Corangamite Catchment Management Authority
in collaboration with the Colac Otway, Corangamite, Golden Plains and Surf Coast Shires

Salinity Management Overlay Project

Cover Report

August 2006

EnPlan-DBA, with Dahlhaus Environmental Geology, and Chris Harty Planning and Environmental Management

Development of Salinity Management Overlays for Corangamite Region Planning Schemes: Corangamite, Golden Plains, Colac Otway, and Surf Coast Shires .

Client: Corangamite CMA in association with the Colac Otway, Corangamite, Golden Plains, and Surf Coast Shires

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Cover photograph:

Caption: Building damage caused by salinity and associated dampness in regional Victoria.

Foreword

This Cover Report should be read together with the following twelve attached documents, which together comprise the Project outputs

Planning Scheme Amendments

- *Proposed Salinity Management Overlay and associated planning scheme amendments for the Corangamite Shire*
- *Proposed Salinity Management Overlay and associated planning scheme amendments for the Colac Shire*
- *Proposed Salinity Management Overlay and associated planning scheme amendments for the Golden Plains Shire*
- *Proposed Salinity Management Overlay and associated planning scheme amendments for the Surf Coast Shire.*

Information Kit for applicants in SMO areas,

- *Soil Salinity - What To Look For. Developing, Building Or Buying Real Estate Within A Salinity Management Overlay.*
- *Permit Application Requirements for Development Proposals where a Salinity Management Overlay Applies.*

Building standards

- *Standards for Building in a Saline Environment : Construction of Dwellings and Outbuildings*

Salinity Technical Reports

- *Golden Plains Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 1. June 2006.*
- *Colac Otway Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 2. June 2006.*
- *Corangamite Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 3. June 2006.*
- *Surf Coast Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 4. June 2006.*

'Best Practice'

- *Salinity Management Overlays for the Colac Otway, Corangamite, Golden Plains and Surf Coast Shire Planning Schemes: Part 1: (Best Practice Report) and Part 2: (Summary statements on Victorian Municipalities with SMOs)*

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Executive Summary

Introduction

The purpose of this project was in brief, to develop Salinity Management Overlays documentation and an associated information kit for the Corangamite, Colac Otway, Golden Plains and Surf Coast Shires in the Corangamite Catchment Management Authority Region. The SMO documentation was to be in a form ready for advertisement by the respective Shires in order to introduce the SMOs via amendment to their respective planning schemes. The project was also to investigate and report on building standards for application in SMO areas.

Project outputs

The outputs of the project are:

- *This cover report.*
- *The SMO and associated statutory documentation for the Shires, ready for application to the Planning Scheme amendment process;*
    - ***Proposed Salinity Management Overlay planning scheme amendment for the Corangamite, Colac, Golden Plains, and Surf Coast Shires.***
- *Two documents forming an information kit for applicants in SMO areas, and a review document on buildings standards information for building in a saline environment;*
    - ***Soil Salinity - What To Look For. Developing, Building Or Buying Real Estate Within A Salinity Management Overlay.***
    - ***Permit Application Requirements for Development Proposals where a Salinity Management Overlay Applies.***
    - ***Standards for Building in a Saline Environment: Construction of Dwelling and Outbuilding.s'***
- *Reports on salinity in each of the four participating municipalities that provide the technical justification that underpinning the designation of SMO areas.*
    - ***Golden Plains Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 1. June 2006.***
    - ***Colac Otway Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 2. June 2006.***
    - ***Corangamite Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 3. June 2006.***
    - ***Surf Coast Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 4. June 2006.***

- *A 'best practice' report on SMO application and associated tools for addressing salinity.*
    - ***Salinity Management Overlays for the Colac Otway, Corangamite, Golden Plains and Surf Coast Shire Planning Schemes: Part 1: (Best Practice Report) and Part 2: (Summary statements on Victorian Municipalities with SMOs).***

The statutory documentation is the primary output.

All of the above documents that accompany this cover report have been developed in consultation with the respective Shires and the Corangamite CMA. These should be read with this cover report.

The following text presents the main Project findings:

General findings

There is no single 'best practice' example of application of the Salinity Management Overlay.

The SMO has generally been used in rural areas as a tool retain native vegetation in groundwater 'recharge areas'.

However, it is also applied in rural and urban areas where there is risk of salinity damage to built infrastructure and the environment. In this case, litigation against responsible authorities is conceivable, if such damage could reasonably have been predicted.

The City of Greater Bendigo applies the SMO in urban areas, however few planning schemes recognise salinity incidence as a matter that can impact on built infrastructure.

The style of SMO varies from blanket application over substantial portions of municipalities with no differentiation, through to detailed mapping of discharge and recharge areas. Extremes are:

- *Golden Plains, where the current SMO is a blanket application across the entire rural area, but with no application inside township boundaries.*
- *Bendigo, where discharge and recharge areas are mapped at detailed levels.*

'Best practice' also requires attention to building standards and to public information.

There are no formal salinity building standards in the Australian Building Code although the Code does contain provisions for minimising the risk of moisture damage. Modifications to the code have been introduced in NSW and SA. Further, Camden and Fairfield City Councils in NSW, have introduced policies that require all new building, regardless of location, to incorporate specified provisions to minimise the risk of salinity damage. The purpose of this is to minimise potential litigation against Councils. It can also be considered best practice for areas currently or likely to experience salinity problems.

'Best practice' at local government level also requires public information explaining salinity and statutory planning processes. The preparation and availability of such materials has been best handled in the Western Sydney region, and in the rural cities of Dubbo and Wagga Wagga..

Other tools currently used include:

- *The Western Sydney Region Salinity Code of Practice, which provides a consistent framework for action across municipalities.*
- *The use of a two staged reporting process for proposed developments:*
  - *Stage 1 (preliminary) report on the potential for high watertables or salinity at a site, or for potential for development to cause salinity.*
  - *Stage 2 (detailed) reporting for areas identified from Stage 1 as being at risk of salinity impact, and including measures to ameliorate salinity and its impact.*

Application of SMOs in the participating Shires.

SMOs may vary across municipalities. Key factors are:

- *the availability of mapping material and the suitability of mapping scales; and*
- *confidence levels ascribed to mapped information.*

In short, it is essential that mapped information and associated text content in SMOs and the supporting planning policy framework can withstand scrutiny and challenge.

In this project the four municipalities have received the same standard of mapping data, and any differences between their proposed planning scheme amendments reflect the structure of their planning schemes and local preferences.

The following summarises the approaches preferred by all four participating Shires.

Areas of known secondary salinity, and areas of primary salinity not currently recognised as sites of environmental value under the Planning Scheme, have been mapped. The SMO has been applied over these mapped areas for introduction into the Planning Scheme. A schedule to the SMO has also been prepared with limited exemptions from the need for a planning permit. A suite of issues, objectives and strategies have been prepared for the Municipal Strategic Statement. These provide guidance for Council in determining planning applications for development triggered by the SMO.

The policy directions provided in the MSS relate to:

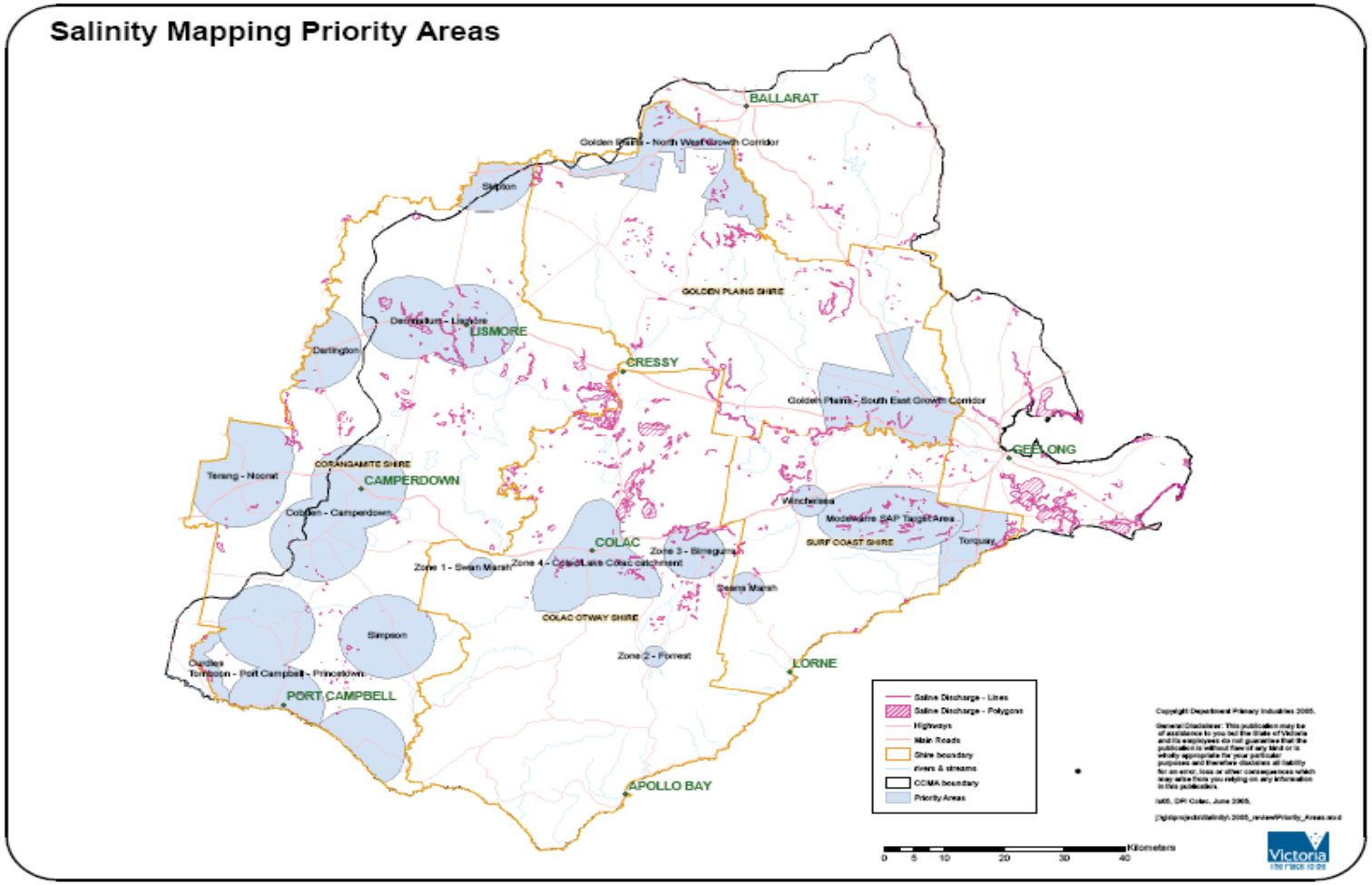
- *The potential impact of salinity on the development at a site;*
- *The potential impact of the development at a site on environmental conditions (specifically salinity) elsewhere in the catchment;*
- *The need to highlight areas within the Shire that have potential to be impacted by salinity as a result of land uses and development that are of a sufficient scale to alter hydrological processes; and*
- *Ensuring that salinity is included in the consideration of urban re-zonings and large subdivisions.*

Information package

A two-part salinity information package is proposed for use by councils, permit applicants or real estate purchasers where a salinity Management Overlay applies.

*The document titled **'Standards for building in a saline environment. Construction of Dwelling and Outbuildings'** informs the CCMA and Shires on current and prospective Australian Standards for building in saline environments in Australia.*

Figure 1: Map of Region



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1 Introduction

1.1 The Corangamite Catchment Management Authority

In its charter the Corangamite Catchment Management Authority (CCMA) is in summary, responsible for the strategic planning and advice on land and water resources, the monitoring of and reporting on resource condition, and undertaking statutory responsibility for waterways and floodplain management under the Water Act (1989).

The vision of the CCMA is to strive for a healthy and sustainable relationship between the natural environment and the community's use of land and water resources.

The CCMA is responsible for:

- Development and implementation of the Regional Catchment Management Strategy (RCS).
- Strategic planning for natural resource management in the region.
- Provision of advice to the Minister on regional resource management matters.
- Monitoring and reporting on the health of the catchment, particularly the condition and management of water resources.
- Reporting on outcomes to both the community and government.
- Undertaking the statutory responsibility for waterway and floodplain management under the *Water Act (1989).*

The CCMA and eight other Regionally-based CMA's in Victoria commenced operation in 1996. Prior to this, the Region had a considerable history of works to improve the condition of catchment resources and productive health of the Region. This notably included:

- Past programs of the former Soil Conservation Authority (SCA) which existed from the early 1950's to 1983 prior to the incorporation of its functions into the now Department of Sustainability and Environment, and in part, CMA.
- River Management Boards, which similarly became incorporated into CMA's across the State

1.2 Salinity in the Corangamite Region

The Corangamite Regional Catchment Strategy defines a number of biophysical threats to the natural resources of the Region: Sediments and turbidity, nutrients, salinity, decreased flow, increased flow, weeds, pest animals, diseases, fauna destruction, soil deterioration, climate change, and disasters.

The Strategy draws upon the Region's Corangamite Salinity Strategy *Restoring The Balance* was initially released in 1994 as part of the Victorian Government's Salt Action: Joint Action initiative. This involved regional communities in salt affected areas working in partnership with Government to develop and implement regional salinity management plans. Nineteen plans and two strategies were developed across the State.

The Corangamite strategy indicated approximately 16,200 ha, or 0.88 per cent, of the Region was affected by salt, and salinity was identified as the major water quality problem in the Moorabool, Werribee, Leigh, Barwon and Woady Yaloak Rivers. Specifically:

- one third of the total being primary salting (ie present prior to European settlement).
- one fifth of wetlands and waterways were deemed salty (above 5,000 EC), with Salinity levels in the Barwon River at Winchelsea having increased by 12 per cent from 1956-60 to 1982-86.
- secondary land salting (ie: caused by land changes since European settlement) had increased by 2.0 per cent

The report predicted the area of secondary land salting would increase to 14,600 ha in 2001 and 27,800 ha in 2021 if no intervention occurred, and that gradual changes of between 40 and 110 EC would occur to the salinity of the Geelong and Ballarat urban water supplies over a 10 year period. No estimates were made of waterway or wetland salting because of a paucity of data.

Salinity costs were calculated on the area of salt affected land and the increased cost to domestic and industrial users. The costs are indicated below. However, figures developed were considered an under estimate as they did not include those associated with impacts on items such as infrastructure deterioration, wetlands and waterway decline, loss of amenity values and only half the urban and domestic water users.

Salinity hot spots were identified in parts of the Region and ground water flow land units were later identified within which land use hydrology and hydrogeology can be expected to respond uniformly to land use changes. A range of physical measures were also identified for application to limit expansion, treat affected areas, and where feasible to reduce salinity impact. Action targets were also set.

The Regional Salinity Plan is currently being redeveloped based in part on new information including groundwater flow systems and knowledge associated with them.

