
MURRAY FUTURES: COORONG, LOWER LAKES &
MURRAY MOUTH RECOVERY PROJECT

June 2014

MANAGEMENT ACTION 12

RUPPIA TRANSLOCATION

Implementation Plan v2



Government of South Australia
Department of Environment,
Water and Natural Resources

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1. Ruppia Translocation

1.1 Background

Conditions in the Coorong, Lower Lakes and Murray Mouth region declined dramatically as a result of drought and unprecedented low inflows from the Murray River between 2006 and 2010. Declining water levels and excessive salinity in the Coorong led to the decline of the formerly dominant *Ruppia megacarpa* in the North Lagoon, and *Ruppia tuberosa* in the South Lagoon.

Ruppia spp. are the key primary producers in the Coorong lagoons, providing food (foliage, turions, seeds) for waterbirds, and habitat for fish (in particular small-mouthed hardyheads) and invertebrates (including chironomids). The *Ruppia tuberosa*/chironomid/hardyhead system historically supported high abundances of a variety of waterbirds, which helped contribute to the Coorong, and Lakes Alexandrina and Albert site being recognised as a Ramsar wetland of international importance.

The health of the Coorong ecosystem dramatically declined since 2004. In particular:

- *Ruppia tuberosa* which was once widespread in the South Lagoon, with *Ruppia tuberosa* beds occupying in excess of 2000ha, has rapidly disappeared;
- The *Ruppia tuberosa*/chironomid/hardyhead system has become virtually absent from the Coorong South Lagoon;
- The *Ruppia tuberosa*/chironomid/hardyhead system has shifted northward and exists over a small area of the North Lagoon;
- *Ruppia megacarpa* has become functionally extinct from the North Lagoon since some time after the mid-1980s.

The absence of an extensive area of *Ruppia tuberosa* in the Coorong reduces the ability to support waterbird populations during drought, and migratory waders that rely on the Coorong in their non-breeding season.

1.2 Project Overview and Aim

The Ruppia Translocation management action forms part of the Coorong, Lower Lakes and Murray Mouth (CLLMM) Recovery Project. The CLLMM Recovery Project is funded by the Australian Government's *Water for the Future* initiative, delivered through the South Australian Government's *Murray Futures* Program.

The Ruppia Translocation management action aims to restore Ruppia species to the Coorong to improve the CLLMM Site's ecological character and provide long-term environmental benefit to the ecosystem. Funding for the management action was compliant but conditional and required certain environmental triggers to be met before the management action could proceed. These triggers included:

- Coorong South Lagoon target salinities of 60-100gm/L and water levels are reached and maintained for long enough to allow *Ruppia* to successfully flourish;
- Coorong North Lagoon target salinities are reached and maintained long enough to allow *Ruppia megacarpa* and/or *Ruppia tuberosa* to successfully flourish.

Project triggers will be reviewed every year of the project to assess suitability to proceed in any given project year as per work flow diagram (Appendix 10.1).

In December 2012, conditional triggers were met for Phase 2 translocation of *Ruppia tuberosa* to be undertaken in 2013 as;

- Monitoring and Research investigations since 2009 have informed a strategy to re-establish the *Ruppia tuberosa* in the South Lagoon. (Paton *et al* 2011)
- Salinity in the South Lagoon has returned to within 60-100g/L (Webster 2012)

- Improved water conditions suitable for *Ruppia* growth have returned, however due to the severely depleted seed bank, populations did not naturally recolonised on a large scale in 2012. (Frahm *et al* 2012)

In December 2013, conditional triggers were met for Phase 3 translocation of *Ruppia tuberosa* to be undertaken in 2014 and 2015 as;

- Triggers met for Phase 2 still held
- Translocation outcomes conducted in Phase 2 were successful

Project Aims

The restoration of *Ruppia* species to the Coorong to improve the CLLMM Site's ecological character and provide long-term environmental benefit to the ecosystem.

The key deliverables are:

- Deliver a reintroduction strategy for *Ruppia*
- Undertake large scale translocation of *Ruppia* species in the Coorong

This implementation plan outlines the reintroduction strategy employed in 2013-2014 and the proposed method for 2015.

2. Governance

The main decision making and formal governance arrangements for the Ruppia Translocation Project are within the broader CLLMM Project delivered within the Department of Environment, Water and Natural Resources (DEWNR). In addition there are three specific advisory arrangements as outlined below.

2.1 Project Advisory Group

A Project Advisory Group was established in December 2012 to endorse major decisions and provide advice with regards to planning, operational delivery, integration, and general project matters to the Project Manager.

Membership includes;

- DEWNR CLLMM staff
Project management, expert input, financial management, statutory and regulatory approvals, risk management
- DEWNR Science, Knowledge and Management staff
State Herbarium Chief Botanist, expert input, restoration population dynamics, monitoring and planning
- DEWNR River Murray Operations staff
Collaboration of monitoring and environmental watering bids
- University of Adelaide School of Earth and Environmental Sciences
Environmental monitoring, monitoring of translocation trials and expert input
- South Australian Research and Development Institute (SARDI)
Environmental monitoring, aquatic botany expert input

A copy of the terms of reference is provided in Appendix 10.2.

2.2 Ngarrindjeri Traditional Owners

A key project partner are the Ngarrindjeri Traditional Owners, as represented through the Ngarrindjeri Regional Authority. Regular engagement through a CLLMM Ngarrindjeri Working Group has been defined and formalised through a Ruppia Translocation Project Statement of Commitment.

A copy of the Statement of Commitment is provided in Appendix 10.3.

2.3 Coorong National Park

Catch up meetings are held at least twice a year between the Project Officer and Coorong National Park staff on site in the Coorong. This ensures suitable consultation, approvals and local expert input regarding work to be conducted within the Coorong National Park.

3. Planning

3.1 Baseline Condition

According to the most recent bathymetry data, there is potential for between 1800 and 2500 hectares of *Ruppia tuberosa* habitat in the South Lagoon under ideal water quality conditions across the range of 0.2 to -0.4 meters AHD. 2000 hectares is used for the purposes of this plan to allow for variation in mudflat sediment types as not all are suitable.

A monitoring program established in July 1998 by The University of Adelaide has documented significant changes in the distribution and abundance of *Ruppia tuberosa* within the Coorong. This 15-year program has tracked the progressive decline of *Ruppia tuberosa* from the southern end of the Coorong South Lagoon northwards. The program also monitored the establishment of *Ruppia tuberosa* in the middle of the Coorong North Lagoon as the salinity increased. However the return of freshwater flows in 2010 resulted in significant reductions in the Coorong North Lagoon population.

The winter 2012 report (Paton & Bailey 2013) found:

- the percentage of samples with *Ruppia* shoots significantly declined to the point of being absent in the Coorong South Lagoon from 2008-2010 (Figure 3, Page 9);
- some *Ruppia tuberosa* did re-appear at the northernmost monitoring point in the Coorong South Lagoon at Villa dei Yumpa (present in 32% of core samples in 2011 and 38% in 2012), but not further south despite similar salinities. This reappearance indicates the ability of the plant to grow in the current salinities if there is available seed bank in the sediment. However the seed bank at Villa dei Yumpa, while better than the other sites, is still extremely low and with continued suitable conditions will take a very long time to recolonise a substantial area of the Coorong;
- how the seed bank has been reduced in the Coorong South Lagoon since 1998, with some remaining at the northernmost point where the response in 2011 was seen. It should be noted that the researchers found much of the very small amount of remaining seed found in the Coorong South Lagoon is no longer viable; and
- the seed bank in the Coorong South Lagoon is significantly (100 fold) lower than the healthy comparison site at Lake Cantara.

The 2012/13 monitoring provides clear evidence that *Ruppia tuberosa* has not 'naturally recolonised' on a large scale in the Coorong. The rate of natural colonisation will be reassessed in 2014 and form part of the annual review process.

Winter monitoring will continue to track the long term sites, with the addition of detailed compliance monitoring at the translocation collection and treatment sites.

3.2 Recent Distribution Survey

Since the 2010/11 floods improved the water conditions in the Coorong an additional survey was undertaken outside the long term monitoring sites to assess the current distribution, abundance and biomass of *Ruppia tuberosa* in the Coorong South Lagoon. The survey also investigated the validity of local reports of the plant being seen again in the Coorong South Lagoon, with reported sites such as Woods Well being directly targeted.

While the long term monitoring program provides excellent temporal datasets, the December 2011 distribution survey (Frahn et al., 2012) investigated any significant response to the improved conditions outside of the monitoring points. This survey was also conducted by a different research institution to provide an independent view on the condition of *Ruppia tuberosa* in the Coorong.

The report found that *Ruppia tuberosa* was present in the Coorong South Lagoon, but was limited to shallow margins and no reproductive material (flowers or developed turions) were found. Of the seed bank sampled only one viable seed was found indicating an extremely depauperate propagule bank.

