen as a single issue. This new plan therefore takes a wider perspective using a multiple outcomes approach to achieve results consistent with the Regional Catchment Strategy framework.

This plan uses the Groundwater Flow Systems (GFS) approach consistent with that adopted by the Murray Darling Basin Commission. The GFS is a decision making tool for implementation of the recommended management options. There are 8 key Groundwater Flow Systems recognised in the region as being associated with the occurrence and management of salinity.

A community reference group was established to provide direction in the development of the plan. The community members were Roy Baird, David Dinning, Jim deHennin, Phyl McLean, James Neary, Judy Griffiths, Don Matthews, Bill Hotson, and Peter Curtis. Also represented was staff from Department of Primary Industries (DPI), Department of Sustainability & Environment (DSE), Goulburn Murray Water (GMW) and North East Catchment Management Authority (NECMA).

There are a number of new challenges associated with salinity management in the region, for example, the threat of urban salinity, particularly around Wodonga and Wangaratta. In addition the need to integrate the plan with the myriad of other significant issues in the region especially planning in a local government framework. This plan also highlights the changing climate scenarios that need to be considered in identifying salinity hazard, and in the development of management options and setting targets.



**Figure 1** – Tree and pasture decline is visible in salt affected sites in North East Victoria and is characteristic of the early signs of many of the sites identified.