Further, salinity is identified on page 73 of the RCS as a key threat in the following contexts:

- Economic threat to land use and to infrastructure.
- Environmental threat to surface waters

In discussion on key threats the RCS states the following:

> Salinity *is an expression of the surrounding hydrology (both surface and subsurface) and as such salinity is both a threat and an integral component to some key assets. The 1992* Regional Salinity Management Plan *"*Restoring the Balance*" determined that the main effort of salinity intervention should be on the agricultural asset. In the decade since the development of the* Regional Salinity Management Plan *both the level of regional information and the policy frameworks (such as the* Victorian Salinity Management

> Framework*, 2000) have advanced the concepts of issues such as asset management to achieve integrated catchment management, hazard assessment, and groundwater flow system delineation. Secondary salinity is a serious threat to the land resource, lakes and wetlands***,** *especially in the Lakes/Plains & Northern Foothills, the Leigh-Moorabool and Geelong & Environs sub-Regions, including Lara salt lands and Lake Connewarre (*Draft Salinity Action Plan, 2003-2008*). Salinity is rated as highly important for its potential impacts on productive use of land, and on the landscape, with soil degradation also seen in this light.* Knowledge limitations, *stressed by both technical groups and community groups, are particularly related to salinised groundwater hazards, increasing salinity in the Lal Lal Reservoir, protection and threats to primary salinity discharge areas, urban salinity management and soil degradation processes. (p82)*

The following text from the Strategy describes the threat of salinity within the Region:

> *Salinity is a significant threat to land productivity, especially in the Lakes/Plains & Northern Foothills sub-Region.*
>
> *Table 16 shows the National Land and Water Resources Audit predictions for the Corangamite Region, of costs arising from salinity to agricultural gross margins. Pastures and crops are principally affected.*

TABLE 16. *PROVISIONAL ESTIMATES OF THE LOSS OF FARM GROSS MARGIN FROM SALINITY ($M/YR)*

	LOW PROJECTION	*HIGH PROJECTION*
1996	*2.8*	*2.8*
2020	*2.9*	*9.6*
2050	*3.0*	*29.4*

> *It is notable that under the "Low" projection there would be very little predicted change in the current level of salinity damage costs to agriculture. Relatively low precipitation and hence groundwater recharge has played a role in this in recent years, given the findings from salinity discharge mapping in 2001 (*Salinity Discharge Mapping in the Corangamite Region*, DPI, 2001). The increase in areas of discharge during this prolonged climatic dry period only serves to underline the uncertainties concerning future impacts, and the need for a precautionary approach enhanced with further research.*
>
> *Salinity threatens agricultural production and biodiversity in many parts of the Region. Salinisation of these assets is attributable to complex processes including: (i) the natural soil salinity in some parts of the Region; (ii) regional groundwater systems; and (iii) secondary dryland salinity.*
>
> *The vegetation history of the Region, particularly the early evolution of grasslands over much of the Basalt Plain, in conjunction with the catchments location to the sea, has meant that leaching processes have been underway for a much longer period than in regions where the native vegetation was woody and deep-rooted.*
>
> *Irrigation has not been determined to be a major contributing factor (*Draft Salinity Action Plan, 2003-2008*).*
>
> *The Region has been provided with results of the Geospatial Salinity Hazard and Asset Risk Prediction Model. This project used geographic information systems to overlay salinity hazard with social, environmental and economic assets. A ground-truthing program and discussions with affected communities and asset managers has been utilised to establish priority areas for salinity action in the* Draft Corangamite Salinity Action Plan (2003-2008)*. Many of the non-market benefits described in the plan refer to the environmental assets of global importance, such as Lakes Corangamite and Connewarre. These lakes, which are Ramsar listed, are under threat of altered hydrological regimes. Both lakes are primary discharge sites at risk of secondary salinity and fresh water intrusions.*
>
> *Provisional estimates by Resource Economics Unit for the "Salinity Hotspot" areas reviewed in 2000, suggests a Net Present Value (at 7 per cent) of damages to infrastructure of around $10M, equivalent to around $0.8M per year. However,*

> *considerably more infrastructure has been identified as being at risk of rising saline groundwater tables outside of these "Hotspot" areas, notably in the eastern part of Greater Geelong. In addition, very conservative assumptions were made about the depths at which groundwater begins to impose costs and the inventory of assets at risk was very provisionally estimated.*

The final paragraph in the above quote focuses on the threat of salinity to built infrastructure. This is often overlooked as an issue where salinity is considered as a threat to rural production and the condition of land and water resources. It is however a main driver of this Salinity Management Overlay Project.

It follows then that the Target 10.2.4 in the Strategy is to protect infrastructure from flood and salinity risks and other disasters.

The RCS sets targets for dealing with threats, a number of which relate directly to salinity and land use planning. The most relevant of these to the current project are identified in Table ES1.

From the above a key target relating to this project is to ensure at least 4,000 urban dwelling allotments in the Corangamite CMA region are protected from salinity by 2020. The management action requires the development of plans with local government guiding their infrastructure placement and urban subdivision.

For example, the urban infrastructure within Colac has been identified in the Corangamite Salinity Action Plan as under threat from salinisation, and a target has been set to reduce the area of land affected by salinity (saline discharge areas) within the city's residential zone by 80% by 2010.

The development of Planning tools for use in local Planning Schemes fits within the above objectives and targets.

Table 1: Regional Catchment Strategy targets for dealing with threats.

ASSET	THREAT	RESOURCE CONDITION TARGETS	MANAGEMENT ACTION TARGETS
Land use	*Land use change*	*S. Landuse planning decisions will be in line with land capability and suitability by 2020.* *T. Ensure that the land asset is managed in a sustainable and improved manner by 2020.* *U. Ensure that land use is matched with land capability in agricultural, industrial and urban areas by 2020.*	*60. By 2004, create an interface between NRM Regional policy and local government strategy development.*
	Inadequate strategic management	*X. By 2020 all planning decisions will take into account the capacity, condition and visual amenity of the landscape and will maintain the health of the environment.*	*62. By 2008, implement the recommendations of the Strategic Planning Framework.* *63. By 2006, further the capacity of local government to undertake Regional strategic land use planning discussions.*
Land use	*Land use change*	*R. Sustainable principles in the RCS are incorporated into rural and urban landuse planning by 2020.* *S. Landuse planning decisions will be in line with land capability and suitability by 2020.* *T. Ensure that the land asset is managed in a sustainable and improved manner by 2020.* *U. Ensure that land use is matched with land capability in agricultural, industrial and urban areas by 2020.*	
Infrastructure	*Disasters*	*Y. By 2010, ensure the integrity of management techniques for floods, fire, erosion and salinity across the Region are maintained and improved from 2003 levels.*	*68. By 2004, identify key infrastructure areas at risk from flooding, erosion and salinity.*
Infrastructure	*Salinity*	*Z. Protect 4,000 urban dwelling allotments in the Geelong, Ballarat, Colac, Meredith, Rokewood, Lara and Torquay urban centres from secondary salinity by 2020.* *AA. Protect 800 urban dwelling allotments from secondary salinity by 2008.*	*69. By 2008, develop plans with local government to guide infrastructure placement and urban subdivision.* *70. By 2005, develop baseline mapping on all urban salinity.* *Provide this information to local government and other asset managers.* *71. By 2008, develop treatment options for the protection of existing urban areas from salinity.*

Source: Corangamite Regional Catchment Strategy

1.3 The current project

This project was commissioned by the CCMA to prepare Salinity Management Overlay and associated statutory documentation for the planning schemes of the Colac Otway, Corangamite, Golden Plains and Surf Coast Shires.

The purpose is to guide decision making in any development in salinity prone areas, in turn to assist Councils to protect their own assets (e.g. roads and buildings) and those of the community.

The Project Brief required the project to target salinity discharge sites in the growth areas as defined by each municipality. Base line mapping of saline land was to be provided by the Department of Primary Industries (DPI), from a separately funded project. This input was a fundamental element of this project.

Also, it was a requirement for the developed Overlays to comply with the Victoria Planning Provisions (VPP), and to assist local government to meet the objectives of the Corangamite Regional Catchment Strategy and the Corangamite Salinity Action Plan. This would assist Councils to protect community infrastructure and assets, including roads, buildings and agricultural production, while reducing their liability and exposure to litigation.

Specifically, the services of a Consultant were required to:

- *review existing Salinity Management Overlays (within Victoria & at least 3 across other States) and evaluate their effectiveness (refer to attachment 1);*
- *prepare a policy statement for the Municipal Strategic Statement that is appropriate for each municipality;*
- *prepare a Salinity Management Overlay, complete with Schedule(s) and procedural guidelines; appropriate to each municipality; and*
- *Meet all the milestones.*

The following outcomes were also specified to be achieved with guidance from Department of Primary Industries and the Department of Sustainability and the Environment.

- *Policy that will encourage development to be undertaken in a way that improves management of salinity.*
- *Policy that will ensure development is compatible with site capability.*
- *Maps of the Salinity Management Overlay for each municipality's Planning Scheme which complies with the planning requirements of DSE and each municipality.*
- *One or more Schedules to the overlay for each municipality, which provide appropriate decision guidelines.*
- *Preparation of all relevant amendment documents, in liaison with DSE to prepare planning scheme mapping requirement.*
- *If appropriate, to identify links in the schedule to Australian Standards in building in saline areas.*
- *An applicant's kit / application guide for permit applications.*

- *Procedural guidelines for the processing of planning permit applications under the overlay. As a minimum, these guidelines should include:*
  - *The sources of background data with confidence levels for the data quality. The data shall be provided in the appropriate format as determined by each municipality.*
  - *Recommended methods to assess the impact of a proposed development or works on secondary salinity processes (both onsite and offsite), within the design life of the development.*
  - *Recommended methods to assess the impact of a proposed development or works on primary salinity assets (both onsite and offsite), within the design life of the development.*
  - *A method to assess the risk of a proposed development or works which is based on the Australian Standard for risk management.*
  - *Guidelines for the assessment of an acceptable risk for a given development or works.*

In responding to the brief the EnPlan-DBA proposal identified five categories of land that are potentially relevant to inclusion in SMOs. These are:

- **Category 1:** Areas currently affected by secondary salinity
- **Category 2:** Areas of primary salinity regarded as an asset
- **Category 3:** Areas not currently affected by salinity, but with a stated likelihood of experiencing secondary saline groundwater discharge within a given time-frame
- **Category 4:** Areas where inappropriate land-use or development may adversely impact on primary salinity assets
- **Category 5:** Areas where development or inappropriate land-use may ultimately initiate secondary salinity or exacerbate existing secondary salinity elsewhere in the landscape

Categories 1, 2 and 3 are all areas of land that are either currently affected by salinity, or have potential to experience salinity. Categories 1 and 2 can be identified by various procedures including aerial photograph interpretation and visual ground truthing, by trained personnel. This was the basis of DPI mapping. Difficulties can occur however in distinguishing between Primary and Secondary salinity areas, particularly where the ecology of naturally saline areas has been diminished by human activity including drainage and grazing. As Category 1 sites generally have not existed for sufficient time to develop site ecology considered beneficial, they can appear similar to degraded Category 2 sites. It can be argued that the difference is irrelevant as both Categories are affected by salinity with the same potential to impact on built infrastructure

Less certainty can be ascribed to Category 3 areas. Water tables fluctuate over time but since European settlement involving land clearance for agriculture, they have generally risen. Hydrogeological expertise backed by scientific data is required to identify Category 3 land. Interpretation is based on consideration of a range of factors including watertable position relative to the land surface, geology, soil types, topography, and ‘groundwater flow systems’.

Categories 4 and 5 land are more difficult to predict due to cause and effect uncertainties. The main planning and development issues with these categories potentially relate to large developments which could impact on landscape scale hydrology.

2 Methodology

2.1 Tasks

The following methodology was followed in accordance with the signed contract.

Task	Description	Summary comment
Task 1: Commencement consultations		
1.1	Inception meeting	This meeting was used to refine and agree upon project conduct details, and for contract signing. All relevant documentation held by the CCMA and respective Shires was requested.
1.2	Meetings with individual council planning staff	Meetings were conducted with respective Shires to establish working relationships, and to refine consultation processes with them.
1.3	Meeting with DPI mapping and DSE planning units	Ongoing discussions and contact were conducted with DPI to discuss and review available data and maps being provided for the project, .
Task 2: Technical review and mapping		
2.1	Review existing salinity technical and mapping information on salinity in respective Shires.	This task was merged within Tasks 1.1 and 1.2
2.2	Ground truth mapped information, develop additional mapping layers and conduct a likelihood analysis	Ground truthing of salinity incidence mapping supplied by DPI was conducted by the project team during travels within the Shires at various times throughout the project. Additional maps were generated by the project team that were required to conduct a likelihood analysis. While the Project brief nominated that the project was to focus on designated 'development corridors' mapping and inspection extended beyond those areas into the broadacre farmland areas.
2.3	Review Australian Standards for building	Consultation was conducted with national, and state building regulation authorities to determine the application of salinity specific building standards applicable in Australia. Reporting on this was included in the Project's best practice' report, and a stand-alone report was prepared as a further Project output.
2.4	Prepare technical issues paper	This task was merged with Task 3.1 as identified below. A separate report has been prepared for each participating shire that documents: • the known occurrences of salinity within the Shire boundaries using previous and recent salinity mapping reports and investigations. Methods for deriving the maps for inclusion in the planning scheme are also documented. • A discussion of the active salinity processes in the Shire, including some specific examples of conceptual salinity process models.
Task 3 Statutory review		
3.1	Identify 'Best Practice' SMOs.	This task was merged with Task 2.4. • A desktop review (and structured consultation to a prepared proforma with respective Shire planning personnel) was conducted across the nine current Planning Scheme SMOs in Victoria to assess documentation (including possible

		'Applicants kits' and other material) and to gauge implementation processes and success thereof. • A visit was made to NSW to discuss and assess urban salinity approaches being used in that State, and to collect relevant publications. Municipalities visited and interviewed included: Wagga Wagga, Dubbo, Blacktown, Campbellfield, and Camden Cities • Telephone discussions were held with WA and SA statutory planning agencies, to determine the extent and effectiveness of planning tools for salinity, and associated awareness tools.
3.2	Prepare report on Best Practice SMOs	A two part 'Best Practice' report was written and submitted to the Project Steering Committee for SMO application and associated salinity tools. The report was discussed with the Project Steering Committee, and referred to DSE policy unit in Melbourne and to the DSE statutory Strategic Planner in Geelong for feedback.
3.3	Review existing MSS and local policy content on salinity management in current planning schemes.	The MSSs and Local Policies (LPPF) of the participating Shires and of Victorian municipalities with SMOs were reviewed, to assess the scope and emphasis placed on salinity within them, for consideration within the 'Best Practice' report identified against Task 3.2 above

Task 4: Overlay / Amendment preparation		
4.1	Paper on outcomes from Tasks 2 and 3.	Two summary report/discussion papers were prepared based on outcome of technical and 'Best Practice' SMOs review, for presentation to / discussion with Shire personnel and for feedback from DSE Planning Division.
4.2	Review and directions workshop	Meetings were conducted with all participating Shires in April 2006 to present outcomes from Tasks 1 to 3, as presented in Task 4.1 report, and to establish guidance for completion of Tasks 4, 5,6. (At this point of the project, Shires differ on detailed requirements from the project). Following this round of meetings a paper was distributed to the Shires, clearly identifying matters on which their direction was required on salinity content in their respective MSSs, and Local Policies and on requirements of the form and content of respective SMOs This paper is presented here as Appendix 3. Responses to the questions from the respective Shires were essential for preparation of the required statutory documentation for inclusion in planning schemes. (The responses received are tabulated as Appendix 4)
4.3	Prepare draft MSS and LPPF amendments	Draft were prepared for discussion with respective Shires and with DSE Planning Division. Preparation was led by outcomes from Tasks 1-3, and Task 4.2.
4.4	Prepare draft SMO Schedules and local planning policy	Draft SMO documentation was prepared for discussion with respective Shires and with DSE Planning Division. Discussions involved Shire representatives, two members of the Project Team and the CCMA Project director (Ms A Vary)
4.5	Prepare Final SMO documentation	Final documents were prepared drawn on outcomes of the Task 4.4 meetings and submitted back to the Shires based. Final Project documents for Shire Planning Schemes as submitted include final comment from the Shires.