3.3 Phase 1 Research

Monitoring and research trials undertaken during Phase 1 have increased understanding of the key drivers of *Ruppia* and trialled potential methods for translocation. From this work the appropriate conditions for *Ruppia* growth were better established and a reintroduction strategy using seed sediment translocation proposed. The following sections summarise the key drivers important for *Ruppia tuberosa*, the reintroduction strategies considered and an overview of the translocation approach.

Key Drivers and Plant Dynamics

A combination of monitoring data and results from research trials (including *in situ* and *ex situ* experiments) has informed the following understanding of the conditions required for *Ruppia tuberosa* to flourish in the Coorong:

- successful growth occurs in water depths between 0.3-1.0m. Below 0.3m *Ruppia* performs poorly due to wind and tide changes, however 0.3m appears to be a suitable lateral seiching buffer. The maximum depth is linked to turbidity and minimum light requirements;
- target salinity for the Coorong South Lagoon is 60-100 g/L. The plant can survive in lower salinities, however is typically out-competed by other plants, including filamentous green algae. Higher salinities have adverse impacts on overall biomass and reproductive ability;
- the duration of the 'normal annual life-cycle' for *Ruppia tuberosa* exploiting the ephemeral mudflats of the Coorong is for the seeds and turions to germinate and sprout when water returns to the exposed mudflats during late autumn and winter. The plants then grow over winter and spring, flower during spring and continue to grow and produce turions post-flowering until water levels retreat (Paton *et al.*, 2011 - p50);
- the Coorong is a hydrodynamically unique system and therefore the applicability of research undertaken on other *Ruppia* species populations is limited; and
- *Ruppia* is the last remaining submerged macrophyte species present in the Coorong. No surrogate species has yet replaced the function of this species or its role in the system.

Suitable Donor Sites

At least two suitable surrogate sites with healthy *Ruppia tuberosa* populations were identified, Lake Cantara and Lake George.

Trialling Different Methods of Translocation

Three key options for reintroduction were investigated (Paton *et al.*, 2011). An overview of these options, and their relative merit, are provided in Table 1.

Table 1: Summary of Reintroduction Options for *Ruppia tuberosa* to the Coorong

Option for Reintroduction	Live Plant/Shoot Sediment Plugs	Reproductive Materials (turions and stolons)	Seed Sediment
Description	Taking sediment plugs with live shoots from surrogate site in late autumn and plant into the inundated mudflats.	Collecting reproductive materials from surrogate plants which float and letting them disperse in the Coorong.	Collecting seed from sediment in the surrogate site, rolling them into almond sized plugs and then sowing them into the exposed Coorong mudflats over late summer and autumn.
Success of Method in Research Trials (was the plant able to grow/survive once translocated?)	Poor Wave action scouring plugs from their original placement within 1-2 days. Fixing plants with wire cages and stakes proved slightly more successful, but labour intensive.	Average Currents and wave actions dispersed the materials to varied locations, some sub-optimal for growth. Difficult to track progress/success.	Good Trials in 2010 and 2011 were successful with seeds able to germinate and spread into surrounding sediment at different locations in the Coorong.
Availability of Materials from Surrogate Site(s)	Excellent The proposed surrogate site at Lake Cantara has abundant live shoots germinate in late autumn. (Paton & Bailey 2012, p7)	Poor Most turions and stolons develop late in the season but would be needed for translocation early in the season.	Excellent The proposed surrogate site at Lake Cantara has a strong seed bank reserve. (Paton & Bailey 2012, p10)
Operational Flexibility (timing limitations, contingency etc)	Poor Must be kept moist and transplanted in short time frame.	Average Potential for currents and wave action to disperse the 'floating fragments' to sub-optimal locations.	Excellent Seed can be stored dry across years. Translocation can occur when mud flats exposed over late autumn and winter. One treatment at any given location can provide two years of germination as not all seeds set every year.
Cost	High Planters working in water 30-100cm deep. Need to secure plugs with cages and stakes to ground.	Low Finding and collecting turions and stolons will be time consuming, however translocation simple as materials float.	Medium Planters working on exposed mudflats, but need to actively sow seed plugs into top layer of sediment so seed is not washed away by wave action.

3.4 Site Selection & Mapping

Sites for translocation were selected in a phased approach including desktop, advisory, site visits and approvals. Criteria for suitable site selection included;

- Large surface area (gentle slope) within the target -0.4 to 0.2m AHD range
- Relatively sheltered bay for reduced wave and wind disturbance to establishing *Ruppia* meadow
- Existing, suitable access track for both practicality and avoiding damage to terrestrial native vegetation within the Coorong National Park
- Suitable benthic surface of mud, sand and clay with minimal rock and/or shell grit.
- Evidence of any *Ruppia* sp. coming back naturally, including baseline seed density.

Suitable, pre-approved site locations were then prioritised with the assistance of the Project Advisory Group for the best ecological outcomes, ensuring suitable spacing of sites within the Coorong South Lagoon where predicted salinity would be ideal for Ruppia growth.

High Resolution Bathymetry

High resolution bathymetry was sourced at multiple sites within the Coorong South Lagoon to allow detailed mapping to the nearest 5cm for purposes of Ruppia Translocation. Figure 1 shows an overview output of the depth range of interest between -0.4 to 0.2m AHD.

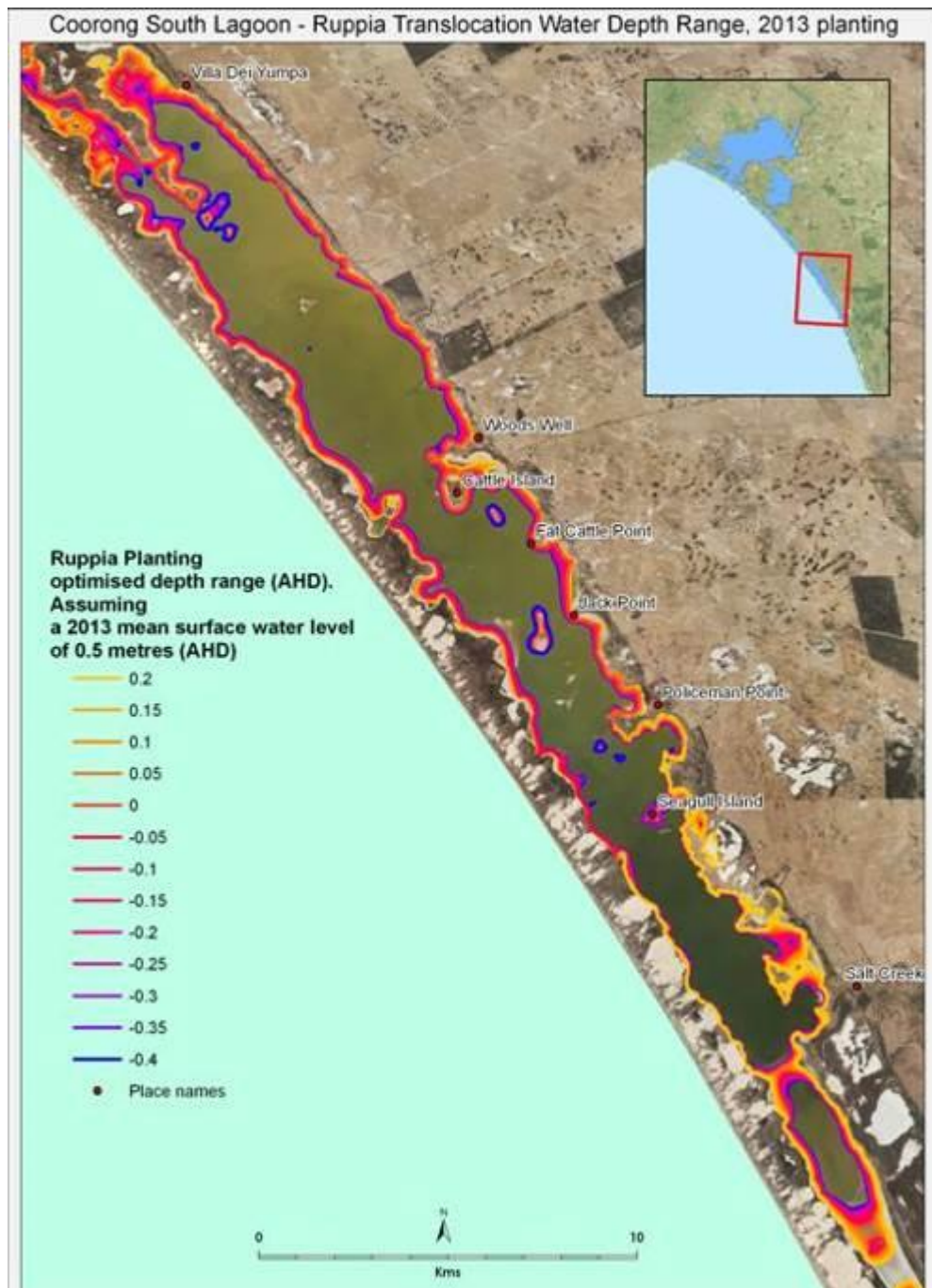


Figure 1: Ruppia Planting optimised depth range for Coorong South Lagoon.