## Timeline of salinity management in North East Victoria.

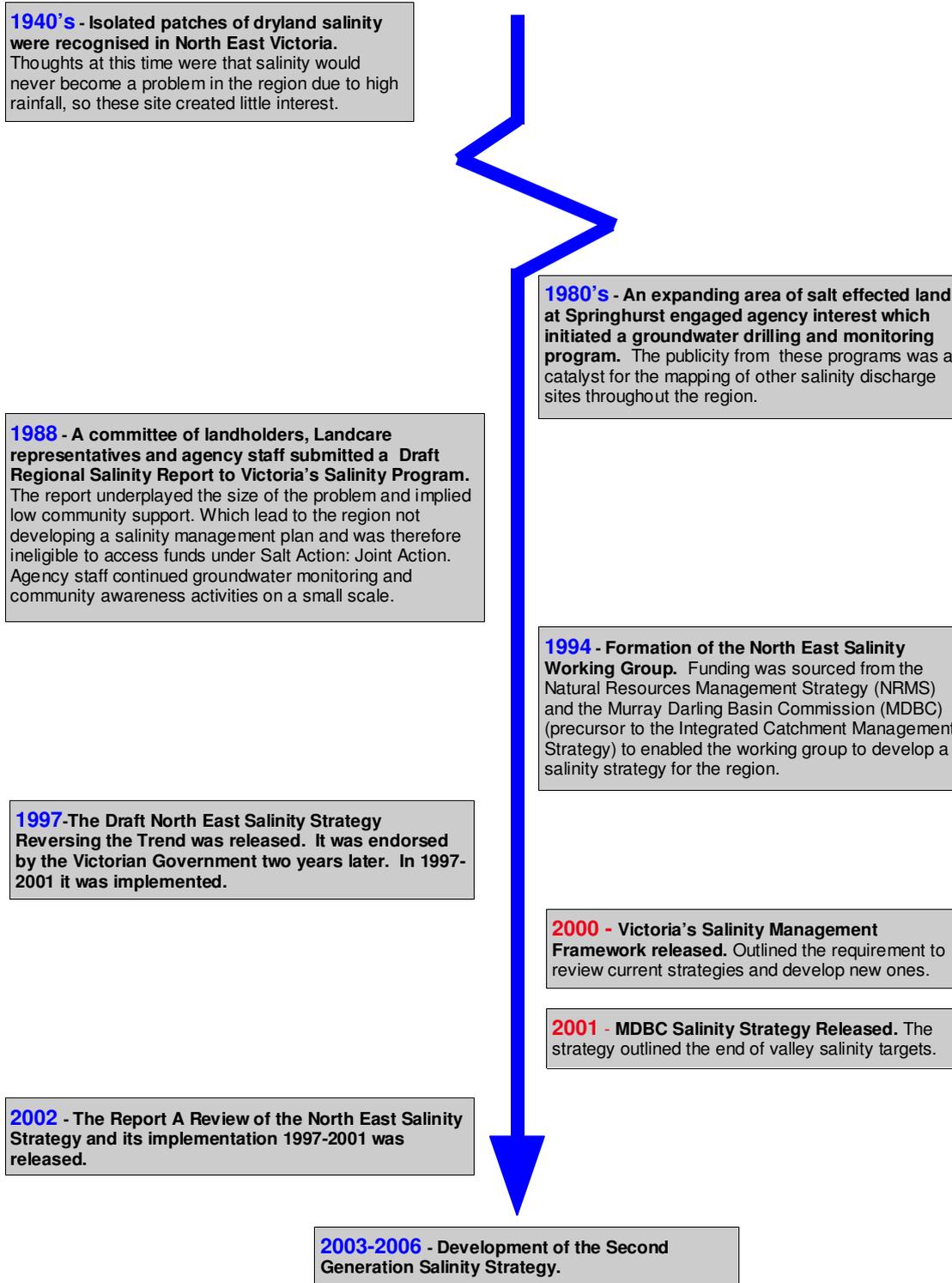


Figure 2 – This diagram represents the time line of the key events in salinity management in North East Victoria.

## 3 Salinity Management in North East Victoria

### 3.1 North East Salinity Strategy (NESS) 1997

Increased concern by the community over the impact of dryland salinity on the region led to the formation of the North East Salinity Working Group (NESWG) in 1994. The Working Group included landholders from a number of Landcare Groups and representatives from Department of Natural Resources (DNRE) and Charles Sturt University (CSU).

The Working Group commissioned several technical studies to improve understanding of dryland salinity processes, its extent and likely trends. This work underpinned the development of the NESS. The Draft North East Salinity Strategy was launched in December 1997, and was subsequently endorsed by the Victorian Government in 1999.

The vision of the strategy was *'to control salinity in the North East Region for the benefit of the environment, local communities and down stream user'*

The strategy had 7 principles:

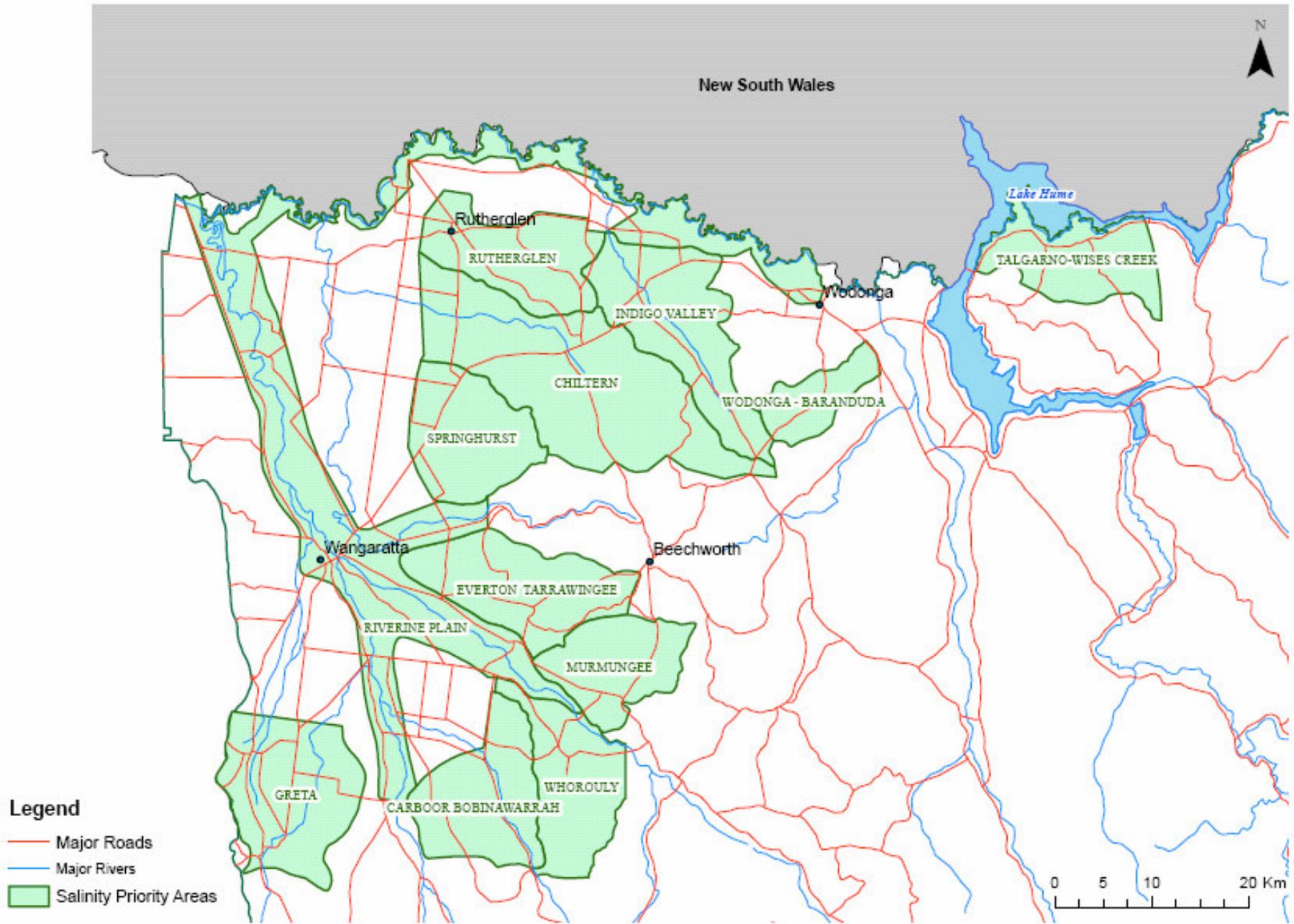
- Protection of high value environmental areas
- Protection of water quality for downstream users
- Treatment of high recharge areas
- Interception of groundwater
- Integration with other natural resource programs
- Protection and rehabilitation of discharge areas
- Integration with primary production

The NESS identified 'salinity priority areas' (SPAs) where the implementation of the strategy could be best focused and the limited resources could be best used to have the greatest benefit (Figure 3). The priority areas were based on:

- Area of salt-affected land
- The potential risk of salt-affected land to spread
- The potential impact on environmental values, urban communities and surrounding areas
- Availability of sound land management practices
- Local community commitment to address the issue.

The Whorouly SPA has no area of land affected by salinity but is still considered a priority based on the impact it has on the surrounding catchments such as Carboor-Bobinawarrah and the Riverine Plain and the other factors listed above.

**Figure 3** - Map of the 12 salinity priority areas were identified in the original NESS based factors such as: area of salt affected land, the potential risk of salt affected land to spread and the potential impact on environmental values, urban communities and surrounding areas.



### 3.2 Summary of Achievements of the North East Salinity Strategy

The achievements made during the implementation of the NESS can be summarised as:

- Better understanding of management options
- Increased community awareness of salinity and sustainable land use,
- Improved knowledge of salinity processes,
- Implementation of on-ground works,
- Working within an integrated framework,
- Building skills and capacity for change in Landcare groups and community.

A wide variety of activities were undertaken to reach these achievements (Table 1).