Task 5: Preparation of Procedural Guidelines and Applicants' Kit.		
5.1 and 5.2	5.1 Prepare Procedural Guidelines for managing planning permit applications within the SMO 5.2 Prepare applicants kit	This task was prepared from consideration of the scope and content of existing salinity information materials prepared for and used and distributed by municipalities in NSW and Victoria. The scope of contents of the 'Information Kit' was tabled at the April 2006 meetings with Shires, with request for feedback on content. Components of the kit included • a step-by-step guide for planning staff and council on the processing and decision making on planning applications within

	for SMO	SMO areas. • Brochure on identifying and understanding salinity from a planning application development context • Guide to building in a saline environment.

Task 6 *: Project conclusion		
6.1	*Draft final report*	*Task: Prepare final draft report based on all previous outcomes, and to include a copy of the final proposed documentation, and cover note of issues for attention in taking the proposed amendment forward for inclusion in the planning scheme.*
6.1a	*Present Draft report to Sub-committee*	*Task: Meeting, and discussion, with feedback for preparation of final report.*
6.2	*Present final report to Sub-Committee*	*Task: Prepare final report based on outcome of Task 6.1a.*
6.2a	*Present Final report to each Council*	*Task: Meetings with respective Councils tailored to their specific needs.*
6.3	*Finalise contract with sub-Committee*	*Task: Sub-committee signs off project and makes final payment.*

** Task 6 incorporates the preparation and submission of this report.*

The above methodology was followed routinely.

A monthly report was tendered to the CCMA approximately at the end of each month through to May 2006. The report was submitted in a consistent form to identify any issues that could impact on the outcomes or timeliness of the project at an early point. The report headings were as follows:

- Summary of work completed during reporting period.
- Progress against schedule.
- Attention issues relevant to general conduct of project.
- Attention issues relevant to timely conduct of project.
- Attention issues relevant to the outcomes / findings of the project.
- Other issues for attention.
- Recommended actions from above issues identification.

2.2 Consultation

Various categories of consultation were conducted.

- Close consultation was maintained with the CCMA and the Shire personnel participating in the project sub-committee designated to steer the project.
- Consultation was maintained with DSE planning personnel at Geelong and Melbourne, regarding the statutory planning tools relevant to salinity, and the development of the SMOs. Consultation was also held with DSE regarding the design template and mapping for planning schemes.

- Direct (face to face) consultation was held with planning personnel from the NSW municipalities of Camden, Dubbo, Wagga Wagga, Campelltown, Blacktown, and the Western Sydney Regional Organisation of Councils (WSROC) regarding their planning and community awareness tools particularly regarding urban salinity.
- Ongoing consultation was conducted with DPI regarding interpretation of its salinity mapping.

Consultation with the individual Shires intensified during the final stages of the project as documentation specific to their planning schemes was prepared that required endorsement. This included ongoing emails, telephone discussions, and a final round of meetings with Shire representatives in June and July2006.

Full consultation details can be provided on request.

3 Project analysis

3.1 Salinity in the participating Shires

3.1.1 Introduction

As identified earlier in this report, the urban growth corridors identified for attention under this Project were identified by the four participating Shires. These were presented as circles of varying radii around the towns in the respective Shires. In most instances they extend well beyond the area that could reasonably be expected to experience orderly planned urban expansion within the foreseeable future.

The main exception to the above was in the Surf Coast Shire which identified a large area of hinterland inland from Torquay through Bellbrae to connect with the Winchelsea 'growth corridor'. This area experiences strong development pressures for lifestyle living.

The general consensus of all Shires at the initial round of meetings (prior to the tabling of salinity maps) was that salinity is not a main driving issue. It was also primarily regarded as a rural issue, that is, affecting rural land and land productivity, but also with some water impacts.

No Shire indicated a problem with infrastructure apart from the Corangamite Shire which identified a low lying section of the Lismore - Skipton Road which experiences foundation problems due to high water tables and salinity.

3.1.2 Salinity incidence in the participating Shires

Substantive reports on salinity in each of the participating shires are presented as free standing attachments to this report. The reports prepared by Dahlhaus Environmental Geology Pty Ltd are titled:

- *Golden Plains Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 1. June 2006.*
- *Colac Otway Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 2. June 2006.*
- *Corangamite Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 3. June 2006.*
- Surf Coast Shire – Salinity Management Overlay: Salinity occurrences and mapping. Background report No 4. June 2006.

Areas in each Shire where salinity may potentially threaten assets have been mapped for inclusion into a Salinity Management Overlay. These include sites where salinity has been identified by previous mapping, and areas where salinity is not obvious but may develop in a relatively short time frame or within the design life of a development (taken as around 30 to

50 years). In these areas there is sufficient salt present in the soil to restrict plant growth or potentially threaten the integrity of buildings, infrastructure and utility services, and the area is underlain by relatively shallow saline watertables.

A number of the primary salinity wetlands and lakes are already covered in Schedules to the Environmental Significance Overlays (ESO) of Planning Schemes in the participating shires. It is conceivable that some areas with shallow saline groundwater surrounding these lakes and wetlands could be threatened by development of a type that lowers the watertables, to dry out the environmental asset. Elsewhere, small ephemeral saline wetlands may retain high environmental values. These areas have been identified as potential primary salinity assets and it is recommended that they be further investigated to determine their suitability for inclusion in the ESO.

Also, broad areas have been delineated in which there is potential for certain land-uses, such as extensive irrigation schemes, urbanisation or vegetation removal, to rapidly change the hydrology of responsive groundwater flow systems. These land-uses may lead to changes in groundwater levels which may exacerbate existing salinity or initiate new outbreaks elsewhere in the landscape. Mapping these areas is only possible at a regional scale, as they are based on the groundwater flow systems, mapped salinity and probability of shallow watertables being present. These areas are identified for the Shires for further strategic planning consideration within revision of their Municipal Strategic Statements, to highlight the issue of potential salinity hazard.

The following text on the participating Shires is abridged from the reports listed above. Those documents should be read for the full explanations.

3.1.2.1 Golden Plains Shire

The 399 mapped salinity sites in the Golden Plains Shire are prepared from the mapping done by the Department of Primary Industries for the current project, and its prior database. The sites range from 158ha to 10 square metres, with the average size being 5ha. The vast majority of the salinity is induced by hydrologic changes resulting from the land-use changes over the past 200 years. This secondary salinity accounts for 88% of the total of 1923 hectares. The remainder is naturally occurring primary salinity, with Wingeel Swamp, the only mapped saline wetland, as the largest primary site.

There are 129 salinity occurrences totaling 89.2 hectares within 50 metres of roads. Approximately 96% of the mapped salinity occurs in the Shire's Rural Zone. The remainder is in the Rural Living Zone (2.4%), Township Zone (0.5%), Low Density Residential Zone (0.5%) and minor amounts in other areas). In some areas such as the Woodlands Village, Haddon and Ross Creek there are a large number of small salinity sites which potentially threaten buildings and road infrastructure.

Primary salinity sites are identified around Wingeel Swamp and a section of Mia Mia Creek upstream of Lake Murdeduke. These may retain some environmental value such as halophytic plants and associated rare or threatened species and it is proposed that they should be further investigated for their potential for inclusion into an Environmental Significance Overlay (ESO).

Secondary salinity at Pittong is expanding and has been extensively studied for 20 years by the University of Ballarat. The latest monitoring shows an 8% area expansion between 1996 to 2000, despite below average rainfall and falling groundwater levels. The salinity includes saline groundwater springs usually associated with the alluvial flats and drainage lines in the area underlain by deeply weathered granite. In places, the salinity has a serious impact on agricultural production, with 147 ha or 26% of one property and 168 ha or 67% of another classed as saline land. Released salt exports to the Woady Yaloak River and Lake Corangamite.

It is now understood that in the above area, regional saline groundwater emerges from geological structures (joints, faults, dykes) in the granite as springs and is spread by freshwater flows through the soil profiles. This infers that control of the saline discharge is outside of the region, but that salinity can be best managed by:

- using the soil-water on the slopes or diverting it before it reaches the discharge areas and lower parts of the landscape where the saline springs may occur. This could be achieved by
- planting of tree belts to intercept lateral flows and the construction of surface drains to
- intercept and divert soil water flow before it reaches the saline discharge areas.
- establishing high water-use vegetation in the saline discharge areas and reducing the length of time of soil waterlogging by improving surface water drainage to reduce both the spread of saline soil water (and the area of land affected) and the salt wash off to the Woady Yaloak River system.

Several salinity processes are occurring in the Illabarook – Mt Mercer area, including influence of past mining activities. Salinity management techniques ideally include establishment of wide tree belts on gravel caps. Conversely, broad-scale irrigation and increased infiltration of water could expand existing salinity and initiate new groundwater discharge sites.

3.1.2.2 Colac Otway Shire

The 539 mapped salinity sites in the Colac Otway Shire, range in size from 658 hectares to 85 square metres. The average size is 19 hectares. The majority of the salinity occurs in saline wetlands, accounting for 55% of the total of 10,252 hectares. The remaining 45% of land salinity is almost evenly divided between dominantly primary (20% total) and dominantly secondary (25% of total).

Salinity potentially threatens urban development in the City of Colac, and some buildings and road infrastructure. Throughout the Colac Otway Shire there are 89 occurrences of salinity covering a total of 73 hectares, within a 50 metre buffer of a road. Approximately 53% of the mapped salinity occurs in the Public Conservation and Resource Zone, accounting for most of the saline wetlands. Around 44% of the mapped salinity occurs in the Rural Zone of the Shire.

Salinity threat in the City of Colac include urban encroachment into saline areas and conversely, the encroachment of saline discharge areas into the City of Colac. Although there has been little expansion of the area of land salinity since the initial mapping was

undertaken in 1976, the City of Colac is more rapidly expanding into the saline areas. Based on this urban growth, it appears that any further subdivision of the rural-urban zone in these areas would threaten buildings, roads and services with damage due to salinity.

The salinity south of Colac is regarded as secondary, caused by the changes to the water and salt balances associated with land use change over the past 100 years or so. The hydrogeology is complex In this area, with local and intermediate groundwater flow systems overlying regional systems. One deep bore (# 56055) in the centre of the City of Colac monitors the confined aquifer of the regional system of the Dilwyn Formation (or equivalent). This bore has artesian pressures which show a rising trend of about 1.2 metres over the past 15 years. Although the aquifer being monitored is 330 metres deep, the positive groundwater pressures maintain the groundwater storage in the overlying confining beds, and they are saturated to the near-surface. The slightly salty groundwater in these shallow local aquifers is unable to percolate downwards and moves laterally to discharge sites where the salt is concentrated by evaporation.

It is proposed here that protecting the urban infrastructure assets south of Colac requires engineering and planning intervention. The construction of surface drains and retro-fitting existing subdivisions in saline areas with improved storm water management are short-term management requirements. In the longer term, reclaiming land from urban development (avoidance) and salinity mitigation measures as part of future developments are probable solutions.

Elsewhere in the Shire, records suggest that the salinity of saline lakes has fluctuated for thousands of years in response to climate change. Some lakes, such as Lake Beeac are regarded as groundwater discharge lakes with hypersaline environments with average salinity of approximately 92,000 mg/l). Lake Corangamite is a surface water and groundwater terminal lake. Its hydrological processes have been extensively studied, and are understood to be associated with varied groundwater flow systems. It is also considered that although these lakes have been saline for thousands of years, more recent changes to landuse and water-use has accelerated changes in salinity associated with climate changes. Salt accumulation and associated ecological balances in Lake Corangamite, are believed to have significantly altered following the opening of the Woady Yaloak diversion scheme in 1959.

3.1.2.3 Corangamite Shire

The 591 mapped salinity sites in the Corangamite Shire, range in size from 13,696 hectares (Lake Corangamite) to 39 square metres. The average size is 66 hectares. The vast majority of the salinity occurs in saline wetlands, accounting for 83% of the total of 39,022 hectares. The remaining 17% of land salinity is almost evenly divided between dominantly primary (8.4% total) and dominantly secondary (8.6% of total).

Salinity potentially threatens development around some smaller towns in the Corangamite Shire, such as Lismore, Derrinallum, Cobden and Curdies and some buildings and road infrastructure and 75 hectares of salinity incidence occurs in 103 sites within 50 metres of a road. Approximately 82% of the mapped salinity occurs in the Public Conservation and

Resource Zone, which includes most of the saline wetlands. Around 15% of the mapped salinity occurs in the Shire's Rural Zone.).

Groundwater monitoring records show that the majority of groundwater levels in saline areas generally fluctuate by no more than one metre. However, seasonal fluctuations in some areas are in the order of several metres. Overall, groundwater levels have been dropping over the past decade, probably in response to the prolonged period of below average rainfalls.

The Shire planning scheme includes a number of primary salinity wetlands and lakes in the Schedule 1 to the Environmental Significance Overlay (ESO1). The ESO1 lists *"possible effect of the development on the quality and quantity of water"* as a decision guideline. However, in some cases the shallow saline groundwater surrounding these lakes and wetlands may be under threat by inappropriate development which may lower the watertables and dry out the environmental asset. It is proposed that further investigations could determine that the ESO1 could be used to cover some such areas.

3.1.2.4 Surf Coast Shire

The 287 mapped salinity sites in the Surf Coast Shire, range in size from 1,184 hectares (Lake Murdeduke) to 29 square metres. The majority of the salinity occurs in saline wetlands, accounting for 68% of the total of 4,552 hectares. The remaining 32% of land salinity is evenly divided between dominantly primary (16.3% total) and dominantly secondary (16.2% of total).

Secondary land salinity in the Shire as mapped for this project has increased from that recorded in previous surveys.