Water Level and Water Quality

The largest constraint for this project is the water quality, quantity and timing in the Coorong which impacts on *Ruppia* growth. This constraint is managed by using water modelling predictions and detailed bathymetry mapping to translocate across the full extent of *Ruppia* healthy range of requirements. To manage the risk of inaccuracy from the predictive modelling, the density of planting will be concentrated in the middle of this range.

The Coorong is a unique and dynamic system with the local climate, sea level, Murray Mouth openness, flows over barrages and upper south east all impacting water quality and level.

Seasonal sea level fluctuations inundate mudflats and *Ruppia tuberosa* beds in winter (regardless of flow conditions) and expose them in summer. Inundation of at least six months is required to permit *Ruppia tuberosa* to flower and set seed so that the population is added to and remains self sustaining. Higher salinities appear to slow the plant rate of growth which means the greater the salinity the greater the duration that water levels need to be maintained to permit the plant to flower and set seed (Paton & Bailey 2012). Therefore 6-8 months is recommended to be the target duration of suitable conditions for *Ruppia tuberosa*.

A longer term salinity forecast (Figure 2) indicates salinity curves remaining below 100g/L until 2015 if barrage flows remain above zero. Barrage flows above zero are anticipated in 2014 and 2015 through the 3,200 g/L annual allocation to the river through the Murray-Darling Basin Plan, additional environmental flows and potential for unregulated (natural) flows.

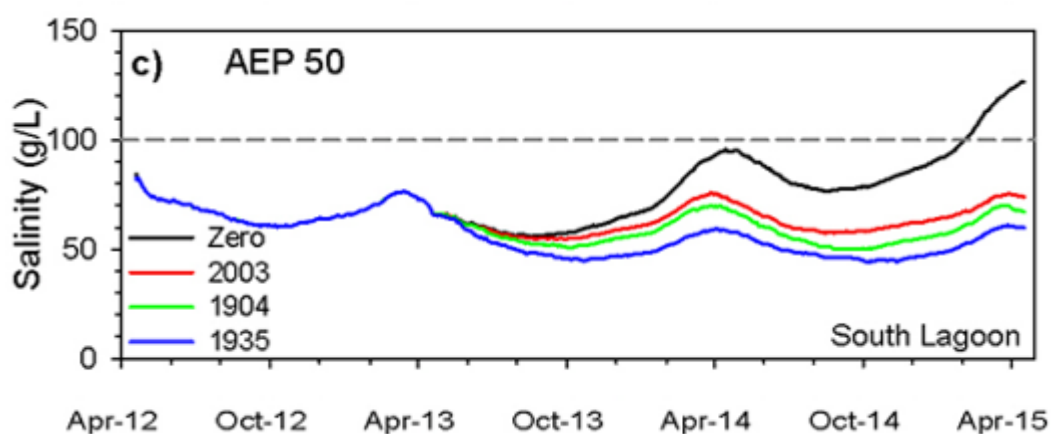


Figure 2: Simulations of salinity averaged over the South Lagoon for 2012-2015 for 16 barrage flow combinations. The dashed line denotes a salinity of 100 g/L. Key denotes average g/L per day flow over the barrages during the historic years noted, where Zero = 0 g/L, 2003 = 1.4 g/L, 1935 = 8.6 g/L and 1904 = 3.9 g/L, (Webster 2012)

Seasonal water levels in the Southern Ocean appear to have the most significant effect on minimum Coorong water levels due to the relatively modest barrage flows expected every summer resulting from delivery constraints and availability of water. Additional delivery of environmental water would further enhance water levels (both minimum level and duration beyond January) and maximise support to existing populations.

Water levels were around 0.5-0.6 m AHD in July 2012 and remained above 0.5 m AHD until around mid October 2012. From around mid-October water levels fell steadily and by December 2012 were around 0-0.2 m AHD (Figure 3). This water level pattern provided 7-8 months from germination of ideal conditions for *Ruppia tuberosa* to complete its life cycle which is within the 6-9 month target. These conditions were

positively assisted by environmental flows, extending the range and reducing the water level drop off in summer. Through a combination of unregulated (natural) flows and environmental water it is anticipated suitable water levels are likely for the remainder of the project, to 2015.

As outlined above, there is a high probability the South Lagoon will meet target salinities and water levels in 2013-15 suitable for *Ruppia tuberosa* to flourish.

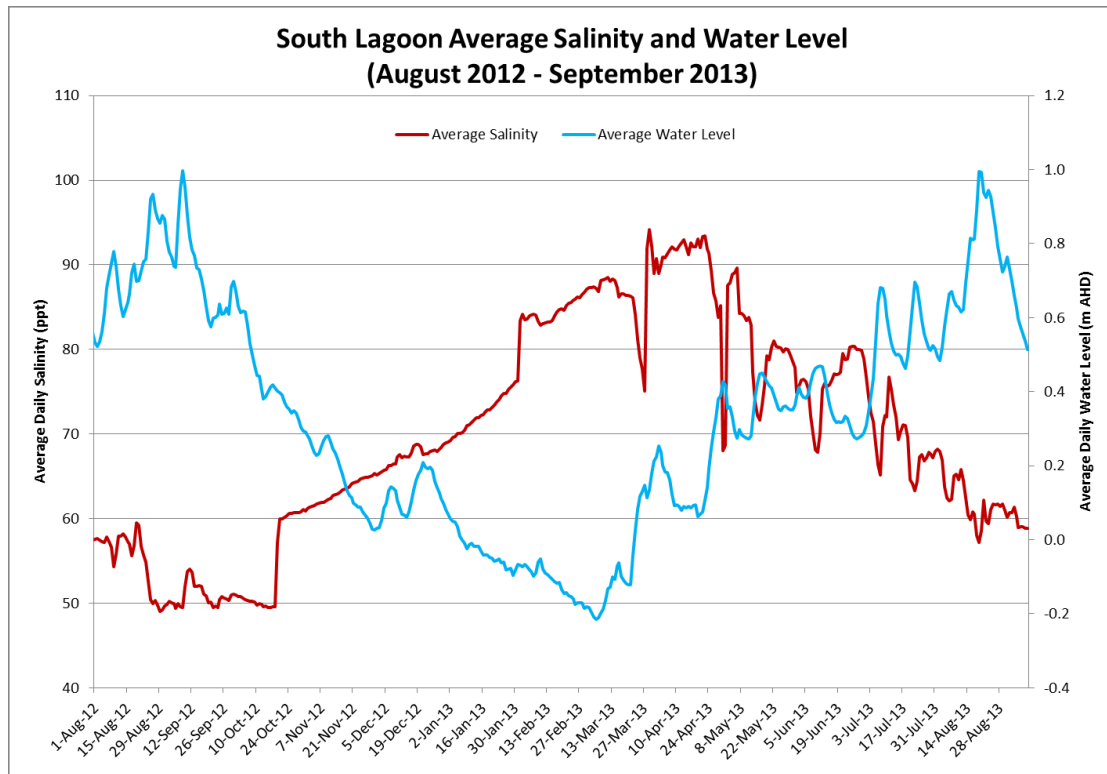


Figure 3: Average salinity and water levels for the South Lagoon from July 2012 to May 2013 (Data from *The Living Murray Icon Site* monitoring programs)

3.5 Approvals

It is a requirement of the funding deed between the Australian Government and South Australian Government for the CLLMM Recovery Project that all approvals are attained prior to any project implementation.

As the key landholder, approval to conduct works in the Coorong National Park was received from the South East Natural Resources Management regional office of DEWNR in December 2012.

Aboriginal heritage approvals for all (collection and translocation) were received in February 2013 as per the Statement of Commitment (Appendix 10.3).

A self-assessment of potential impacts to matters of National Environmental Significance (NES), protected under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), was undertaken in February 2013. The self-assessment determined that no significant impacts to matters of NES were likely to result from the management action. As such, it was determined that the action did not need to be referred under the Act (Appendix 10.4)

4. Objectives and Targets

Long and short term targets were initially developed by the Ruppia Project Advisory Group in 2012. These were further refined in 2014 and aligned with work and input to the Quantifiable Ecological Objectives developed under the Basin Plan.

As the long term seed density and extent targets are unlikely to be met within the project timeframe we hope to see a trajectory towards this which will be provided in the final years monitoring report.