**Table 1** - A Summary of the wide range of activities undertaken during the implementation of the NESS.

Key Achievement	Activities
Better understanding of management options	<ul style="list-style-type: none"> <li>• Publication of the 'Managing Dryland Salinity with Vegetation in North East Victoria' report.</li> </ul>
Increased awareness of salinity and promote sustainable landuse.	<ul style="list-style-type: none"> <li>• Field days (Figure 4) - Spring 1999 field days on groundwater processes and perennial vegetation (120 people attended).</li> <li>• Development of four coloured brochures: 'Groundwater Monitoring Summary North East Salinity Strategy - Year 2000', 'Is It Salt?', 'Understanding Salinity', and 'Managing Dryland Salinity with Perennial Vegetation'.</li> <li>• Distribution of North East Salinity Strategy Implementation (NESSI) newsletter commenced in winter 1999 (3500 hard copies per edition) circulated to landholders in salinity priority areas, as well as an electronic version which is circulated to agency staff and others across Victoria and interstate (29 editions).</li> <li>• Production of the North East Salinity page on the DPI web site with all NESSI newsletters and NE salinity publications, with links to other web sites eg, NECMA.</li> <li>• Salt watch and education activities held in schools</li> <li>• Media articles.</li> <li>• Development of a brochure, 6 posters and a video on the CSIRO Heartlands project.</li> </ul>
Improved knowledge of salinity processes	<ul style="list-style-type: none"> <li>• 330 groundwater bores drilled and monitored in NE CMA region.</li> <li>• 3 discharge sites monitored (as part of the state network).</li> <li>• Discharge site mapping expanded to include 35 additional salinity sites assessed and 25 existing sites reassessed.</li> <li>• 4 continuous stream flow monitoring sites established and reported on each year.</li> <li>• Recharge mapping undertaken.</li> </ul>
Implement on-ground works	<ul style="list-style-type: none"> <li>• High density tree planting (Figure 4).</li> <li>• Protection of remnant vegetation including native grasses.</li> <li>• Perennial pasture establishment (lucerne, phalaris, cocksfoot).</li> <li>• CSIRO/CMA/DPI Heartlands on-ground works in the Byawatha Hills.</li> </ul>

Build skills and capacity for change in Landcare groups and community.	<ul style="list-style-type: none"> <li>• Adoption of on-ground works (listed above)</li> <li>• Demonstrations on properties that had undertaken works.</li> <li>• Publication of 'Providing the knowledge base for landscape change in the Ovens Catchment' (CSU).</li> </ul>
Working within an integrated framework	<ul style="list-style-type: none"> <li>• Involvement in Heartlands project.</li> <li>• Combined project delivery with Landcare Groups.</li> </ul>

**Figure 4** – Photos of field days and tree planting activities undertaken in the implementation of the NESS.



### 3.3 North East Salinity Strategy Review

In 2002 the NESS and its implementation was reviewed by Charles Sturt University, as part of a state-wide review of Salinity Management Plans (Allan and Curtis, 2002). The review examined how effectively the Strategy accomplished its goals and addressed stakeholder needs. This was undertaken through interviews with individual landholders and agency staff, discussion groups and document review. The review concluded that, in the context of the four and a half years of the NESS program's activities, the Strategy provided '...a good foundation for future management of salinity in the NECMA region'. The review provided a list of recommendations to improve the effectiveness of the NESS program.

The review highlighted that -

- NESS was a fledgling program – only four years old.
- Just how limited the scientific/technical information was on the status of salinity in the North East prior to the implementation of NESS.
- Just how limited community awareness was of salinity, which the review identified as 'certainly raised over the period'.

- The further development of the NESS and its implementation was considered a valuable turning point in salinity management in the North East region. However, reflection on whether a focus on salinity was necessarily the best approach would be a useful activity.
- Short term and uncertain nature of project funds also impacted on planning, skewing it towards short term activities.
- Evaluation was not addressed well.
- Structural constraints on using new learning should also be considered.
- Staffing levels would need to remain at current levels to maintain the momentum of the program.
- Most people surveyed regarded salinity as just one of many symptoms of inappropriate land management. Salinity should not be focused on as a single issue.