The Modewarre area is a target area for investment in the Corangamite Salinity Action Plan that includes Lake Modewarre, and Gherang and Brown Swamps. Salt released from the area adds to the salt load of Thompson Creek. About 30 groundwater monitoring bores have been constructed in area. These show that groundwater is generally within 3 metres of the surface in the lower landscapes, and may be up to 7,000 mg/L dissolved salts. There is no recent upward trend in watertables however and there may be limited immediate or near-term threat of future of rising groundwater levels. Despite this it is considered that infrastructure will continue to be affected and at risk from saline discharge and shallow saline watertables. This includes roads, where capillary rise will bring salts to the road subgrade

4 Salinity and the Victorian planning system

4.1 What is the purpose of the planning system?

The purpose of the planning system is to provide order in land use to protect the public good. It is intended to ensure that public resources are expended and provided efficiently, while minimising potential for unplanned land use conflicts, while also providing for the emerging land use requirements of the community. Land use zoning allocates land use types to areas, and are applied across all lands in a municipality, such that all land sits within one zone or another. Land use overlays can also be applied to land as a tool to protect recognised character of values within a designated area or to protect development from threats associated with the land.

4.2 What are the Victoria Planning Provisions?

4.2.1 SPPF

The SPPF identifies state policies that overlie local policies. Planning schemes need to demonstrate compliance with State policy. Where state policies are deemed to conflict within a local situation, planning schemes are expected on balance to reflect the best public good.

4.2.2 MSS

Section 12A(3) of the Planning and Environment Act 1987 requires a Municipal Strategic Statement (MSS) to contain the strategic planning, land use and development objectives of the planning authority and the strategies for achieving those objectives. The Act also requires an MSS to include a general explanation of the relationship between those objectives and strategies and the controls on the use and development of land in the planning scheme. A consistent format is recommended, to demonstrate that the requirements of the act are met and that links to zones overlays schedules and policies are clearly expressed, and the links to the Councils Corporate Plan are apparent. The recommended format is as follows:

21.01 Municipal profile

21.02 Key influences

21.03 Vision – strategic framework

21.04 Objectives – strategies – implementation

21.04-1 Settlement

21.04-2 Environment

21.04-3 Housing

21.04-4 Economic development

21.04-5 Infrastructure

21.04-6 Particular use and development

21.05 Monitoring & review

Where issues such as salinity are to feature in a planning scheme by way of zones or overlays for example, it will be expected that reference will be made to it within the MSS. Emphasis given to it in the MSS should relate to its relative importance with and against other decision making influences.

Salinity can impact on land productivity and environmental values, and can also impact on built infrastructure. Where it exists in municipalities and to the extent that it can influence land use and development decisions, relative to those matters, it can be expected that it should be referred to in Clauses 21.04-1 to 21.04-6. If it is a key factor, reference could also be expected in Cl 21.01

4.2.3 LPPF

Local policies deal with specific areas and issues. The State Government has developed the following working principles for the development of local policies:

- Policies should have an origin in the MSS.
- Policies should be clearly linked with the MSS, other strategy or policy in the LPPF and the application of the zones and overlays.
- Policies may be issue based or area based but must have application to land use outcomes.
- Policies must aid in exercising or informing discretion. Policy must not be a development control. It should provide direction to achieve a justified land use outcome.
- Policies should seek to achieve a long-term goal.
- A consistent approach and format should be used wherever possible.
- Policies must be clear, concise and simple and the reasons for it must be supported by research or studies.

4.2.4 Zones

Zones provide controls over designated land use as well as development. Their provisions are consistent across all planning schemes. Each zone has:

- A statement of purpose
- A set of use tables
- Subdivision requirements, if appropriate
- Building and works controls, if appropriate

- Advertising controls, if appropriate

The zone controls may also include decision guidelines that can obligate the Responsible Authority to consider the matters listed.

4.2.5 Overlays

Overlays are be used for specific local requirements or locations. The requirements of any overlays apply in addition to the requirements of the zone. The overlays have a statement of objectives, permit requirements and exemptions if appropriate. The overlays with the most potential relevance to salinity are:

Salinity Management Overlay

This overlay identifies land subject to significant salinity. Generally, there should be appropriate technical justification available to support the application of this overlay. It can be applied in rural and urban settings as appropriate for reasons and to areas of land as discussed elsewhere in this report.

Environmental Significance Overlay

Environmental significance is intended to be interpreted widely and will often be applied for to natural environment issues such as significant wetlands or areas with designated ecological values that warrant specific planning attention. The nature of the issue and the intended effects or outcomes of the requirements being imposed must be clearly stated.

Vegetation Protection Overlay

This overlay can apply to any form of vegetation, whether trees or not and whether native or not. The significance of the vegetation being identified needs to be stated, with the intended outcomes of the requirements being imposed. Reference to the vegetation's status should be included in a reference document.

Erosion Management Overlay

This overlay identifies land subject to significant erosion hazard which in some land types can be closely associated with salinity. Appropriate technical justification should be available to support the application of this overlay.

4.2.6 Reference and Incorporated documents.

Planning schemes can incorporate or refer to documents.

Incorporated documents become a formal component of a planning scheme through listing in Clause 81 and are read as part of the scheme. Reference to incorporated documents can only be changed by amendment to the scheme. A planning authority therefore needs to explicitly choose whether a document is to be formally incorporated, or whether the document is simply mentioned in the scheme by reference (ie as a reference document).

While there are no specific criteria, incorporation needs to satisfy that the relevant document directly affects the operation of the planning scheme.

Reference documents may show why particular requirements are in the scheme. They may substantiate the existence of a specific issue or background to specific decision criteria being imposed in local policies or schedules. They are used for input to decisions, but are not formal components of the Scheme.

4.3 Why are Salinity Management Overlays used?

SMOs are used for the following reasons.

Environmental reasons

SMO's are applied to protect areas with saline environmental value from inappropriate development. This will normally apply to Category 2 salinity areas (ie areas with primary salinity and associated ecological values considered to be environmental assets). They are some times also used to protect against clearance of native vegetation ostensibly for broader recharge control reasons. However this can in turn protect environmental values associated with those vegetated areas

Economic reasons

SMOs can be used to control development in areas that currently or potentially experience salinity to preferably divert proposed development to other areas to protect against future assets degradation (and hence adverse economic implications). Conversely the application of engineering solutions for infrastructure development in saline areas to avoid infrastructure decline will normally incur economic costs.

Social reasons

Development in saline areas will often be associated with infrastructure decline, or damage to community open space or private gardens, which may in turn be associated with social stigma.

Legal reasons

Potential exists for Councils that approve development in areas known to experience salinity, or with known potential to experience salinity, to be subject to litigation from developers or buyers of property in such areas. This has been a main driving force for local government interest in salinity in New South Wales. At least one such legal action against a NSW municipality was recently settled out of court. While NSW does not currently have an equivalent to the Victorian SMO, the potential for litigation is the main reason why several municipalities in the Western Sydney have introduced blanket building standards that assume all areas to be subject to salinity or potential salinity. This is despite the additional $2500 (approximately) added to the cost of construction of a standard house.

4.4 Where are SMOs applied in Victoria

SMO's are applied in nine Victorian municipalities:

- Cities: Greater Bendigo; Ballarat; and Greater Shepparton; and
- Shires: Campaspe, Central Goldfields, East Gippsland, Golden Plains, Loddon, Mitchell

They are applied in different geographic contexts. They also have varied origins mainly derived from planning tools used in planning schemes of Shires that have now been 'consumed' by the Local Government restructuring of the late 1990s. Most are applied to rural or non urban situations. Examples maps and summary statements are provided as Appendix 1 of this report.

Only the City of Greater Bendigo and the Central Goldfields use the SMO in urban areas. In both cases the application of SMOs in urban areas is of limited extent.

However SMOs are not the only overlay tool to incorporate salinity implications. For example in the City of Ballarat the Erosion Management Overlay is used for part of the municipality that was formerly in the Shire of Bungaree. The area concerned is on Ordovician sedimentary land with a combination of eroded drainage lines, poor soil conditions for domestic waste absorption, and salinity incidence expressed as saline seepage into drainage lines and as bare soil scalds. In this instance all of these issues are dealt with through the EMO.

In summary, the SMOs are not widely used. They mainly identify salinity as a rural land productivity issue, with little reference to potential impact on built assets. Most are used at least in part to control the loss of native vegetation on the basis of its groundwater recharge control function.

SMOs in the following municipalities explicitly map salinity incidence areas:

- Central Goldfields, East Gippsland, Greater Bendigo, Loddon,

SMOs in the following municipalities map blanket broadacre areas.

- Ballarat, Campaspe, Golden Plains, Greater Shepparton, Greater Bendigo, Mitchell.

Application of the SMO is not triggered commonly in any of the municipalities within which it is applied. This does not infer that the SMO is of limited value, as a main objective of its application is to encourage avoidance of development in saline areas, and to avoid large scale development in areas that carry existing native vegetation, in order to minimise impact on recharge control. Also, as most SMOs are applied in rural areas, opportunity for avoidance of development in SMO areas generally exists.

However, the 'best practice' report prepared for this project in February 2006, concludes that there are no complete 'best practice' examples of SMO application and administration.

5 Salinity risk

The basis for the SMO in planning schemes is that in some places salinity can impact on built infrastructure and the environment in urban and rural locations. Conversely, large scale development may also impact on or cause on salinity at remote locations via changes to the water cycle. Risk evaluation is used as a tool to decide on whether such risk is acceptable, whether risk treatment is required, and if needed, to contribute to the setting of priorities to alleviate risk.

In short, the SMO is applied where salinity risk can reasonably be anticipated based on existing knowledge, and where its application is needed as an input to planning decision making. An extension of this is that its use can be appropriate where litigation could potentially occur if developments were permitted by responsible authorities in areas subject to such risk.

The following text provides a summarised explanation of risk. A fuller explanation is provided as Appendix 5 to this report.

Risk is defined in the *Australian/New Zealand Standard on Risk Management (AS/NZS 4360:2004)* as "the chance of something happening that will have an impact upon objectives". The Standard and its associated guidelines (HB 346:2004) note that risk generally is categorised into three levels, viz: acceptable, tolerable and intolerable.

- An *acceptabl*e risk is one which fits with the specified criteria and does not need further treatment. (ie no design or mitigation measures needed).
- A *tolerable* risk is too high to be acceptable, but can be tolerated under certain conditions, such as where treatment measures are undertaken or liability is transferred. (ie: Specific design and materials can be used to mitigate anticipated problems).
- *Intolerable* risks are those which are unacceptable or too costly to treat. (eg: Development should not occur at such sites).

The application of the SMO may be appropriate where risk is tolerable or intolerable.

Risk assessment requires consideration of the **likelihood** of an event happening multiplied by the **consequences** if it does occur ie:

Risk = Likelihood x Consequence

In other words, risk identification requires analysis of: what can happen, where it can happen, and when it could happen.

For salinity, **likelihood** is best determined by persons trained in land sciences and hydrogeology, based on professional experience and on analysis of available technical data. It may need confirmation via investigations of site features including the following:

- the soil salinities at various depths within the soil profile;

- watertable depth;
- groundwater salt concentration at the site.

For larger developments that could impact on local water balances (eg: large urban subdivisions or irrigation schemes), likelihood estimations may also require assessment of the regional hydrogeology and salinity processes, to establish the following:

- depth to groundwater,
- salinity of the groundwater,
- response of the groundwater system to hydrologic change, the landscape, and hydrological context, and salinity of the soils (ie: water balance assessment).

Where information is available, a review of the historical trends of local groundwater levels can be most important in both of the above cases, as watertables may move during the life of a proposed development.

Determining the ***consequence*** of predicted salinity on a proposed development, (or of the proposed development on the salinity processes) typically involves consideration of features including the type and purpose of a building (eg: hay shed, residence, milking shed), construction materials and design elements (eg: architectural or engineering detail, landscaping proposals, (eg plants and watering systems to be used, the extent of impervious surfaces), and drainage design.

Risk can be determined and expressed in qualitative (ie descriptive) or quantitative terms, depending on the type of data available and confidence levels associated with those data. Where numerical data are not available risk expression is limited to qualitative expression. The following text summarises approaches to qualitative and quantitative risk determination and expression.

5.1 Qualitative risk assessment

Table 2 below identifies **qualitative** risk categories.

Table 2: Example risk matrix

Likelihood	**Consequence**			
	Severe	***Major***	***Moderate***	***Minor***
Probable	Very high risk	Very high risk	High risk	Moderate risk
Possible	High risk	High risk	Moderate risk	Low risk
Improbable	Moderate risk	Moderate risk	Low risk	Very Low risk

Source: HB 436:2004

The following explanations apply.

For *likelihood*:

- *Probable*: Can be expected to occur during the life of the project.
- *Possible*: Not expected to occur during the life of the project.
- *Improbable*: Conceivable but highly unlikely to occur during the life of the project.

For *consequence*:

- *Severe:* Irreversible damage, huge cost.
- *Major:* Extensive damage, major cost.
- *Moderate:* Some damage, high cost.
- *Minor:* Little damage, low cost.

Negligible:* Negligible impact, no financial loss.

(Negligible consequence is excluded from the above Table as all risk associated with it will be Very Low.)*

5.2 Quantitative risk assessment

Quantitative risk assessment can be used when adequate data are available or can be developed. For example, the risk of salt damage to infrastructure might be calculated as:

R(p) = P(s) x P(s:h) x V(p:s) x E

Where:

R(p) = the risk (eg. annual loss of building or property value).

P(s) = the annual probability of the hazard (eg. shallow saline watertables).

P(s:h) = the probability of the spatial impact by the hazard (eg. the salt coming into contact with the building foundations).

V(p:s) = the vulnerability of the property to the spatial impact (eg. the proportion of materials affected by the salt).

E = the element at risk (eg. the net present value of the property).

5.3 Application of qualitative and quantitative risk assessment approaches to SMO designation.

The qualitative risk assessment approach has been nominally used for designation of SMO areas as identified in this project. This is based on the technical mapping on salinity incidence areas and areas with perceived potential to become affected by salinity within the foreseeable future (ie identification of likelihood), combined with consideration of the consequence of impact on infrastructure or the environment. Quantitative assessment is more applicable for use in assessing salinity risk for a specific development within an SMO

area. This might be used for example if a developer were to argue a case for development within an SMO area using data accumulated for the development of the application.

The preferred option however in all cases, is to avoid risk of salinity impacts by locating development on sites where there is no risk of salinity impact.

References

Australian/New Zealand Standard on Risk Management (AS/NZS 4360:2004)

HB 436:2004 Risk Management Guidelines (Companion to AS/NZS 4360:2004) and

HB 203:2004 Environmental Risk Management: Principles and process.

6 What is being done elsewhere

As previously identified, a review was conducted of the content and scope of the nine SMOs being applied in planning schemes within Victoria. The review also considered what other tools were being used in local government to address salinity in Victoria and interstate. Additional tools include:

- Use of building standards (where able to be applied).
- Use of information kit materials.
- Development of local policies for use instead of the SMO (and potentially other overlays).

6.1 Best practice

A separate 'Best Practice'[1] report on this review has been prepared under this project so a full explanation is not provided here. The following text summarises the findings of that report.