4.1 Short Term Objective (1-2years)

Annual targets for project success are that the seed bank is maintained or increased at treated sites. Also that rate of recovery at treated sites are higher than those in the same subregion of Coorong that are non-treated.

4.2 Medium Term Objective (5 years)

To have a self-sustaining population of *R. tuberosa* in the South Lagoon that is trending towards resilience.

Regional scale

1. Extent of occurrence (distribution)
50km distribution (excluding outliers) north–south direction in the Coorong.
N.B. the distribution is not necessarily exclusive to the south lagoon.
2. Area of occupation at regional level (% of sites)
Every year 80% of sites monitored within the extent of occurrence have *R. tuberosa* present in winter and in summer (ideally a minimum of 10 sites should be monitored).

Site scale

3. Area of occupation at site level (% of cores)
80% of sites have at least 30% cover in winter (to be achieved at the 5 year mark).
4. Abundance (density)
When a core sample has *R. tuberosa*, there must be an annual average of at least 10 shoots per core when measured in Winter.
5. Reproductive success at site level
There must be a minimum of 50 flower heads per m² for 50% of the area of occupation (at the site level, item 3) with *R. tuberosa*. If achieved, this will indicate a self-sustaining population, not necessarily a resilient population.
6. Building resilience (seed bank)
By 2019 there must be at least 2,000 seeds per m² on the main bed (this is the equivalent of ~8 seeds per core sample). If achieved this target would demonstrate a trend towards resilience, not necessarily a resilient population.

4.3 Long Term Objective (15 years)

To have a population of *R. tuberosa* in the South Lagoon that has the resilience to deal with 3-4 years of false starts.

Site scale

1. Area of occupation at site level (% of cores)
50% of sites have at least 60% cover in winter (to be achieved at the 15 year mark).
2. Resilience (seed bank)
By 2029 there must be at least 10,000 seeds per m² on main bed (this is the equivalent of ~40 seeds per core sample). This target falls short of the seed bank condition present in 1985 at Ramsar listing, however if achieved would likely demonstrate population resilience.

5. Translocation Method

Research trials in Phase 1 determined that seed sediment translocation from surrogate sites is the most effective method to fast track habitat recovery for *Ruppia tuberosa* in the Coorong South Lagoon (Paton *et al.*, 2011). This was also the consensus of attendees at the Ruppia Project Advisory Group held on 14 June 2012.

5.1 Seed Sediment Collection

Seed is collected when Lake Cantara is dry (late summer/early autumn). A small excavator is used to scrape the top layer of sediment containing the seeds. Track mats are used to reduce the impact of the excavator as well as reduce the risk of bogging (Figures 4 and 5). The seed is collected in strips, with even-width gaps to promote faster recovery of the *Ruppia* seed bank in Lake Cantara.

Figure 8 provides an overview map of the collection site at Lake Cantara and the maximum extent of the surface to be harvested over the three years.

Please refer to the 2014 Seed Sediment Collection Plan in Appendix 10.5 for detailed collection methodology and principals.

After collection the sediment is then collected and transported to translocation sites on the Coorong (Figure 5). Please refer to the 2014 Seed Sediment Preparation and Delivery Plan in Appendix 10.7 for detailed methodology and principals.



Figure 4: Excavator using track mats on lake bed at Lake Cantara, March 2013 (Photo: K. Ryan)



Figure 5: Minimal scrape mark created by seed sediment collection at Lake Cantara, March 2013 (Photo: K. Ryan)



Figure 6: Pile of seed sediment being prepared and transported by Ngarrindjeri at Lake Cantara, March 2013 (Photo: K. Rvan)



Figure 7: Exposed mudflat in the South Lagoon Coorong before treatment at Woods Well, March 2013 (Photo: A. Watt)

5.2 Planting

Planting is carried out when mudflats around the edge of the Coorong South Lagoon are exposed (Figure 7). As *Ruppia* grows best when water levels are between 0.3 m and 1.0 m, the planting sites are chosen based on water level predictions. Planting involves lightly agitating the mudflat surface and then scattering the seed sediment. Deeper sections of mudflats still have shallow water cover even at planting time. For these sections the seed sediment is scattered directly into the water, letting local wave action keep it in place.

Please refer to the 2014 Translocation Planting Plan in Appendix 10.7 for detailed collection methodology and principals. Figures 9-11 provides an overview of the translocation sites and the maximum extent of the surface to be treated over the three years.

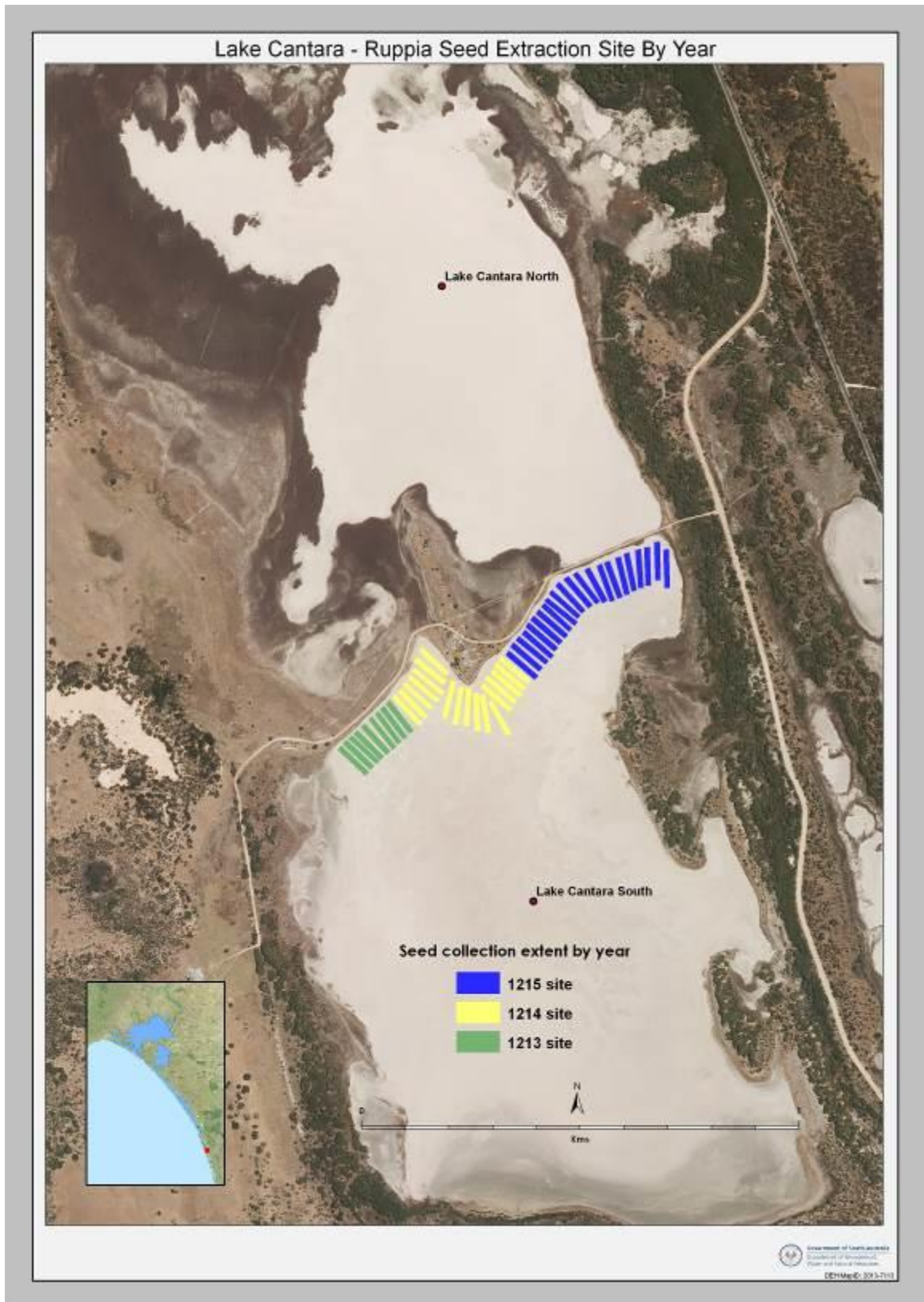


Figure 8: Lake Cantara, Seed Sediment Collection Site Extents per Translocation Year