### **3.4 Social Aspects of Salinity Management in the Region**

In 2001 Charles Sturt University undertook a survey of landholders in the Ovens Valley to explore social dimensions of natural resource management (Curtis *et al* 2002). The survey explored landholders' capacity and willingness to change on-property management, and identified social factors limiting the uptake of incentives. The survey found:

- Dryland salinity was not widely regarded as being a very important/important threat to the long-term productive capacity of land in the district. However, there was a high level of readiness to work with government to manage salinity in respondents' areas, and a strong recognition of the need for local cooperative action to prevent the water table rising.
- Respondents who reported evidence of salinity on their property were significantly more likely to be concerned about salinity. They were more likely to be involved in measures to ameliorate salinity. At the planning stage (through Landcare membership and preparing property plans), or through implementing land management change (establishing perennial pastures or adopting recommended practices for planting trees for farm forestry, shelter and shade, erosion control and recharge control).
- There was a moderate level of scepticism about the ability of perennial vegetation to prevent the water table rising, and a moderate level of knowledge of introducing perennial grasses. Increased knowledge lead to the increased adoption of current recommended practices for planting trees for farm forestry, shelter and shade, erosion control and recharge control.

## **4 Development of The Action Plan**

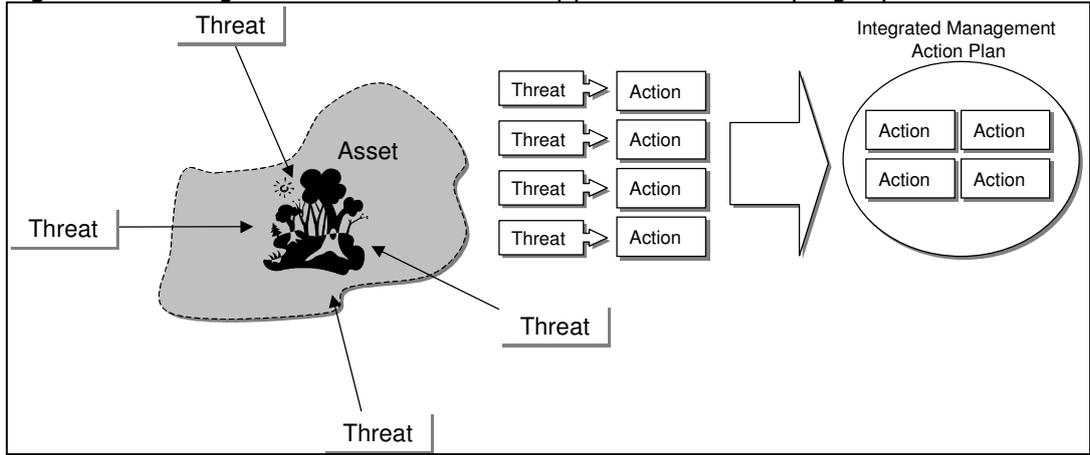
### **4.1 Summary of the Approach taken in the Development of the Plan**

The State of Victoria has a policy that supports the re-development of regional salinity strategies at intervals of five to ten years. The objectives of this policy are:

- (a) to ensure that action plans are consistent with the findings of new knowledge and
- (b) That there are opportunities to vary regional approaches to salinity management as experience with implementation is gained. Therefore the review of the NESS and development of this action plan was initiated under this policy.

The challenge in developing this plan was to bring together the learning's and knowledge from the existing plan and combine this with the latest information so as to create a plan that aligned with relevant government objectives. The approach taken in the development of this plan has changed since its initiation, because of the changes in direction provided by the state and direction by the community. The asset based approach has been used in the development of this plan (Figure 5). This approach involves focusing on protecting the things of value in the region rather than focusing on the issues that impact on them.