6.1.1 SMO application

- There is no single best practice example of application of the SMO. Different municipalities in different parts of the State have applied the SMO from different origins to meet different needs, and for application across different forms of land use from irrigated to dryland agricultural, and across agricultural and urban situations.
- Most SMOs in Victorian are generally being applied to rural areas, except for the City of Greater Bendigo which also includes urban areas.
- The style of SMO applied varies from blanket application over substantial portions of municipalities, with no differentiation (by text or maps) given to recharge or discharge areas, through to detailed mapping to single allotment scale of discharge and recharge areas. Extremes are:
  - Golden Plains, where the current SMO is a blanket application across the Shire's entire rural areas and no application within its township boundaries.
  - Bendigo, where discharge and recharge areas are mapped to a fine level of detail.

[1] *Salinity Management Overlays for the Colac Otway, Corangamite, Golden Plains and Surf Coast Shire Planning Schemes: Part 1: Best Practice Report. EnPlan –DBA January 2006; and Best Practice Report: Part 2: Summary statements on Victorian Municipalities with SMOs*. EnPlan DBA February 2006

- The focus of most SMOs is on recharge control through attention to regulating the removal of native vegetation and encouragement of revegetation (as regeneration or replanting) to combat groundwater recharge.
- In all instances salinity is a background issue rather than a foremost issue in areas where the SMO is applied.

6.1.2 Building standards

- There are no formal salinity Building Standards in the ***Australian Building Code*** although the code does contain provisions for minimising the risk of moisture damage. However modifications to the code have been introduced in NSW and SA. Further, in the cities of Camden and Fairfield in NSW, the Councils have introduced policies that require all new buildings regardless of location within the municipalities incorporate specified provisions to minimise the risk of salinity damage. This has occurred in the interests of minimising risk of litigation against Council, and can be considered best practice at least for areas currently or potentially likely to experience salinity problems.
- Australian Standards for building in a saline environment are likely to be introduced into the Australian Building Code in the near future but not prior to the completion of this project. (Refer to the Building Standards attachment to this report).
- Best practice at local government level also requires the availability of explanatory material covering salinity processes and planning processes for areas that either do or may experience or contribute to salinity problem, including for areas covered by Salinity Management Overlays. The preparation and availability of such materials has been best handled in combination by the Western Sydney Region, (due to various efforts of the NSW planning and environment Department, the Western Sydney Region Organisation of Councils and respective municipalities), and the rural cities of Dubbo and Wagga Wagga.

6.1.3 Other ‘best practice’ elements

Other ‘best practice’ tools include the following:

- The introduction of a measure such as the Western Region ***Salinity Code of Practice*** which provides a consistent framework for action across municipalities with a common matter requiring attention. The Code was prepared in 2002 and has been adopted by some councils. Other councils have determined not to adopt the Code.

  Chapter topics in the 80 page document include the following:

  - Background to Urban Salinity;
  - Salinity and Development;
  - Development Assessment Guidelines;
  - Development Management Guidelines;
  - Implementing the Salinity Code of Practice;
  - Future directions and Recommendations;
  - Appendices (includes Salinity Management Response Checklists).

The Code of Practice contains development assessment flow charts for multi-lot developments or rezoning, and for single lot developments. The level of salinity hazard of the locality, and the size and nature of the development are used to determine one of 3 levels of management:

- The use of a **two staged reporting process** (by appropriately qualified persons) for proposed developments in current or potential saline areas:
  - Stage 1 reporting on the potential for high watertables or salinity at a site, or for areas which may impact on salinity incidence
  - Stage 2 reporting for areas identified from Stage 1 reporting as being at clear risk of salinity impact on infrastructure development, and including measures to ameliorate salinity and salinity impact

  The detail of Stage 2 reporting methodology and content is a matter for further discussion with the municipalities participating in the current project.

- The requirements for best practice **mapping** for SMOs may vary across municipalities and is for discussion in the subsequent stages of the current project. Key factors are:
  - the availability of mapping material and the suitability of mapping scales; and
  - confidence levels able to be ascribed to mapped information.

  In short, it is essential that mapped information and associated text content in SMOs can withstand scrutiny and challenge.

A map and brief text summary of the application of the nine Victorian SMOs is provided in Appendix 1.

7 Preparation of SMOs and associated materials.

7.1 SMOs

During the course of the Project it became clear that separate responses to the planning needs of each Shire would be required.

Consultation meetings were held with the respective Shires in early April 2006 to present all available material and findings to that time, specifically to seek direction from the respective Shires on their requirements of the Project. As it was not realistic to expect direction on a range of matters at the meetings, a list of common questions and explanations was put to the Shires within a week of the meetings.

The questions, presented in **Appendix 3** were prepared to ensure understanding between the project Team and the respective Shires.

The primary common elements emerging from the April discussions were as follows:

- An SMO to cover areas with identified existing salinity incidence areas was required. This covers Category 2 (existing induced salinity) and Category 3 (areas potentially at threat salinity incidence) areas.
- It was generally agreed that primary salinity areas (ie Category 2 areas) from which ecological assets had been eliminated by human activity should be interpreted with Category 1 areas for application of the SMO.
- Acknowledgement of, and protection against salinity identified as Category 2 areas that retain their ecological asset values, are potentially better recognised via the Environmental Significance Overlay (ESO) where this is already applied, in preference to application of an additional salinity overlay.
- The application of SMOs to Category 4 and 5 salinity areas (ie recharge areas remote from salinity incidence) was not favoured as there was inadequate confidence in identifying specific cause-effect relationships between areas.

The following matters required attention in refining the planning scheme amendments for the respective Shires across the SMO Schedule, Local Policy, the MSS, and the applicants' kit.

- Replacing salinity policy repetition from individual townships with a more general policy located within the MSS under Settlement and Housing.
- Clarifying the role of the map proposed to be included within the MSS.
- Shires had differing expectations of the level of discretion that should be available to planning officers in applying the SMO including the use of local policy and the applicants kit.

7.1.1 Transposing salinity mapping to SMO area definition.

The following technique was established for the identification and mapping of SMO areas, after discussions with the respective Shires in April 2006. The mapping was conducted by the Department of Primary Industries as a field exercise involving around 20 trained persons using all available resources including geological, topographic and aerial photograph interpretation, supported by extensive ground-truthing by field inspection.

Areas included in mapped SMO polygons are limited to those areas where salinity poses or could pose a risk to assets. These include mapped salinity and a buffer area around the salinity to accommodate a one metre rise in the groundwater table. The buffer component is based on the assumption that there would be no more than a one metre rise in the watertable over the life of this version of the SMO (assumed to be 30 years). This is in turn based on the groundwater monitoring record.

Since the area affected by a one metre rise in the groundwater levels is proportional to the terrain slope, the buffer area was constructed using the following 'rules':

- a 100 metre buffer was applied to the proportion of the mapped salinity polygons which occur on terrain slopes of less than 2% (i.e. less than 1 in 50);
- a 50 metre buffer is applied for the proportion of mapped salinity polygons lying on slopes of between 2% (1 in 50) and 4% slope (1 in 25);
- a 25 metre buffer is applied to the proportion of mapped salinity polygons on slopes of between 4% (1 in 25) and 10% (1 in 10);
- a 10 metre buffer applied to the proportion of salinity polygons lying on slopes of between 10% (1 in 10) and 20% (1 in 5); and
- no buffer is applied to the proportion of salinity polygons on slopes greater than 20%.

The buffers around the mapped salinity polygons were then combined, and enclosed with a 10 metre buffer, which is the basis of the SMO polygons. The nodes of the SMO polygons were thinned and generalised (3-node co-linear deviation = 5 metre; node separation = 5 metres), and the polygon boundaries smoothed. The combined dataset was then disaggregated into individual polygons. Where polygons were separated by short distances (<25 metres), the polygons were merged based on an interpretation of likely groundwater behaviour.

The SMO area boundaries are generally regarded as accurate at a map scale of 1:25,000, based on the based on the accuracy of the input data (salinity polygons, wetlands and Digital Elevation Model from which the slope contours were generated). Use of the data beyond the scale of 1:25,000 should be supported by additional site investigation data.

Some mapped saline areas are naturally occurring primary salinity sites which may retain halophytic (ie salt tolerant) plants and rare or threatened species associated with the evolution of these 'island ecosystems' of saline discharge over the past centuries. The most obvious examples are the semi-permanent and permanent saline wetlands.

To delineate areas where salinity may potentially be an environmental asset, two components need to be identified:

- The areas where the mapped salinity has been identified as primary in origin and which may retain some environmental value. In these areas semi-permanent and permanent saline wetlands have been identified, and areas adjacent to them which are regarded as dominantly primary salinity sites.
- The areas surrounding the primary saline sites in which some developments could threaten the integrity of the environmental asset. These are areas where shallow saline watertables occur, and where a lowering of the groundwater level (for example, through tree planting) or disposal of fresh water (storm water, for example) may potentially destroy the environmental values.

The above approach is the final method used for the definition of SMO areas.

The Project Team developed all mapping in the format required for inclusion in Planning Schemes. This product was forwarded to DSE for insertion into the required Planning Scheme template. This product is incorporated into the proposed amendment documents attached to this report.

7.2 Building provisions

The Project was required to consider standards for building in saline environments within Australia, for potential application within the participating municipalities. This is presented in the document titled ***Standards for building in a saline environment: Construction of dwellings and outbuildings*** that complements this report. The information in the document is derived from the Building Code of Australia and associated literature. The information presented was developed in consultation with the Victorian and National building legislation bodies.

The document identifies steps that can be taken to reduce potential salt damage to structures, through modifying design and construction techniques and land management practices. It includes prospective *Australian Standards* for managing salinity in building controls, that are not yet adopted by Australian governments. Adoption is likely to occur in 2006 or 2007, following consultation that has been conducted by the Australian Building Control Council with the national building industry.

The document is presented as information, rather than as a document to be used now for general public distribution. This responds to direction from the Shires that a public information document would not be acceptable at this time, given the lack of formal status of some standards. The document is presented in a form that can be readily adapted for public information if required.

The information provided does not replace the need for professional advice. Builders and owners should evaluate the level of salinity risk for their specific situation before making decisions on appropriate products and practices. Detailed advice should be sought from certified structural engineers for specific situations or from the relevant state or national building authorities.

Although some of the products and building practices mentioned may cost marginally more than standard building techniques, it is proposed that the life of buildings constructed in saline environments will be prolonged.

7.3 Information kit for applicants

The information kit for applicants contains two documents. Both are derived in part from the content of a range of Victorian and interstate documents prepared for similar purposes. The two documents are:

- ***Soil Salinity - What To Look For. Developing, Building Or Buying Real Estate Within A Salinity Management Overlay.***
- ***Permit Application Requirements for Development Proposals where a Salinity Management Overlay Applies***

The '*What to look for'* document provides :

- guidance on assessing land for salinity.

- an explanation of salinity.

The '*Permit application'* document provides:

- a summary explanation of the Victorian planning system.
- an overview the SMO and its requirements for developments within the Overlay.
- a ready reckoner identifying information required for various forms of development within SMO areas.

Both documents are useful well developed guides. They do not replace the need for potential planning applicants or developers to discuss their proposals with municipal planning and building staff, and other suitably qualified professionals as appropriate.

7.4 Administering permit applications under SMO's

The SMO maps delineate the discrete areas of salinity and shallow watertable hazard. Current knowledge dictates that these areas constitute high risk for developments and as a matter of councils' policy, applicants should be advised to avoid building in these areas.

However if applicants wish to proceed with development in SMO areas in spite of advice to the contrary, it is reasonable from a due diligence perspective for councils to expect compliance with the strong permit application requirements indicated in Clause 44.02-2 of the SMO provisions.

A single stage permit application process has been agreed by the participating municipalities. This uses two tools that will minimise workload and decision making for council staff in the processing of permits.

- The "ready reckoner" in the Information Kit provides council staff and permit applicants with clear guidance on permit requirements for a range of development types.
- Clause 44.02-4, (Referral of Applications) which identifies DSE as the referral authority, states that:

  Before deciding on any application, the responsible authority must refer the application and any site capability report to the Department of Sustainability and Environment under Section 55 of the Planning and Environment Act, 1987 unless in the opinion of the responsible authority the proposal satisfies requirements or conditions previously agreed in writing between the responsible authority and the Department of Sustainability and Environment.

This means that Councils must refer all permit applications to DSE for decision advice unless otherwise agreed in writing by DSE.

8 The SMO products

The content of the SMO planning scheme amendment products for the respective Shires is provided in the attached documentation. The following summarises the amendments across the four participating Shires.

Areas of known secondary salinity, and areas of primary salinity not currently recognised as sites of environmental value under the Planning Scheme, have been mapped. Map boundaries extend to include fringe areas that could suffer salinity incidence within the foreseeable future due to modest watertable rises as discussed in Section 7 of this report. The SMO has been applied over these mapped areas for introduction into the Planning Scheme.

Schedules to the SMO have also been prepared with limited exemptions from the need for a planning permit. A suite of issues, objectives and strategies have been prepared for the respective Municipal Strategic Statements and local policies. These provide guidance for Council in determining planning applications for development triggered by the SMO.

The policy directions provided in the MSS contents relate to:

- The potential impact of salinity on the development at a site;
- The potential impact of the development at a site on environmental conditions (specifically salinity) elsewhere in the catchment;
- The need to highlight areas within the Shire that have potential to be impacted by salinity as a result of land uses and development that are of a sufficient scale to alter hydrological processes; and
- Ensuring that salinity is included in the consideration of urban re-zonings and large subdivisions.

Appendices

Appendix1: Summary overview of SMO application in Victoria

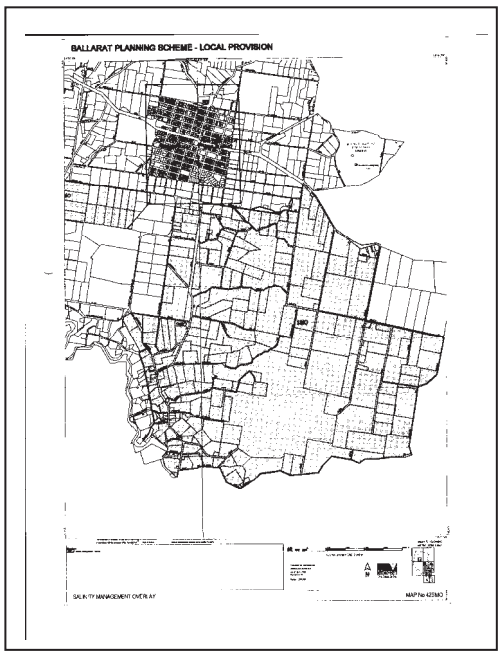


Figure 2: Ballarat Planning Scheme SMO map

The Ballarat SMO is a blanket application over Ordovician geology covering part of the southern section of the municipality. The SMO is a carry over from the former Shire of Bunninyong. Implementation focus is on revegetation and preventing clearance of native vegetation.