Figure 9: Coorong Ruppia Translocation Sites by Year, Map 1 of 3

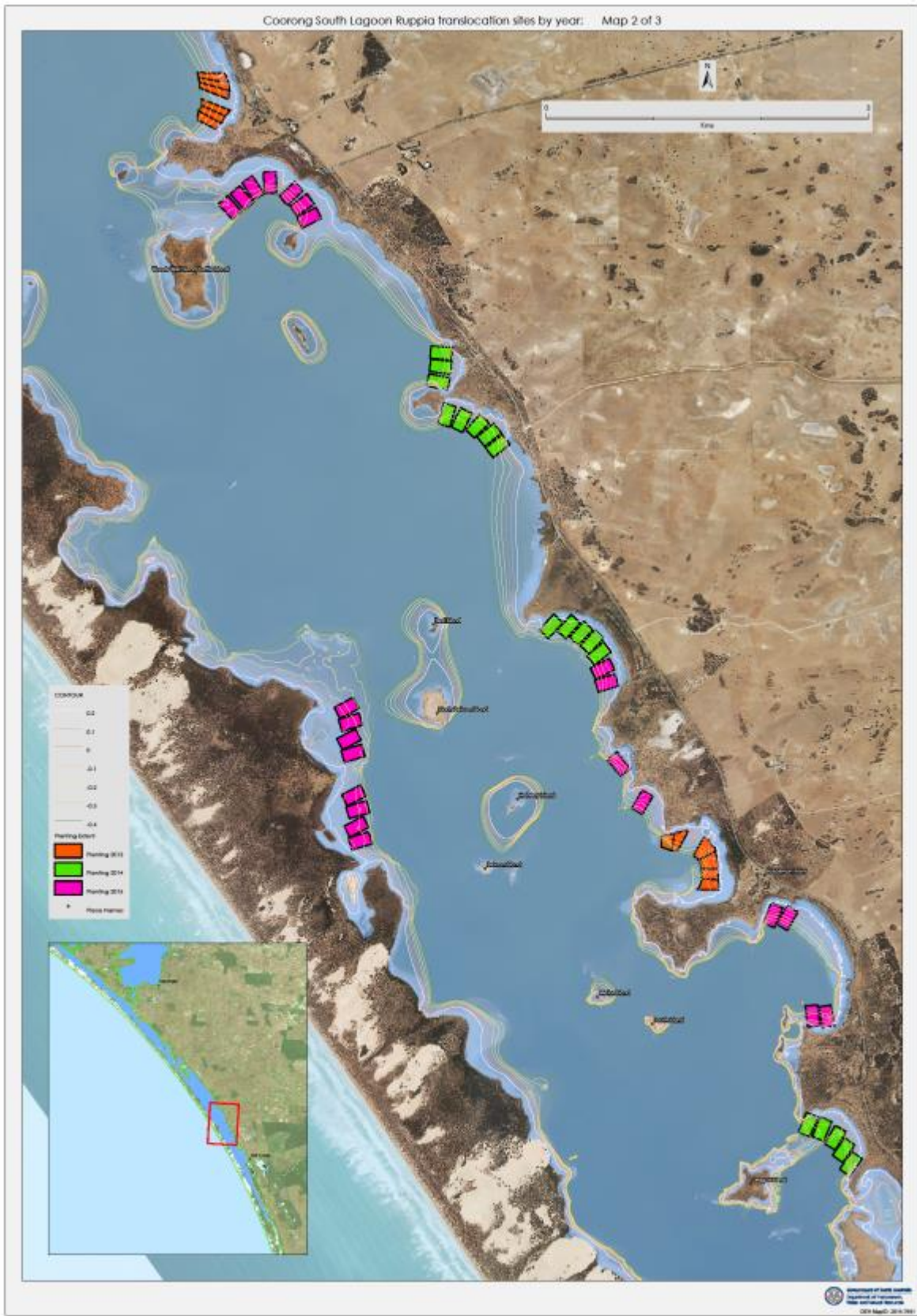


Figure 10: Coorong Ruppia Translocation Sites by Year, Map 2 of 3

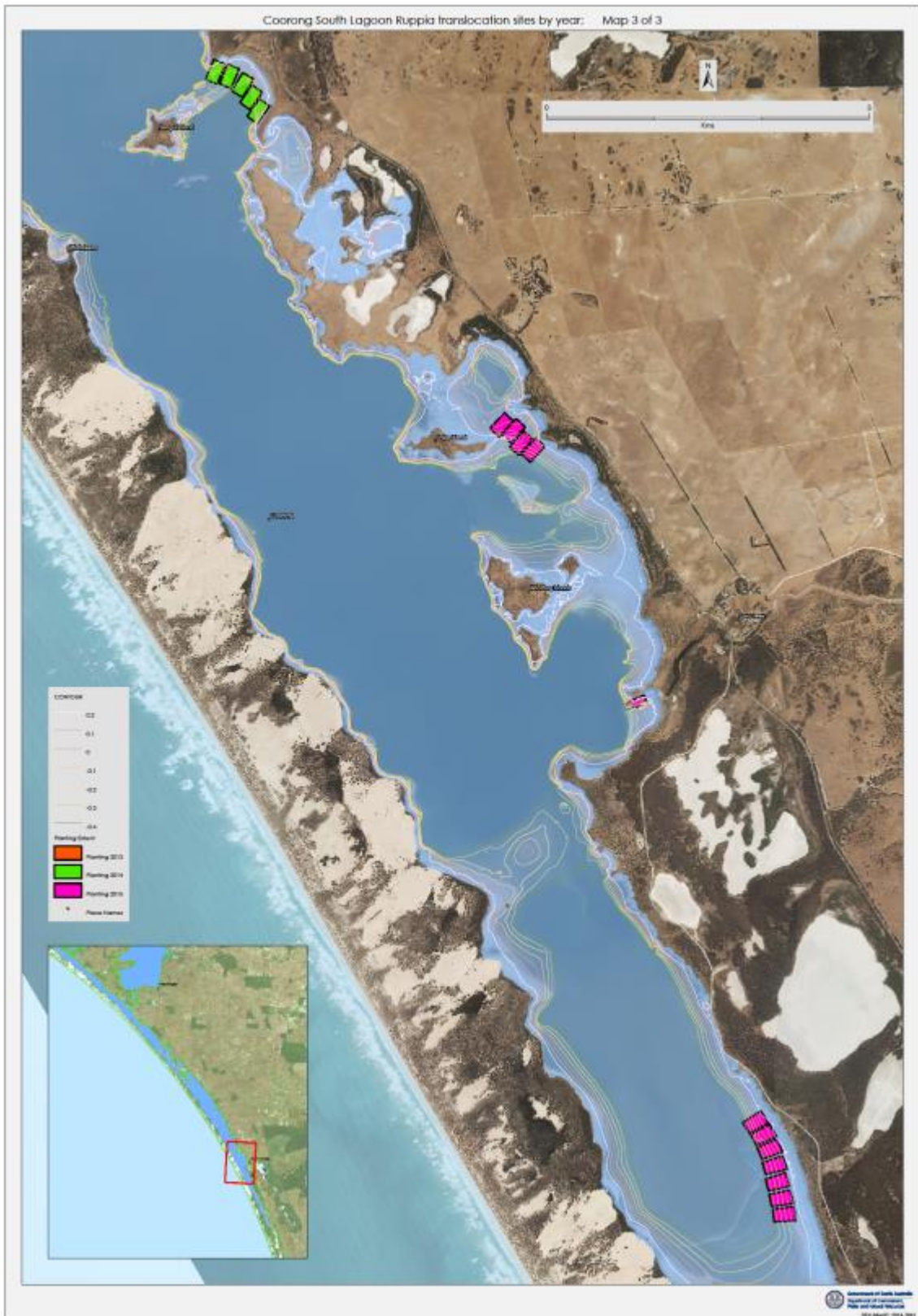


Figure 11: Coorong Ruppia Translocation Sites by Year, Map 3 of 3

6. Risk Management

Risk is inherent in any project. All projects have some degree of uncertainty due to the assumptions associated with them and the environment in which they are executed. Project risks cannot be eliminated entirely, but many of them can be anticipated and reduced.

The risk management plan defines safeguards to minimise the probability that certain risks will materialise and contingent actions to deal with the risks if they do occur.

All projects should be subject to a risk assessment. The level of analysis undertaken as part of the risk assessment should reflect the complexity and criticality of the project to the achievement of the project objectives.

In December 2012 a Risk Mitigation Plan was written using the Australian Standard 4360 to identify the risk factors and subsequently develop risk management strategies to reduce these risks for the Ruppia Translocation Project.

Appendix 10.8 records the all risks identified and the mitigation strategies and actions for extreme, high and medium risks as they affect the Ruppia Translocation Project.

7. Stakeholder Engagement

Objectives, Target Audiences and Key Messages

The communication and community engagement activities aim to:

- continue to promote that the government is working with the best available science to improve the CLLMM site's ecological character
- involve the Ngarrindjeri in implementing the project to help foster the cultural importance of the Coorong region and the role of Ruppia species
- continue to inform, educate, and engage with the community about the importance of Ruppia, and to build up a strong seed bank to better cope with water level variability as a result of flood and drought.