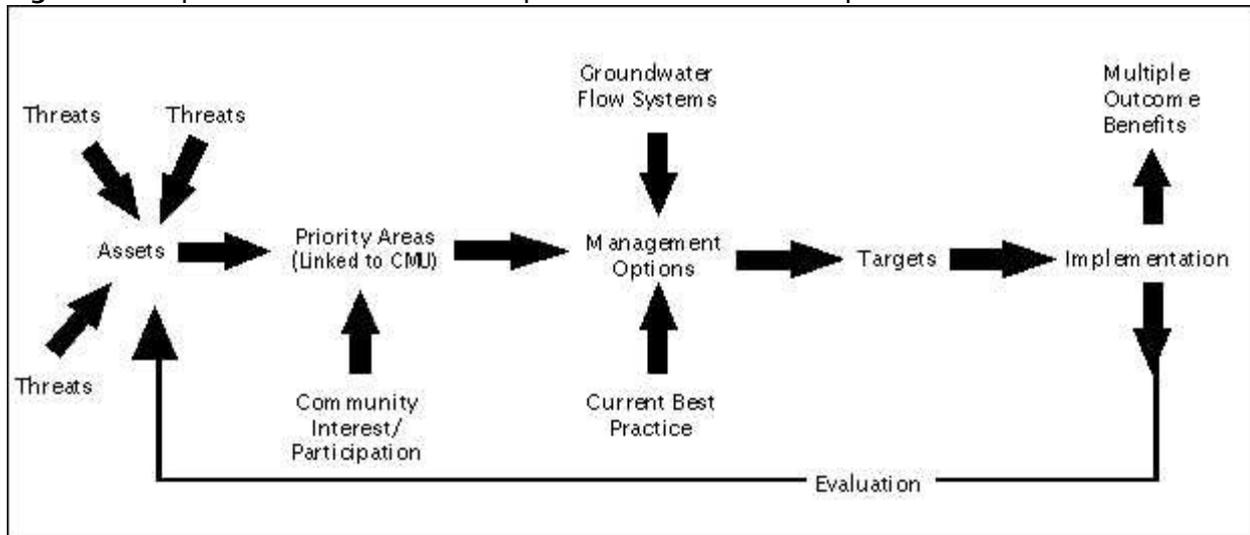
**Figure 5 - A diagram of the asset based approach to developing a plan.**



By taking this approach the plan is aligned with the RCS. The RCS identifies the assets and threats to assets in the region. This is the first two steps in the asset-based approach. This plan expands on these concepts, highlighting how assets are currently affected. It also predicts the impact of salinity, as well as the relationship that salinity has with other threats. The threat of salinity can be described as rising water tables, saline discharge areas and saline water.

The next step is to identify actions that protect and enhance the assets. There are a number of limitations in following this approach to its true form. There is a lack of base information on assets and their value within the region. It was not possible during the development of this plan to undertake a full analysis of assets in the region. This has seen a number of other tools being used in identifying the approach to protect and enhance assets. (Figure 6).

**Figure 6 - Representation of the development of the North East plan.**



This plan has retained the concept of salinity priority areas (SPA's), that were identified in the NESS. The areas have been reviewed in the development of this plan to ensure that they align with the asset-based approach. These areas have a concentration of discharge areas and threatened assets and are therefore priority areas for salinity management in the catchment (Table 2). This is explored further later in the plan when specific assets are identified. There is also discussion in Section 9.7 regarding the Implementation strategy. The key assets threatened by salinity in the region match with Groundwater Flow Systems used in developing this plan. It also highlights the approach being taken in the review of the NC Salinity Plan using the (SIF3) Salinity Investment Framework developed by the CRC Salinity. The priority areas have been aligned with catchment management units (CMU's). This aligns this Plan with the RCS and regional reporting requirements. All of the implementation will be undertaken in cooperation with community groups such as Landcare.

**Table 2 – Area (ha) and percentage of discharge sites found within each salinity priority area.**

<b>Priority Area</b>	<b>Area of Discharge Sites (ha)</b>	<b>%</b>
Carboor/Bobinawarra	78	5.9
Chiltern	3	0.2
Everton/Tarrowingee	67	5.1
Greta	77	5.9
Indigo Valley	105	8.0
Murmungee	25	1.9
Riverine Plain	658	50.2
Rutherglen	18	1.4
Springhurst	53	4.0
Talgarno/Wises Creek	7	0.5
Whorouly	0	0.0
Wodonga/Baranduda	25	1.9
Outside priority zone	272	20.8
<b>Total</b>	<b>1311(ha)</b>	<b>100.0%</b>

The concept of Groundwater Flow Systems (GFS) is introduced in this plan as a tool for identifying actions to protect and enhance assets. The GFS are regions that have similar geological and geomorphic attributes that define similar groundwater systems. By understanding these attributes the recommended actions are the most likely to have the greatest benefit.