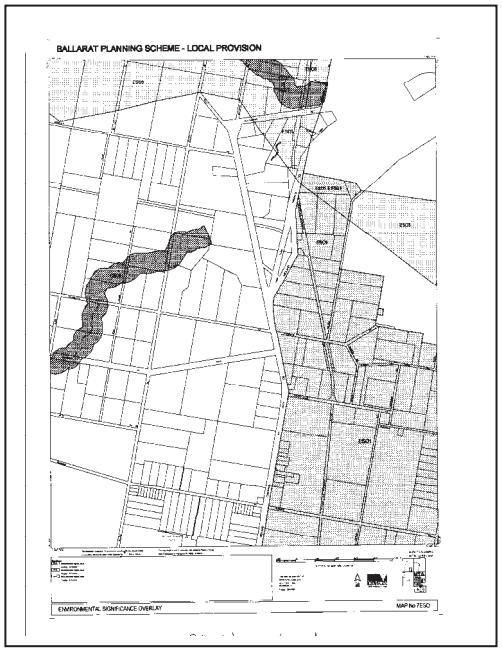


Figure 3: Ballarat Planning Scheme Environmental Significance Overlay (ESO1) map covering the Invermay Land Protection Area

Salinity is covered in the north of the Shire on Ordovician geology via an Erosion Management Overlay (EMO) for the Invermay Land Protection Area (refer Fig) which also covers soil erosion.

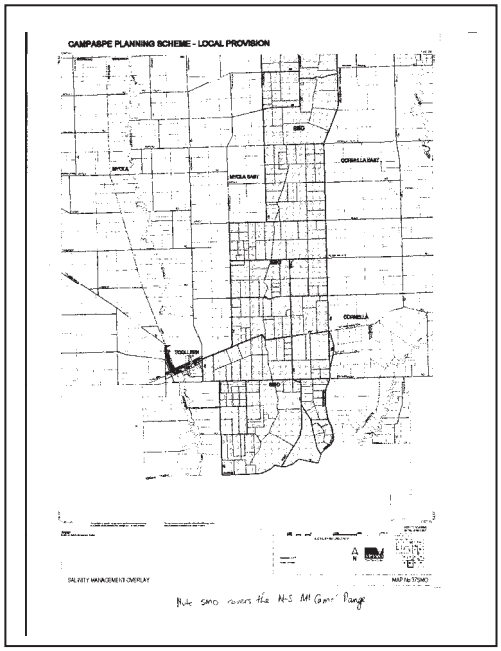


Figure 4: Campaspe Planning Scheme SMO map

This SMO covers the Mount Camel Range which experiences cause and effect of salinity. The SMO was previously more broadly applied across irrigation areas experiencing high water tables. That was removed as a general shift by 'irrigation' municipalities to deal with salinity matters via compliance with sub-regional Salinity Management Plans

The SMO is largely to promote revegetation on the Mount Camel Ranges.

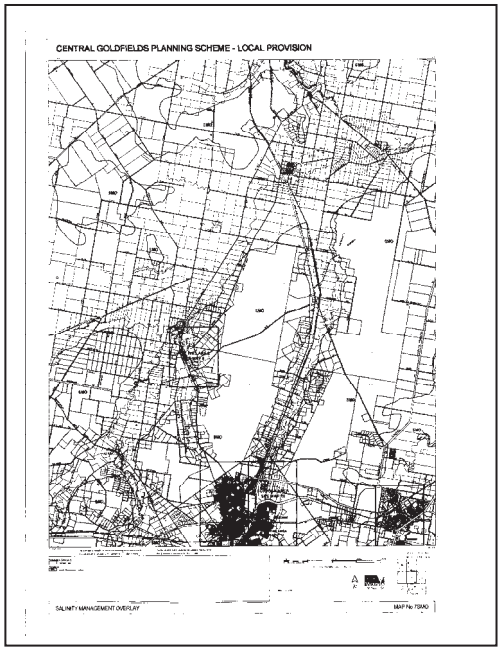


Figure 5: Central Goldfields SMO.map

The Central Goldfields SMO is applied across hills of the Shire. Focus is on native vegetation retention and revegetation for groundwater recharge control. The SMO is applied in rural areas only. It does not cover urban/township areas.

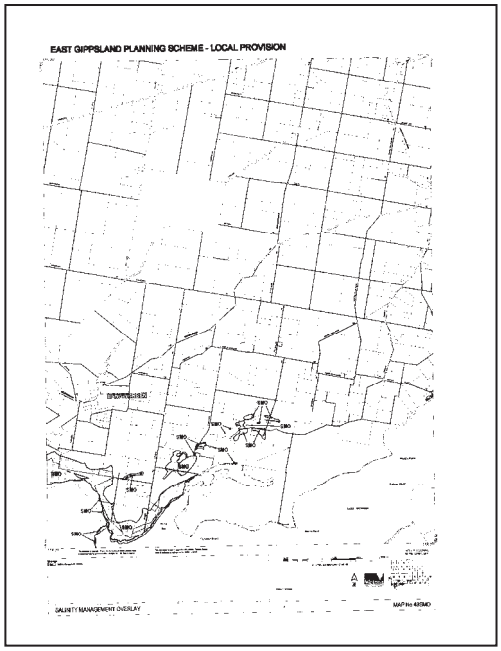


Figure 6: East Gippsland Planning Scheme SMO map

The East Gippsland SMO is applied to very limited areas of salinity incidence close to the coast based on salinity hazard mapping of a section of the Shire.

Figure 7: Golden Plains Planning Scheme SMO map

The Golden Plains SMO is a blanket application across the rural areas of the Shire. It does not cover the township areas as shown in the SMO map covering Meredith (refer Figure 7)

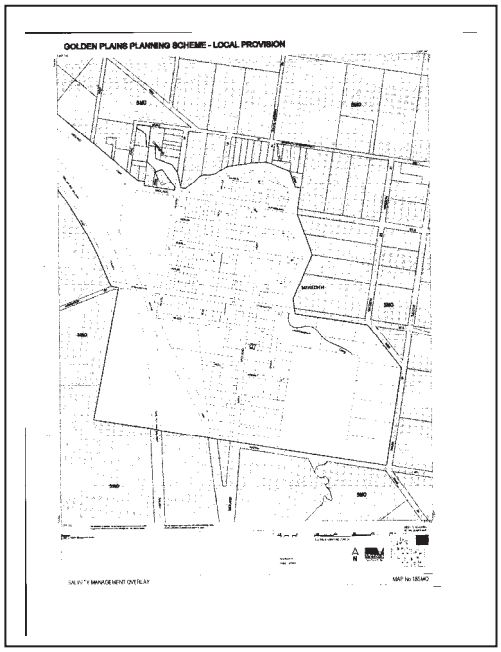


Figure 8: Golden Plains SMO map at townships.

The blanket SMO surrounds but does not include township areas as demonstrated in this map of Meredith.

Figure 9: Greater Bendigo Planning Scheme SMO map in urban Bendigo

The SMO is applied within the urban areas of Bendigo to cover mapped recharge and discharge sites. The mapped sites mainly cover immediate stream environs and other open space areas but also include some urban residential lots.

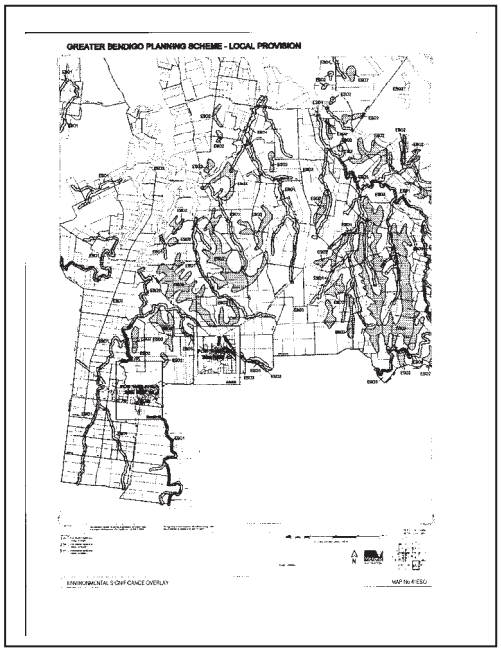


Figure 10: Greater Bendigo Planning Scheme SMO map in the Eppalock Catchment

The Bendigo Planning Scheme applies the SMO across the entire catchment, concurrently with other Overlays (Erosion and Environmental Significance) on ridge areas and along drainage lines the Eppalock Catchment. The Overlays collectively cover recharge and discharge areas with a focus in vegetation retention and revegetation. The catchment provides around 60% of Bendigo's domestic water consumption and irrigation water to the Campaspe Irrigation District near Rochester (in the Campaspe Shire).

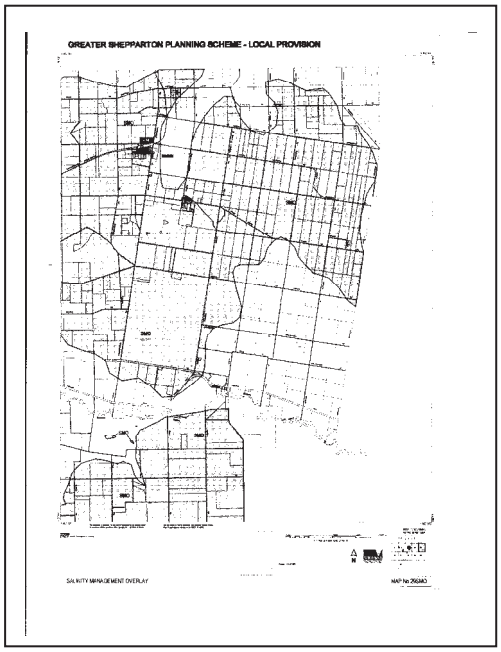


Figure 11: Greater Shepparton Planning Scheme SMO map

This SMO is applied as a blanket cover only in the hills of the Dookie and Caniambo areas between Shepparton and Benalla. While the Shepparton Irrigation Region which covers much of the municipality (and beyond) contains large areas of high water tables and associated salinity, and areas at risk of high water tables and salinity the Planning Scheme addresses this by requiring permit applications to comply with sub-regional salinity management. While urban salinity occurs in town areas, the SMO is not applied in urban areas and the Council relies on advice from DSE regarding potential risks to development (including residential development. Council does not apply specific measures for building in salinity areas.

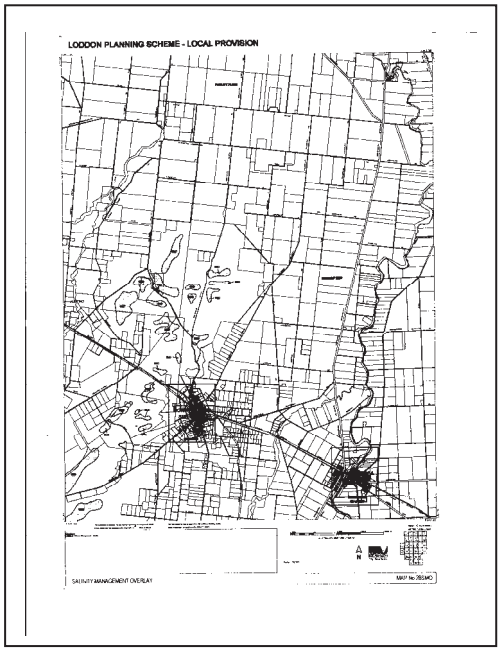


Figure 12: Loddon Planning Scheme SMO map

This SMO is applied across the Shire's rural areas to sites mapped by the (former) Loddon Campaspe Regional Planning Authority and the Department of Natural Resources in the 1980s and 1990s. The SMO does not occur in township areas as it is understood that these were not mapped. Residential and other development is not commonly proposed within Overlay areas.

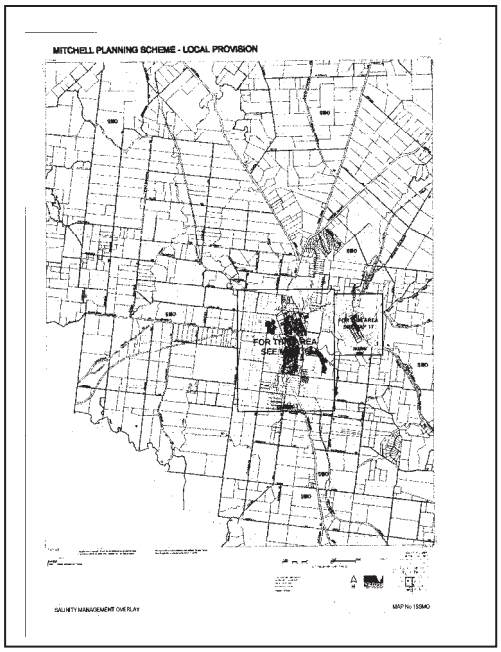


Figure 13: Mitchell Planning Scheme SMO map

The Mitchell SMO is a blanket application across the rural areas of the Shire, and is mainly used for vegetation retention and for revegetation requirements. Urban areas including towns such as Kilmore Wallan, and Broadford are not covered by the SMO (Refer Figure 13).

Figure 14: Mitchell Planning Scheme SMO map

As stated at Figure 12, urban areas such as Kilmore are not covered by the Shire's SMO.

Appendix 2: Consultation

The following organisations contributed generously to the Project through provision of their time and knowledge.

Organisations

The following organisations assisted with the project through permission to inspect sites and through discussion with staff.

Australian Building Codes Board
Corangamite Catchment Management Authority
Department of Sustainability and Environment
Department of Primary Industries
Corangamite Region Shires: Colac Otway, Corangamite, Golden Plains, SurfCoast
Other Victorian municipalities
    Cities: Ballarat, Greater Bendigo, Greater Shepparton, Casey,
    Shires: Campaspe, Cardinia, Central Goldfields, East Gippsland, Loddon, Mitchell
NSW Municipalities
    Cities: Blacktown, Camden, Campbelltown, Fairfield, Wagga Wagga, Dubbo.
Victorian Building
Western Sydney Region Organisation of Councils

Appendix 3: Directions sought from participating municipalities

Matters for direction from participating Shires

The SMO project team requires direction on the matters identified below in bolded italics. Long responses are not sought but sufficient direction is needed to provide the Team with the context to commence Planning Scheme amendment documentation for the MSS, Local Policy, and SMO options. Written responses are preferred to minimise the potential for ambiguity. However discussion should be held with Chris Harty where this is needed.

Discussion will then be conducted with the Shire's Steering committee representative (or other nominated person if needed) in proceeding with the needed documentation.

Emphasis on salinity in MSS

The following statement is a partial explanation of the MSS extracted from the VPPs

> *The Municipal Strategic Statement (MSS) is a concise statement of the key strategic planning, land use and development objectives for the municipality and the strategies and actions for achieving the objectives. It furthers the objectives of planning in Victoria to the extent that the State Planning Policy Framework is applicable to the municipality and local issues. It provides the strategic basis for the application of the zones, overlays and particular provisions in the planning scheme and decision making by the responsible authority. (Extract from VPP)*

Reference to salinity and associated high watertables is needed in the MSS to provide a link through Local Policies to the application of SMOs being applied through the current project. It is proposed to include reference to the following salinity scenarios:

- Salinity can impact on the strength, integrity and life span of built private and public infrastructure assets, on environmental assets, and on the productivity of rural land and urban gardens.
- Changes in land use that alter the water balance or hydrology of areas can exacerbate existing saline areas or cause or contribute to the emergence of new saline areas.