Target Audiences

Stakeholder	Interest in project
Ngarrindjeri community	Active involvement, community support and awareness Input into and approval of stories and messages Membership of Project Advisory Group
Local Residents around Coorong, particularly South Lagoon	Community support and awareness
Professional fishermen	Community support and awareness
Tourists and visitors to Coorong	Information and awareness
Scientific Community, particularly aquatic plant and water bird experts	Information and awareness of restoration efforts
Broader CLLMM region community	Community support and awareness

Key Messages

- The South Australian Government, through the Department of Environment, Water and Natural Resources' Coorong, Lower Lakes and Murray Mouth

(CLLMM) Program, is working to restore an aquatic plant - Ruppia - to the Coorong.

- Ruppia is a key aquatic plant once dominant in the Coorong. It is an important food source for water birds and habitat for fish and invertebrates.
- The project will involve translocating seed from nearby surrogate sites to the Coorong.
- The project will start in the Northern end of the South Lagoon, in the Parnka and Hacks Points region.
- The project is part of the South Australian Government's *Murray Futures* program, funded by the Australian Government's *Water for the Future* strategy.
- The best available science and local knowledge has been used to develop the project, including extensive discussions with:
 - Associate Professor David Paton from the University of Adelaide
 - the Ngarrindjeri – the Traditional Owners of the Land.

COMMUNICATIONS AND COMMUNITY ENGAGEMENT TACTICS

A community relations program will be established to enable local community involvement and participation in the project. This will be supported by a range of public relation activities to promote the project and its achievements.

Community relations	
Involve the Ngarrindjeri in planning and implementing the project to foster environmental and cultural stewardship of the area.	<ul style="list-style-type: none"> • Engage through Statement of Commitment • Engage through Project Advisory Group meetings
Ensure local residents are aware of work about to commence, particularly shack owners	<ul style="list-style-type: none"> • Letter drop to all shacks and residents adjacent to translocation treatment sites (see Appendix 10.9 for letter example).
Work with the Community Advisory Panel to ensure consistent messages about the project are being communicated to the public	<ul style="list-style-type: none"> • Work closely with CAP to ensure key relationships within the site are maintained and current information is disseminated
Work with Lakes Hub to ensure consistent messages about the project are communicated to the public	<ul style="list-style-type: none"> • Work closely with Lakes Hub on media and promotion of the project.
Involve fishermen (professional and recreational) through communication of the design phase of the Project to foster environmental and cultural stewardship of the area.	<ul style="list-style-type: none"> • Engage through focus groups and/or public meetings.
Educational resources	
Develop resources to inform and educate the community about building wetland resilience in the longer term to better cope with water level variability.	<ul style="list-style-type: none"> • Develop project fact sheet/DL brochure to be available in Lakes Hub, Coorong District Council offices and on the DEWNR website including information about how the project is improving the Coorong. • Update brochure as project progresses.
Media/Public Relations	
Promote the project achievements and	<ul style="list-style-type: none"> • Media releases from Minister/DEWNR at

opportunities for community involvement using appropriate media channels.	<p>project milestones.</p> <ul style="list-style-type: none"> • Work with partner organisations to identify regular 'good news stories' for the media (particularly local Lakelander) highlighting the positive work being undertaken by the government and the community. • DEWNR to liaise with Australian Government re possible promotional/media opportunities.
Other promotion	
Murray Futures Community update	<ul style="list-style-type: none"> • Monthly updates on the project highlighting the community involvement, including a special profile of the 'Friends of Meningie' group.
NRM Research and Innovation Network Newsletter	<ul style="list-style-type: none"> • Prepare scientific article on project. Newsletter audience includes SA Universities and Research Institutions.
DEWNR website	<ul style="list-style-type: none"> • Maintain website content to include latest progress of the project.
Water for Good News	<ul style="list-style-type: none"> • Articles in the quarterly Water for Good News publication (winter, spring, summer 2011)
Wetlands Australia	<ul style="list-style-type: none"> • Annual publication by the Australian Government
Internal communications	
Internal communication – CLLMM Program and DEWNR	<ul style="list-style-type: none"> • Updates on progress of the project at CLLMM Program team meetings. • Community update emails circulated to all staff with project updates. • Ochre articles for project achievements

EVALUATION

Objective	Measure
Continue to promote how the government is working with the best available science to improve the CLLMM site's ecological character.	<ul style="list-style-type: none"> • News releases and media articles released about the project. • Positive media attention presenting accurate information. • Visits to the Murray Futures & CLLMM websites.
Involve the local Ngarrindjeri in implementing the project to help foster cultural importance of the Coorong region and role of Ruppia species.	<ul style="list-style-type: none"> • Feedback from the NRA about how well DEWNR has involved Ngarrindjeri in the project.
Continue to inform, educate, and engage with the community about the importance of Ruppia and building up a strong seed bank to better cope with water level variability as a result of flood and drought.	<ul style="list-style-type: none"> • Feedback from the Lakes Hubs, and the NRA about how well DEWNR has informed, educated and engaged the community about the importance of Ruppia and the Coorong. • Informal feedback from the community

8. Compliance Monitoring

Compliance monitoring commenced in late June 2013 and includes tracking the planting densities, rate of survival/recovery, impacts at surrogate site and water quality monitoring. Initial inspection of the treatment sites in June 2013 indicated that at the seed has successfully germinated (Figures 13 and 14).

Copies of annual monitoring reports and results are made available on the DEWNR website.



Figure 13: Young shoots of *Ruppia tuberosa* at South Lagoon translocation site Policemans Point, June 2013 (Photo: K. Ryan)



Figure 14: Young shoots of *Ruppia tuberosa* at South Lagoon translocation site Woods Well, June 2013 (Photo: J. Phillips)

The process of applying the scientific research and monitoring to commercial scale implementation provided the following key learnings and design approach changes during Phase 2. The Project Advisory Group were made aware of these adaptive management changes and were satisfied they did not materially alter project outcomes or objectives.

Collection Site

Collection site planning and approvals for Lake Cantara confirmed that additional collection sites previously considered (e.g. Lake George) are not required. Lake Cantara is physically closest to the Coorong which reduces transport costs, has more than sufficient seed without significantly harming the donor population.

Excavation Method

A weight bearing risk assessment on the collection site lake bed found very low weight bearing capacity. Therefore track mats were required for use by the seed collection operator, with a maximum excavator size of 5 tonne to reduce both impact to site by excavator treads and any risk of bogging. The smaller excavator increased the time and cost of seed sediment collection, but led to a very precise, low risk and low impact method.

Bulk Preparation

Instead of small individual sediment plugs (used in the experimental trials), large polypropylene bags were used for transport and deployment. This bulk method was more efficient while still being within safe manual handling requirements as bags were no more than 15 kg in weight.

Planting Method

A public tender process was used to procure planting contracts to test the market for this new project. The work was awarded to two providers to compare their

techniques, work rate and approach. The relative success of these will be assessed through the compliance monitoring.

Planted Area

Site access approval to the Coorong mudflats was only granted for light weight vehicles (e.g. Gators or quad bikes). This significantly increased the planting costs as sediment could only be delivered to the edge of the mudflat sites and then had to be transferred to light weight vehicles to move around the planting site. Multiple trips were required due to lower load capacity of the light weight vehicles. Therefore only 20 ha was planted with seed sediment in 2013 (instead of 30 ha planned).

Exit Interviews

Feedback on the project was sought from all contractors involved through exit interviews in May 2013 to harness different perspectives and adaptively manage the project techniques and approach. This proved very useful, confirming what worked well and providing some improvement suggestions to consider in 2014. For example weight bearing testing the Coorong mudflat sites to hopefully allow some larger vehicles safe access to tip seed sediment directly onsite. This would significantly lower costs and increase the total areas translocated.