Key considerations in the development of this plan are:

- the existing NESS and its review
- incorporate new knowledge of salinity processes and management
- alignment with all levels of government policy
- have the support of the catchment community
- incorporation of multiple outcomes
- linking asset protection to potential threats

In late 2002 a community reference group was formed to oversee the development of this action plan. This group consisted of representative from:

- North East Catchment Management Authority (NECMA) and its community committees
- Community members
- Department of Primary Industries
- Department of Sustainability and Environment
- Goulburn Murray Water

The salinity reference group engaged consultants in May 2004 to work closely on the development of the plan. A salinity technical working group was formed to oversee the technical aspects. This group reported to the community reference group.

The development process included:

- A review of the previous NESS
- A review of existing information relevant to salinity in the region
- Updating mapping of salinity sites in the region
- Extensive mapping and modelling of catchment processes and threats to assets
- Development of a conceptual model for groundwater flow in the Ovens Basin
- Field trips to review the GFS in the region
- Contracting consultants
- A series of community reference group and technical group meetings to provide direction to the DPI/CMA staff and consultant.
- Meeting with the NECMA Board
- Identifying assets affected by salinity
- Identifying management options
- Identifying targets

A number of draft documents have been presented to the community reference group, who provided comments and appropriate changes were made.

## 4.2 Government Policy

The national significance of dryland salinity has been recognised in a suite of policies developed across all levels of government, and through many strategic planning exercises conducted throughout Australia. There are a number of relevant policy and planning documents that have direct relevance to dryland salinity management within the NECMA region. These have been taken into account in the development of this plan (Table 3).

**Table 3** – Key government policies taken into account in the development of this plan.

Organisation	Overview	Objectives/Targets	How it relates to salinity management planning in the North East.	Other relevant policy and documents to consider at this level
<b>NATIONAL/BASIN POLICY: Basin Salinity Management Strategy 2001-2015 Launched – August 2001</b>				
<b>Murray Darling Basin Commission</b>	The Basin Strategy outlines end of valley targets for each tributary in the MDB and a Basin target at Morgan in South Australia. The targets are a method of measuring the progress of the strategies' outcomes, while also identifying acceptable salinity levels and saltloads in key tributaries throughout the MDB.	<p>Objectives:</p> <ul style="list-style-type: none"> <li>Maintain the water quality of the shared water resources of the Murray and Darling Rivers for all beneficial uses agricultural, environmental, urban, industrial and recreational.</li> <li>Control the rise in salt loads in all tributary rivers of the Basin and, through that control, protect their water resources and aquatic ecosystems at agreed levels.</li> <li>Control land degradation and protect important terrestrial ecosystems, productive farm land, cultural heritage, and built infrastructure at agreed levels Basin-wide.</li> <li>Maximise net benefits from salinity control across the Basin.</li> </ul>	<p>Targets for tributaries in the North East are:</p> <ul style="list-style-type: none"> <li>Ovens River at Peechelba East – salinity to be maintained within 100% and salt loads within 101% of current levels.</li> <li>Kiewa River at Bandiana – salinity and salt load to be maintained within 100% of current levels.</li> <li>Upper Murray = To be advised.</li> </ul> <p>(This implies no increase in salt loads based on the 2000 conditions, utilising 1975-2000 climatic bench mark)</p>	<ul style="list-style-type: none"> <li>Integrated Catchment Management in the Murray Darling Basin 2001-2010 (Murray Darling Basin Council) (2001)</li> <li>Australian Dryland Salinity Assessment 2000 (National Land &amp; Water Resources Audit)</li> <li>Dryland Salinity and its Impact on Rural Industries and the Landscape (Prime Minister's Science, Engineering and Innovation Council). (1999)</li> </ul>
<b>STATE POLICY: Victoria's Salinity Management Framework: Restoring our Catchments Launched August 2000</b>				
Organisation	Overview	Objectives/Targets	How it relates to salinity management planning in the North East.	Other relevant policy and documents to consider at this level
<b>Department of Primary Industries and Department of Sustainability and Environment (Previously</b>	The Framework identifies the need to build on the achievement of the Salt Action: Joint Action program. The progress of salinity management in Victoria is highlighted in the document as are the challenges and future	<p>Targets:</p> <ul style="list-style-type: none"> <li>By 2005, there will be representative coverage of monitoring, sufficient to account for the impacts of groundwater rise and river salinity.</li> </ul>	The Framework identified the need to review existing strategies and update them	<ul style="list-style-type: none"> <li>Salinity Management in Victoria: Future Directions (2000)</li> <li>Victorian River Health Strategy (2002)</li> </ul>