The MSS can vary in length, form and complexity between Shires. The following framework generally applies:

Clause	Title
	MSS
21.01	Municipal profile
21.02	Key Influences
21.03	Vision and Strategic Framework
21.04	Objectives Strategies and Implementation
21.04-1	Settlement
21.04-2	Environment
21.04-3	Economic Development
21.04-4	Infrastructure
21.05	Monitoring and Review

From the above, reference to salinity and associated high watertables is likely to be included in the following:

21.02 Key Influences (if so regarded)

21.04-1 Settlement (ie impact of salt on infrastructure)

21.04-2 Environment (ie potential impact of land use change on land and environments)

Response on the following is needed for the MSS:

Is salinity required to be written in to the MSS as a dominant or subordinate influence on policy development and decision making?

Does the Shire have its own preferred wording for salinity content in the MSS?

Does the Shire accept inclusion of reference to the two above-mentioned scenarios in the MSS (I: impact of salinity on assets and potential for land use change to cause or exacerbate salinity.

Does the Shire wish to direct where in its existing MSS it wishes reference to salinity (as per the above dot points) to be inserted.

Emphasis on salinity in Local Policy?

The following statement is a partial explanation of Local Policy requirements as extracted from the VPPs

> *A Local Planning Policy (LPP) is a policy statement of intent or expectation. It states what the responsible authority will do in specified circumstances or the responsible authority's expectation of what should happen. The LPP gives the responsible authority an opportunity to state its view of a planning issue and its intentions for an area. An LPP provides guidance to decision making on a day to day basis. It can help the community to understand how the responsible authority will consider a proposal. The consistent application of policy over time should achieve a desired outcome.(Extract from VPP)*

Local Policy in Planning Schemes is structured differently between Shires. For example:

- The Corangamite Shire uses a similar headings structure as for the MSS (refer above)
- The Colac Otway Shire Local policy is structured as follows:

  22.01 Main roads / Scenic route

  22.02 Ridgelines

  22.03 Tourism Development

  22.04 House lot excision in RUZ and ERZ

  22.05 Coastal and Otway Ranges Townships

  The structure of the Corangamite local policy is conducive to insertion of the application of SMOs in rural and township areas. The Colac Otway local policy is less conducive to insertion of reference to salinity as it does not have explicit headings covering environment, agriculture/ rural productivity, nor to town environments (apart from 'Coastal and Otway Ranges towns').

Further, the SMO in the VPP requires attention to a range of matters in Applications. However, it does not specify the detail required in applications nor who is required to prepare reports that accompany permit applications. A two tiered assessment approach (ie: basic assessment and detailed assessment for proposals) is proposed in draft Information Kit documents provided by the Project Team to Shires in meetings of April 2006. This is based on scale and types of works and their potential to impact on, or to be impacted upon by, salinity.

All participating Shires need to advise on the type of content required for insertion of salinity into local policy content.

Should the local policy relate to particular types of buildings and works development or should it be a more generic style of policy?

The SMO in the VPP is quite prescriptive in the Permit requirements (Cl 44.02-1) the Application Requirements (Cl 44.02-2) and the Decision Guidelines (Cl 44.02-4). (NB: A new Exemption from notice and review clause (Cl 44.02-3) was also inserted on 22/11/2005)

Should the local policy add further detail for application requirements and decision guidelines to pick up on any considered deficiencies?

Potential exists for introducing a 'two tiered' assessment report approach in Local Policy for different scales of development where:

- A basic assessment is required for some (lesser) types of development where the assessment report may be prepared by the submitter against designated criteria
- A detailed assessment report (by suitable qualified geotechnical type persons) for larger, more valuable, or more sensitive development types in SMO areas, or in other (eg Category 4 or 5 type areas as identified below), where large scale development could cause or impact on, or be impacted on by salinity

Does the Shire have any requirements or thoughts to contribute on the notion of including such a scenario into local policy?

Type and scope of SMO

The DPI salinity mapping work for this project focused on growth 'Growth Corridor' areas identified to the CCMA by respective Shires for this project. These basically surround townships to a significant distance (eg: up to 8-10 km). Salinity is mapped to a high degree of confidence in those areas. Outside of those areas and across the broadacre rural lands salinity mapping in part pulls from previous mapping but confidence levels are high for such mapped areas. However it is conceivable that other saline areas exist outside of the Growth Corridor areas that have not been mapped, and also that mapped areas may have expanded since they were mapped some time ago.

Does the Shire propose that all mapped saline sites (ie inside and outside of designated growth corridors are to be included in the project?

At the April 2006 meetings of the Project Team with individual Shires various scenarios for SMOs were put based on some or all of the following five salinity 'categories'. The

Category 1:	Existing secondary salinity (ie human induced)
Category 2:	Primary salinity (ie Naturally saline 'asset' areas)
Category 3:	Potentially affected by rising watertables
Category 4:	Areas where inappropriate development may impact on C2 areas
Category 5:	Areas where development including vegetation loss may cause or exacerbate secondary salinity (eg: recharge areas).

Subject to internal discussion outcomes, we have indicated the following preferred approach regarding the above salinity categories.

1 *That Shires introduce an '**SMO1**' that includes mapped* Category 1 *plus a 200 metre surrounding buffer (ie* Category 3 *areas). Thus the recommended SMO1 is inclusive of Category 1 and (with qualification)* Category 3 *areas.*

(The qualification with Category 3 is that the width outside existing visibly affected salt areas, that are potentially susceptible to future incidence cannot be determined accurately without site by site analysis.. It can be reasonably sure however that existing areas will expand rather than contract over time and that the extent of expansion will be dependent on a number of factors, mainly local topography. (ie lateral spread will be more confined in undulating topography than in flat topography). A 200 metre buffer width is identified by the Project Team as a reasonable buffer beyond which it can be reasonably expected that

shallow watertables and visible salinity incidence will not impact outside that buffer within around 10-15 years.

2 That reference to *Category 2* salinity (relates mainly to Saline wetlands that retain original pre-settlement ecological values) be incorporated into (Environmental Significance Overlays (where they are currently applied) that may potentially be expanded to include a surrounding buffer areas of potentially 200 metres as used in proposed SMO1 areas. This would be in preference to applying another buffer over those areas.

3 The concept of applying an SMO2 that covers groundwater flow system land units was discussed. This would be a more strategic SMO, picking up *Category 5* salinity land (as described above). Within such defined land units, large scale land use change that could alter surface and groundwater hydrology (ie the water balance) could exacerbate or cause salinity at less defined locations, or could (eg large scale plantations) potentially adversely impact on primary salinity assets (ie: Category 2 salinity areas). It was acknowledged that less technical certainty can be applied to this SMO2 concept, which would cover larger areas of the Shire (eg around 50%) but with all developments exempt except those specified.

Direction is needed from all participating Shires on the following:

Acceptance of the application of SMO1 (as described above) with or without the 200 metre buffer areas in urban and non-urban areas as identified on existing maps (and subject to Shire satisfaction re mapping scale).

Specification of mapping scales required for SMO1 areas in urban/township and non-urban areas.

Any other matters it identifies relevant to the above questions for consideration of the Project Team

The use of ESO where it exists and can incorporate salinity considerations*.*

(We note that this will not apply in the Golden Plains Shire where such ESOs do not exist)

Direction on the application of an SMO2 as described. (ie Is it appropriate to apply and under what base conditions would the Shire agree to use the SMO2 as discussed?)

Given discussion on the SMO2 in the document emailed in March (ie Planning Scheme Tools for Implementation of Salinity Management Overlay project) what buildings or works should require permits and what building and works should not require permits/

Does the Shire see a place for the use of the Vegetation Protection Overlay (existing or potentially to be introduced) as a tool to assist in retention of vegetation for salinity management?

Ancillary matters for response and or further development include the following:

Agreement will also be needed with Shires as to what exemptions etc are to be included in the SMO requirements. This will need to occur sequentially following agreement on most of the above matters

Information kit

Response is requested from Shires on the 'big picture' content of draft information kit materials tabled at April meetings. Editorial comment is not needed as this will be attended to by the Team. However

comment on the scope of content (ie: what subject matter should be deleted or inserted) will be valuable and valued.

Graeme David

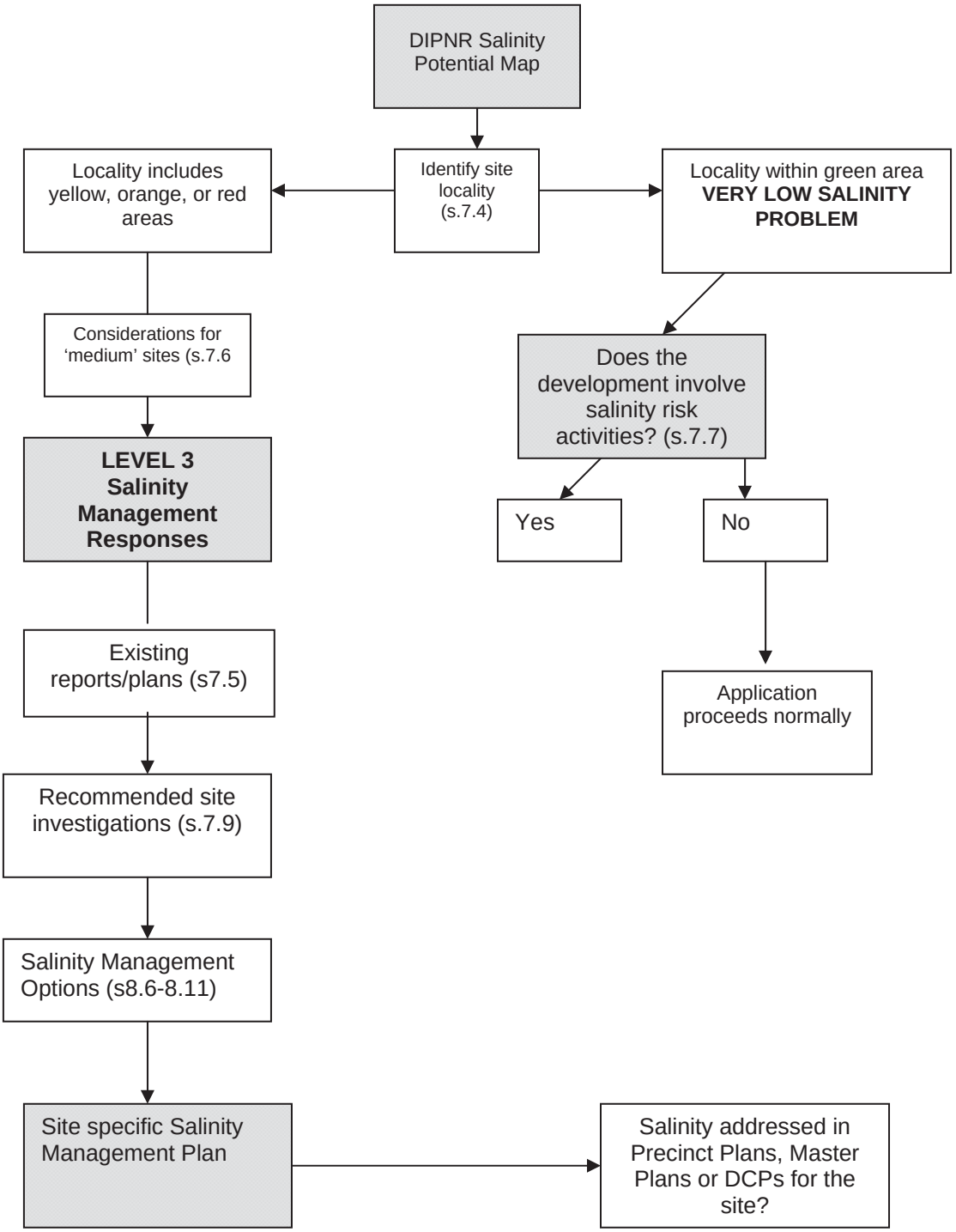
Chris Harty

Darrel Brewin

Peter Dahlhaus

18 April 2006

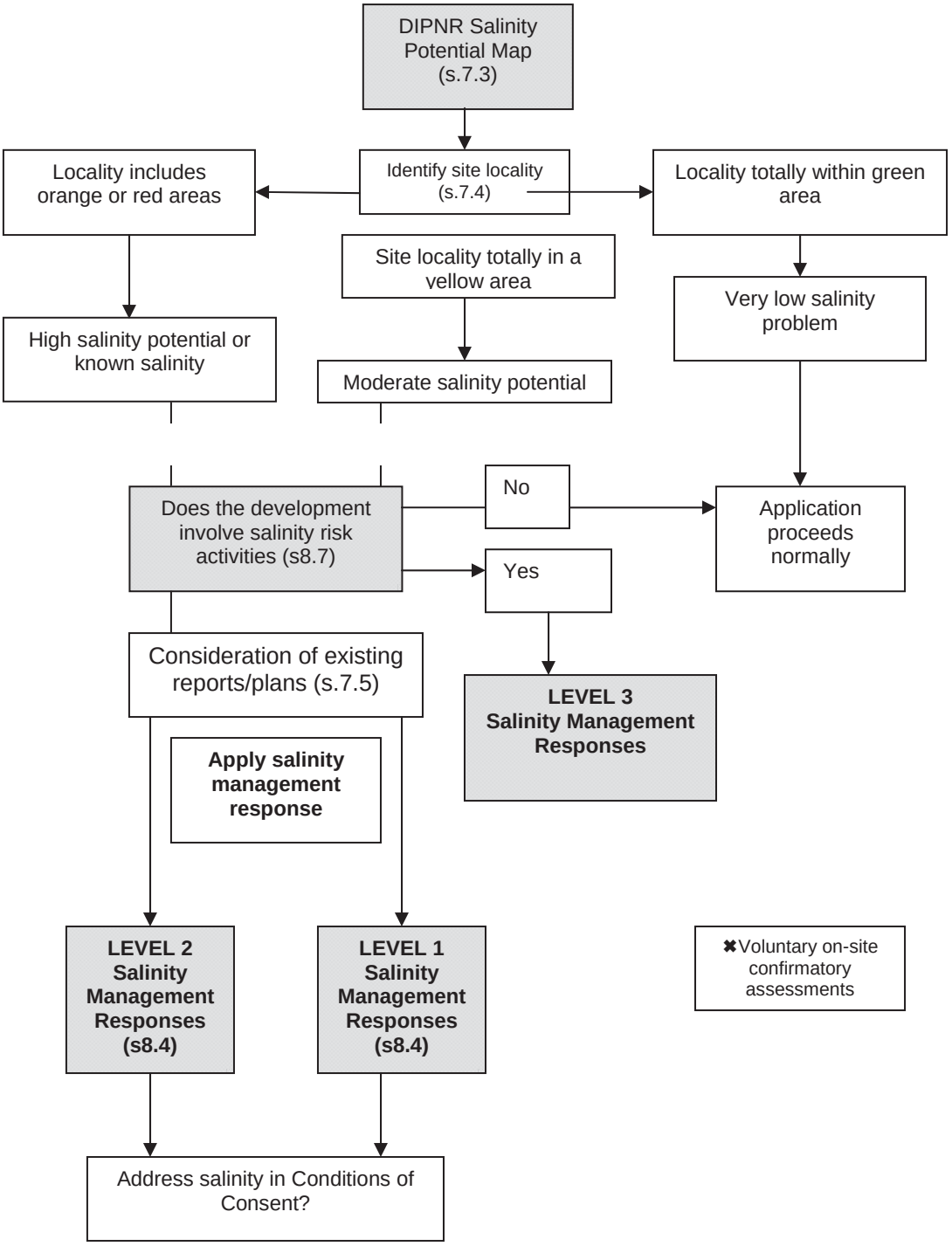
Appendix 4a: Flowchart: Western Sydney Salinity Code of Practice for Multi-lot developments or rezoning applications