9. References

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10. Appendix

10.1 Ruppia Translocation Project Workflow Diagram

10.2 Ruppia Project Advisory Group Terms of Reference

10.3 Statement of Commitment with Ngarrindjeri Regional Authority

10.4 Summary Assessment of potential impacts under EPBC Act

10.5 Seed Sediment Collection Plan 2014

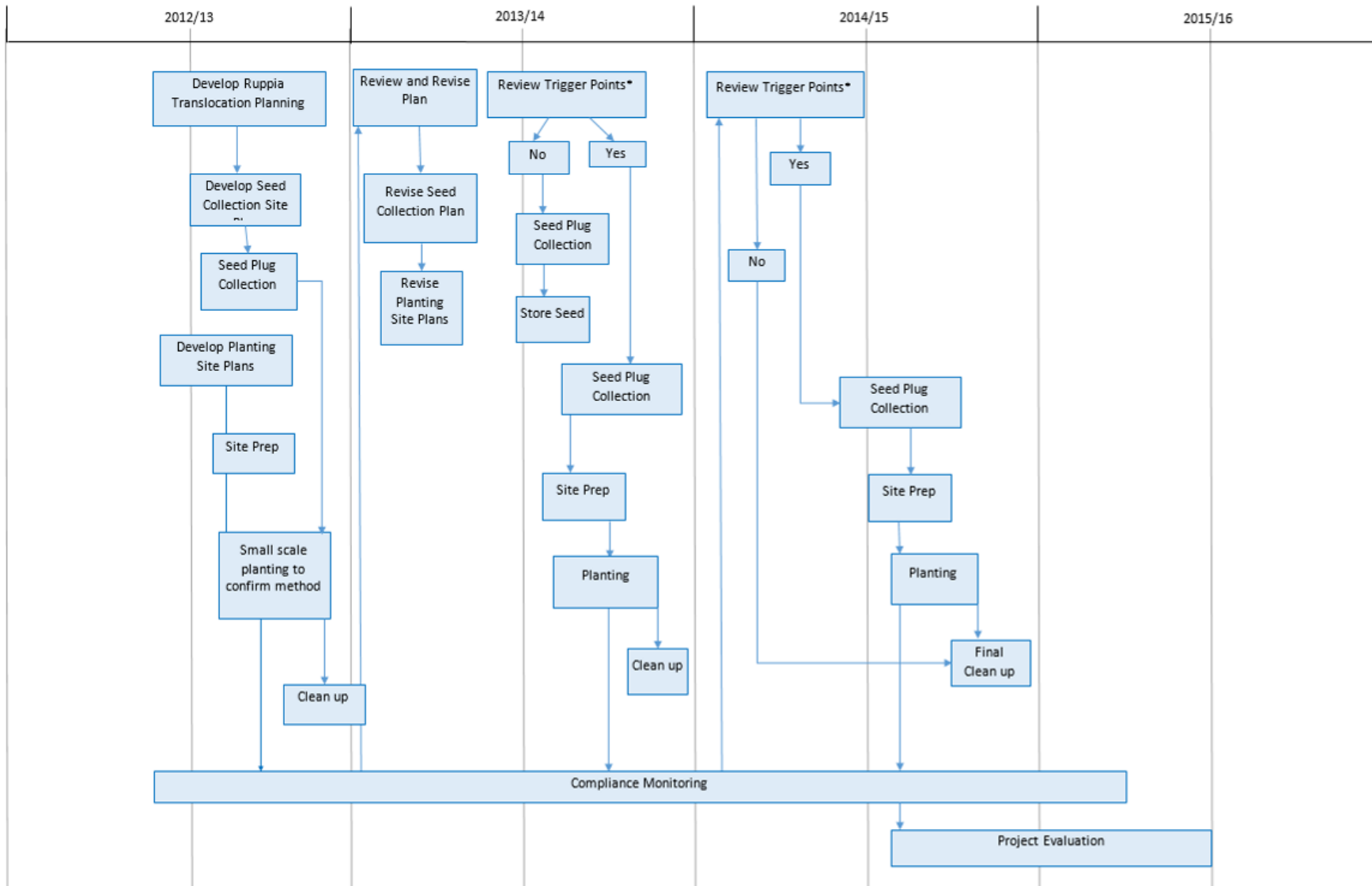
10.6 Seed Sediment Preparation and Delivery Plan 2014

10.7 Ruppia Translocation Planting Plan 2014

10.8 Ruppia Translocation Project Risk Assessment Table

10.9 Residents Letter Advising Ruppia Translocation Work

10.1 Ruppia Translocation Project Workflow Diagram



*Conditions favourable for planning and collection

10.2 Ruppia Project Advisory Group Terms of Reference

RUPPIA TRANSLOCATION PROJECT ADVISORY GROUP

Terms of Reference

Last Updated: November 2013

1. Purpose

To seek input and advice from key scientists and project managers with regards to planning, operational delivery, trigger conditions and general project matters to progress a large-scale translocation project for *Ruppia tuberosa* in the Coorong.

2. Establishment

The Coorong, Lower Lakes and Murray Mouth (CLLMM) Ruppia Translocation Project Advisory Group (PAG) was established under CLLMM corporate governance arrangements to advise management and delivery of the CLLMM Program Ruppia Translocation Project.

3. Objective

Reporting to the Senior Project Officer, the Project Advisory Group will provide technical advice and feedback on the delivery of the Ruppia Translocation Project.

4. Responsibilities/Functions

The Advisory Group will provide input into the Ruppia Translocation project through:

- Reviewing trigger conditions to support action
- Investigating key drivers and reproductive cycle
- Input to proposed methodology and techniques to progress large scale translocation, including risk identification and development of targets
- Identification of translocation sites and selection process
- Identification of monitoring requirements

Further the Working Group will:

- Annually review large-scale translocation of *Ruppia tuberosa* in the Coorong and recommendations for improvements
- Annually reviews trigger conditions and recommendations for future work.

5. Membership

a. Membership

The Project Advisory Group will comprise:

Agency	Name	Expertise
DEWNR (CLLMM)	Liz Barnett	Chair Estuarine and program management
DEWNR (CLLMM)	Katherine Ryan	Executive Officer Environmental project management
DEWNR (CLLMM)	Jason Higham	Site management knowledge
DEWNR (SMK)	Daniel Rogers	Ecosystems population dynamics, restoration strategies and Coorong.
DEWNR / University of Adelaide	Michelle Waycott	Biology restoration and population dynamics, particularly for seagrass and halophytic macrophytes.
DEWNR (RMO)	Adrienne Frears	Site water delivery management knowledge
University of Adelaide	David Paton	<i>Ruppia</i> and bird species condition and ecology in the Coorong
SARDI	Jason Nicol	Aquatic plant ecology

Representative from DEWNR South East Region (eg Ranger) and/or the Ngarrindjeri Regional Authority may attend as required.

b. Chairperson

The Manager, Environmental Investigations and Management, CLLMM, DEWNR will chair the meetings. It is the responsibility of the Chair to ensure that Advisory Group meetings are run in accordance with the agreed meeting procedures and all required outcomes are achieved. The Senior Project Officer, CLLMM, DEWNR is Executive Officer and Deputy Chair.

c. Proxies to Meetings

Members may nominate a proxy or representative to attend meetings in their absence, with approval of the Chair.

d. Quorum Requirements

A minimum of four Advisory Group members, where at least two are non-CLLMM staff is required for a meeting quorum. Members may attend via teleconference.

e. Observers

Legal, technical or other representatives of the agency or State may, by invitation of the Chair, attend an Advisory Group meeting either as observers or as presenters of relevant material. Observers may be asked by the Chair to absent themselves from any discussion of the Advisory Group.

6. Proceedings of the Working Group

a. Agenda

The target for distribution of the Advisory Group agenda will be three working days prior to the scheduled meeting.

b. Minutes

The outcomes of Advisory Group meetings will be in the form of a Decision and Action Log which will identify decisions made and also identify action items, including nomination of responsible persons in respect of those action items, and target completion dates for the actions. The target for distribution of the Decision and Action Log, including attachments, will be ten working days following each meeting. The identified action items will be monitored and reported on at the next meeting.

c. Executive Officer Support

The Senior Project Officer will be responsible for administering the meetings and providing executive support for the Advisory Group.

d. Frequency of Meetings

Meeting of the Advisory Group will be scheduled bi-annually but may be held more frequently if required. Urgent matters for consideration may be distributed to Advisory Group members for consideration out of session.

e. Records Management

Records of the Advisory Group will be maintained in accordance with the State Records Act 1997. The Project Officer will ensure that appropriate records of Advisory Group meetings, decisions and resolutions are maintained.

f. Meeting Recommendations

Advisory Group recommendations should be made by consensus. All reasonable effort will be made to reach agreement by the Advisory Group. However, should agreement not be reached, the dispute resolution process will be triggered.

g. Dispute Resolution

Where agreement cannot be reached within the Advisory Group, a submission must be presented to the Program Manager, Major Projects in the first instance (subject to delegated authorities) and then to CLLMM Coordinating Committee for consideration, analysing the relative merits and risks of the options under consideration. If the CLLMM Coordinating Committee still cannot reach agreement, then the matter shall be referred to the Project Sponsor for

consideration (who may elect to refer the matter to the CLLMM Program Steering Committee).

7. General

a. Confidentiality

Members are expected to maintain appropriate levels of confidentiality of Advisory Group discussions and of information made available to them.

Members should be aware that all written material associated with the Advisory Group is subject to the relevant State and Commonwealth Freedom of Information legislation and may be made available to the public.

b. Intellectual Property

'Intellectual property' developed by the Advisory Group will be owned by the Government of South Australia, unless it can be demonstrated that background Intellectual Property exists that is owned by another party.

c. Duration

The Advisory Group will operate to December 2015 to oversee the Ruppia Translocation Project timeframe.

d. Review

A review of the roles, responsibilities and membership of the Advisory Group will be undertaken in November 2014.

e. Dissolution

The Advisory Group may be dissolved if the CLLMM Program undergoes a significant shift in governance which renders the role of the Advisory Group redundant.