<b>Natural Resources and Environment)</b>	Salinity with integrated catchment management that simultaneously considered the environmental, economic and social benefits.	<ul style="list-style-type: none"> <li>• By 2005 critical recharge zones within catchments will be identified with 50% of these critical areas revegetated by 2015.</li> <li>• By 2005 a quarter of agricultural production will be produced from natural resources that are managed within their capacity. By 2015 this will increase to half of all agricultural production.</li> <li>• By 2015 there will be a real reduction in the environmental and economic impacts of salinity.</li> <li>• By 2015 Victoria will have investigated, and where practical, substantially reduced the impact of rising groundwater on the riverine environment and key wetlands.</li> <li>• By 2015, Victoria will have participated in joint Murray Darling Basin salt interception schemes to earn sufficient salt credits to provide for future drainage, new irrigation development and to protect important environmental values.</li> </ul>		<ul style="list-style-type: none"> <li>• Victorian Native Vegetation Framework</li> <li>• Victorian Pest Management Framework: A Framework for Action (Fox Management Strategy) (2002)</li> <li>• Victorian Pest Management Framework: A Framework for Action (Rabbit Management Strategy) (2002)</li> <li>• Securing our water future together: our water, our future (White Paper) (2004).</li> <li>• Victoria's Biodiversity Strategy (1997)</li> <li>• Sustainability Action Statement (2006)</li> <li>• The Impact of Acid Soils in Victoria (2002)</li> <li>• Growing Victoria Together</li> <li>• Victoria's Environmental Sustainability Framework (VESF)</li> </ul>
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**REGIONAL POLICY: North East Regional Catchment Strategy (NERCS) Launched 2004**

Organisation	Overview	Objectives/Targets	How it relates to salinity management planning in the North East.	Other relevant policy and documents to consider at this level
<b>North East Catchment Management Authority</b>	The RCS was developed as an overarching document to coordinate catchment management, by integrating land, water and Biodiversity management planning activities. It outlines the major threats to the assets in the North East, and outlines management options for all the threats.	Objectives: <ul style="list-style-type: none"> <li>• Improve understanding of effective natural resource management</li> <li>• Prepare plans for conservation, enhancement and balanced use of natural resources</li> <li>• Build the means and capacity to implement plans</li> <li>• Facilitate necessary changes in</li> </ul>	The RCS identifies soil salinity and water salinity as a threat to assets in the region.	<ul style="list-style-type: none"> <li>• North East Soil Health Action Plan (2001)</li> <li>• Ovens Basin Water Quality Strategy (1998)</li> <li>• Upper Murray Water Quality Strategy(1999)</li> <li>• North East Native Vegetation Strategy (Draft) (2000)</li> </ul>

	Vision - diverse, healthy landscapes; vibrant communities	<ul style="list-style-type: none"> <li>practices and management</li> <li>Evaluate progress and learn from results</li> </ul>		<ul style="list-style-type: none"> <li>Regional Rural Drainage Management Strategy (1999)</li> </ul>
				<ul style="list-style-type: none"> <li>North East Weed Action Plan (2001)</li> <li>North East Rabbit Action Plan (2002)</li> <li>Biodiversity Actions Plans (on-going)</li> <li>North East Regional River Heath Strategy (2006)</li> <li>Draft Wetlands Strategy (in development)</li> </ul>

NOTE: There are a number of relevant state and regional policies such as the Victoria's Biodiversity Strategy (1997) and the Sustainability Action Statement (2006) that not been outlined in detail within this plan. They are however, considered to be fundamental in its implementation, and have been taken into account throughout this action plan and especially in the multiple outcomes section 9.7.8.