Source: Western Sydney Salinity Code of Practice Fig 11

Appendix 4b: Flowchart: Western Sydney Salinity Code of Practice for single lot development applications

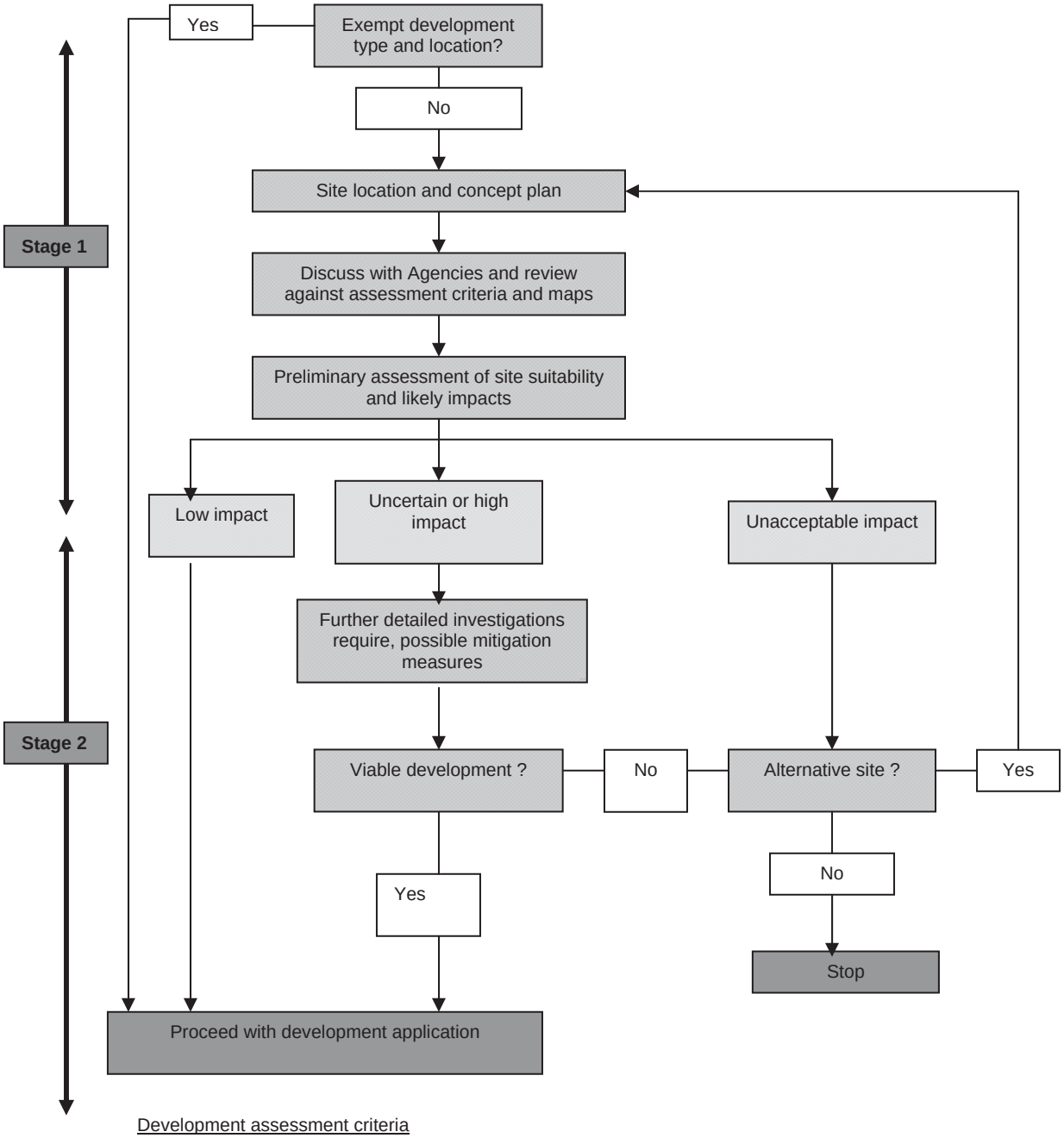
Source COP Fig 12



Source: Western Sydney Salinity Code of Practice Fig 11

Appendix 4c: Flowchart: Process prepared for Cardinia Shire by SKM consultants

Initial and detailed development assessment process (adapted from Sinclair Knight Merz 2003) (From Planning Decision Support Framework for Salinity : SKM 2004



Development assessment criteria

Appendix 5: Guidelines for assessment of salinity risk

The Australian/New Zealand Standard on Risk Management (AS/NZS 4360:2004) provides the appropriate framework for the assessment of salinity risk for any proposed development. The standard defines risk as: *"the chance of something happening that will have an impact upon objectives"* and notes that risk is measured in terms of a combination of the consequences of an event and their likelihood. Salinity risk may have a positive or negative impact.

The main elements of the risk management process are illustrated below (Figure 1).

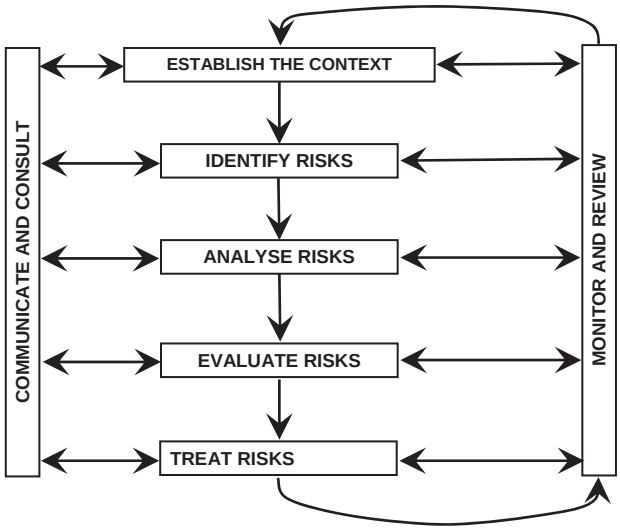


Figure 1. AS/NZS 4360:2004 Risk Management Process (Overview)

The Australian Standard risk management framework is the recommended process to assess salinity risk for developments within the Shire. Two accompanying documents to the Risk Management Standard provide considerable guidance on how to use the process. These are: HB 436:2004 Risk Management Guidelines (Companion to AS/NZS 4360:2004) and HB 203:2004 Environmental Risk Management: Principles and process. In an increasing litigious society, the need for a defendable approach to salinity risk management cannot be overstated.

Hazard assessment

Assessing the salinity hazard for a particular development requires considering the risk to the development (eg. a house or other building) and the surrounding environment (eg. neighbouring properties, or nearby wetlands or waterways). Identifying the salinity risks requires an analysis of what can happen, where in the landscape it is likely, and when it could occur. For urban development it is recognised that there is the potential impact of salinity on the development at a site, and the potential impact of the development at the site on salinity elsewhere in the catchment. Thus, there are potentially five categories which need to be considered:

Areas currently affected by secondary salinity. These areas are included within the boundaries of the Salinity Management Overlay and indicate that any development needs to consider that salinity is present at the site.

Areas of primary salinity regarded as an asset. These areas include saline wetlands or areas where high value flora or fauna are generally dependent on the salinity at the site. The areas are generally

included in the Environmental Significance Overlay. Planning any developments around these areas needs to consider that the integrity of the environment and ecosystems must be maintained.

Areas not currently affected by salinity, but with a stated likelihood of experiencing secondary saline groundwater discharge within a given time-frame. These areas are generally included within the boundaries of the Salinity Management Overlay and represent areas underlain by shallow saline groundwater tables. Any development in these areas needs to plan for the future possibility of salinity developing at the site.

Areas where land-use or development may adversely impact on primary salinity assets. Developments in areas surrounding saline wetlands or salinity-dependent ecosystems, may have a negative impact on that salinity asset. The discharge of storm water may change the salinity or the reduction in recharge through hard paved surfaces or tree planting may dry out a wetland.

Areas where development or land-use may ultimately initiate or exacerbate secondary salinity elsewhere in the landscape. In the Municipal Strategic Statement, broad areas have been delineated in which there is potential for certain land-uses, such as extensive irrigation schemes, urbanisation or vegetation removal, to rapidly change the hydrology of responsive groundwater flow systems. These land-uses may lead to changes in groundwater levels which may exacerbate existing salinity or initiate new outbreaks elsewhere in the landscape.

Risk assessment

Risk is a function of the likelihood of salinity impacting on an asset and the consequence of that impact on the asset. The analysis of the salinity risk requires the estimation of both the likelihood of salinity impacting on a development and the likelihood of a development impacting on salinity elsewhere in the environment (i.e. by increasing or decreasing salinity). The guidance provided by AS/NZS 4360:2004 indicates that this estimation can be qualitative, semi-quantitative, or quantitative. The likelihood is then combined with the consequence of the impact of the salinity on the development and the consequence of the impact of the development on the salinity process in the region, to estimate the level of risk.

The likelihood is determined though a site investigation, with the minimum required site details for a development stated in the ready reckoner. The spatial extent and concentration of salts at various depths within the soil profile should be determined, as well as the depth to the watertable and the concentration of salts in the groundwater at the site. Where larger developments are proposed, such as an urban subdivision or an irrigation scheme, the estimation of likelihood would be typically established by a regional assessment of the hydrogeology and salinity processes. Such an investigation should establish the depth to groundwater, the salinity of the groundwater, the response of the groundwater system to hydrologic change, the landscape and hydrological setting and salinity of the soils. Most importantly, the historical trends of the groundwater levels need to be established and predictions made as to whether the groundwater is likely to rise or fall during the life of the development (taking into account the impact of regional land-use on the hydrology).

A qualitative estimation of likelihood can be stated in terms of probability such as that shown below (Table 1). Alternatively, a semi-quantitative or quantitative approach may be used where the site measurements may be combined to calculate a value for likelihood. As an example:

Likelihood = *function* (depth to groundwater, rate of rise of watertable, salinity of the groundwater, development design life, rate of change of land-use, soil salt store, etc.).

Descriptor	Description
Probable	Can be expected to occur during the life of the project
Possible	Not expected to occur during the life of the project
Improbable	Conceivable but highly unlikely to occur during the life of the project

Table 1. Example likelihood scale (probability) from HB 436:2004

To establish risk, the consequence of the predicted salinity on the proposed development and the consequence of the proposed development on the salinity processes also need to be considered. This would typically involve an examination of the design elements such as the selection of construction materials, the architectural or engineering detail, the nature of proposed site landscaping including the selection of plant species and watering systems, the proposed occupation rate and use of the development, the extent of impervious surfaces and the handling of surface water runoff.

A qualitative estimation of consequence might be:

Descriptor	Description
Severe	Irreversible damage, huge cost
Major	Extensive damage, major cost
Moderate	Some damage, high cost
Minor	Little damage, low cost
Negligible	Negligible impact, no financial loss

Table 2. Example consequence scale (based on HB 346:2004)

Consequence may be quantified in terms of the economic, environmental and social cost, and may include site value, cost of building repairs or site rehabilitation, number of species lost, salt content of potable water, or other measures as appropriate.

The risk is then described as a function of the likelihood and the consequence. In a qualitative example, these may simply be combined in a matrix:

Likelihood	Consequence			
	Major	*Major*	*Moderate*	*Minor*
Probable	Very high risk	Very high risk	High risk	Moderate risk
Possible	High risk	High risk	Moderate risk	Low risk
Improbable	Moderate risk	Moderate risk	Low risk	Very Low risk

Table 3. Example matrix for determining the level of risk (based on HB 346:2004)

Alternatively, the level of risk can be calculated as a probabilistic equation. As an example, the risk of salt damage to a building might be calculated as:

$$R_{(p)} = P_{(s)} \times P_{(s:h)} \times V_{(p:s)} \times E$$

Where:

$R_{(p)}$ = the risk (eg. annual loss of building or property value)

$P_{(s)}$ = the annual probability of the hazard (eg. shallow saline watertables)

$P_{(s:h)}$ = the probability of the spatial impact by the hazard (eg. the salt coming into contact with the building foundations)

$V_{(p:s)}$ = the vulnerability of the property to the spatial impact (eg. the proportion of materials affected by the salt)

E = the element at risk (eg. the net present value of the property).

Risk evaluation

The objective of risk evaluation is to decide on whether the risk is acceptable, whether risk treatment is required, and to set priorities. For some risks, the evaluation criteria are established by the standards (in the case of building codes and materials standards), the regulators (eg. the Shire, Catchment Management Authority, or Environment Protection Authority), the asset managers (eg. Parks Victoria), the proposed developers, or the owners. Risk evaluation often includes a consideration of issues such as cost of treatment, business or public confidence, public reaction, politics, availability of alternatives, environmental impact, availability of insurance, and fear of litigation.

The standard (AS/NZS 4360:2004) and guidelines (HB 346:2004) note that risk generally is categorised into three levels, *viz*: acceptable, tolerable and intolerable. An acceptable risk is one which fits with the specified criteria and does not need further treatment. A tolerable risk is one which is too high to be acceptable, but can be tolerated under certain conditions, such as where treatment measures are undertaken or liability is transferred. Intolerable risks are those which are unacceptable or too costly to treat.

Risk treatment

Where a risk is unacceptable, a decision can be made to treat the risk to bring it within a tolerable range. Typical options would include:

- Accept the risk (e.g. the risk is tolerable and no further treatment is required)
- Avoid the risk (e.g. choose to develop outside of the salinity affected area)
- Mitigate the risk (e.g. use appropriate design to reduce the risk)
- Reduce the likelihood (e.g. use drainage or trees to control the shallow watertables)
- Reduce the consequences (e.g. select appropriate salt-resistant building materials)
- Share the risk (e.g. invest in salinity damage insurance)
- Retain the risk (e.g. develop strategies to deal with the salinity impact in the future)
- Physically separate (e.g. install barriers or protective membranes)
- Duplicate resources (e.g. relocate species at risk for their preservation)
- Transform the risk (e.g. install groundwater pumps and salt disposal options)
- Postpone the risk (e.g. undertake further investigation, or install warning systems)

The ultimate decision on the acceptance of the risk and the suitability of the proposed treatment will be made by the Shire in consultation with the Department of Sustainability and Environment.