10.3 Statement of Commitment with Ngarrindjeri Regional Authority

Statement of Commitment CLLMM RUPPIA TRANSLOCATION PROJECT

Between the

Ngarrindjeri Regional Authority Inc.

and the

Department of Environment, Water and Natural Resources

Version	Date	Author	Summary of Changes
1	3/9/2012	L. Sutherland	Provided example SOC from the Vegetation Program.
2	14/9/2012	K. Goss	Adapted Vegetation Program SOC to reflect Ruppia project specific information
3	5/12/2012	K. Goss	Updated to include draft Activities section as discussed and developed at Working Group meeting on 4/12/12
4	15/10/2013	K. Ryan	Updated to include monitoring and interpretation opportunities and refine deadlines.
5			

1. Guiding Principle

Ngarrindjeri have a long-term aspiration to be centrally involved in development, planning and implementation of natural and cultural resource management in the CLLMM region. DEWNR acknowledges its responsibilities under Ramsar Guidelines to incorporate cultural values into Ramsar site planning and management and commitments made under the Kungun Ngarrindjeri Yunnan Agreement (KNYA).

The Parties acknowledge that Ngarrindjeri hold a depth of ecological knowledge and understanding of the CLLMM region and that Ngarrindjeri management has shaped the regions ecological character. The Parties acknowledge that vegetation management planning (including revegetation and pest management) in the region aimed to restore the ecological character must acknowledge and seek to incorporate Ngarrindjeri knowledge and understanding in an appropriate way. This Statement of Commitment (SOC) establishes an equitable framework to support appropriate engagement with Ngarrindjeri in the development of the CLLMM Ruppia Translocation seed collection and translocation site plans that also protects Ngarrindjeri Cultural Knowledge.

2. Overview

2.1 Ruppia Translocation

The Department of Environment, Water and Natural Resources (DEWNR) leads the Coorong, Lower Lakes and Murray Mouth (CLLMM) Program which addresses the issues at the site and its long term recovery during a time of ecosystem stress. The CLLMM Program aspires to achieving its goal of 'a healthy resilient wetland of international importance' and a number of ecological, cultural and community objectives. The CLLMM Program seeks Ngarrindjeri involvement in these aspirations through the Ngarrindjeri Partnerships Project.

Ruppia Translocation is a key project of the CLLMM region recovery. Ruppia is an aquatic plant and is the key primary producer in the Coorong lagoons, providing food (foliage, turions, seeds) for waterbirds, and habitat for fish and invertebrates. It has important cultural and community value in aesthetics, well being and other ecosystem services.

Over 2004-2010, low flows and increasing salinities caused the health of the Coorong ecosystem declined dramatically with the population of Ruppia virtually absent from the Coorong South Lagoon. Water levels and salinity have since improved, however due to the severely depleted seed bank, Ruppia has not responded to the improved conditions. Large scale translocation of seed sediments from surrogate sites is therefore proposed to assist in restoring Ruppia to the Coorong.

Implementation of a translocation project will involve the development of a number of plans;

- Overall Implementation Strategy
- Seed collection plans from surrogate site
- Translocation site plans (specific site detail for translocation to be applied)

2.2 Ngarrindjeri engagement

The KNYA establishes a consultation and negotiation framework between the State and Ngarrindjeri Regional Authority (NRA). DEWNR acts as the lead agency for the State in consulting with Ngarrindjeri in regard to the CLLMM Program.

The KNYA commits DEWNR to support the full participation of Ngarrindjeri in CLLMM Program activities and ensuring cultural values are integral to future planning and management of the CLLMM region. DEWNR and NRA recognised the importance of Ngarrindjeri involvement in the Ruppia Translocation project and have sought to establish an equitable, appropriate and transparent process to ensure that involvement. The Parties resolved at a KNYA Taskforce meeting on 10 August 2012 for relevant representatives develop this Statement of Commitment to guide the way the two Parties will work together.

Ramsar has official guidelines for establishing and strengthening Indigenous people's participation in the management of wetlands. The guidelines create a framework for Ramsar States to enable Indigenous people to contribute to developing effective management arrangements, that contribute significantly to effective conservation as well as contributing to community well-being and more equitable access to resources.

DEWNR formed internal working groups and external revegetation and pest management reference groups to guide plan development. Ngarrindjeri are represented on both existing external reference groups.

The Funding and Service Agreement contains contractual clauses for the protection of Ngarrindjeri Cultural Knowledge that is collected, used or divulged in respect of the Ngarrindjeri Partnerships Project. The Parties are currently developing protocols in respect of Cultural Knowledge to assist them to comply with the requirements of the Funding and Service Agreement.

2.3 Purpose

This SOC between NRA and DEWNR sets out a mechanism to involve Ngarrindjeri in the Ruppia Translocation project.

The SOC outlines a range of aspirations, principles, objectives and actions that NRA and DEWNR will utilise to support participation of Ngarrindjeri in the Ruppia Translocation Project. The document establishes mutual intentions of NRA and DEWNR for the period of the development and review of the Project Plan(s). It is not intended to give rise to any enforceable rights or binding obligations on the part of either NRA or DEWNR. The SOC does not commit funding provision. Ngarrindjeri participation in this SOC and management planning is to be reported against the Ngarrindjeri Partnerships Project. Ngarrindjeri participation in this SOC has been incorporated into long-term delivery of the CLLMM Ngarrindjeri Partnerships Project.

The SOC supports DEWNR in implementing a range of priorities under the DEWNR Corporate Plan 2010-14 (2b, 2c) and targets under the South Australian Strategic Plan (3.2, 3.15 and 5.7). The SOC also supports DEWNR implementing the intent of the KNYA through the integration of Ngarrindjeri cultural values into natural resource management planning in the Ngarrindjeri region.

The SOC does not consider delivery of on ground works and the Parties acknowledge that Ngarrindjeri participation is through community grants or competitive tender processes.

This SOC does not affect any Native Title rights and interests of the Ngarrindjeri People.

2.4 Definitions and Interpretations

- 2.4.1 **Caring for country** is a phrase used by Aboriginal people including the Ngarrindjeri to describe the critical importance of looking after their relationships with their traditional lands.
- 2.4.2 **CLLMM Program** means Coorong, Lower Lakes and Murray Mouth Program, funded under the Murray Futures Program.
- 2.4.3 **CLLMM Region** means the land and waters within and surrounding the Coorong, Lower Lakes and Murray Mouth.
- 2.4.4 **CLLMM Ruppia Translocation Project** means the CLLMM program Ruppia Translocation project (movement of Ruppia seed from healthy sites to the mudflats of the Coorong)
- 2.4.5 **Cultural Knowledge** means all and any cultural knowledge, whether such knowledge has been disclosed or remains undisclosed by the Aboriginal people represented by the Ngarrindjeri, including but not limited to:

- a. Traditions, observances, customs and beliefs
- b. Songs, music, dances, stories, ceremonies, symbols, narratives and designs
- c. Languages
- d. Spiritual knowledge
- e. Traditional economies and resources management
- f. Scientific, spatial, agricultural, technical, biological and ecological knowledge;

and includes the manifestation of such Cultural Knowledge in documentation and other forms of media arising therefrom including but not limited to archives, films, photographs, videotape or audiotape, subject to any intellectual property rights owned by third parties in any such manifestation.

- 2.4.6 **Cultural Landscape** means the way in which the CLLMM region has been shaped by Ngarrindjeri land management and also includes Ngarrindjeri spiritual beliefs on the formation and shaping of the region by Ancestral beings.
- 2.4.7 **DEWNR** means Department of Environment, Water and Natural Resources.
- 2.4.8 **Ecosystem services** means the wellbeing, life ways and livelihoods humans derive from resources and processes that are supplied by natural environments.
- 2.4.9 **Funding and Service Agreement** means the agreement on funding and service arrangements executed by the Minister for Sustainability, Environment and Conservation and NRA, Ngarrindjeri Heritage Committee and Ngarrindjeri Native Title Management Committee and Ngarrindjeri Tendi Incorporated for and on behalf of the Ngarrindjeri on 2 April 2012.
- 2.4.10 **Implementation Strategy** means the overall strategy document guiding the Ruppia Translocation Project.

- 2.4.11 **KNYA** means (Whole of Government) Kungun Ngarrindjeri Yunnan Agreement (listening to Ngarrindjeri people speaking) executed between SA Government and Narrindjeri Tendi Inc. Ngarrindjeri Heritage Committee Inc and Ngarrindjeri Native Title Management Committee for and on behalf of the Ngarrindjeri on 5 June 2009.
- 2.4.12 **Ngarrindjeri Partnerships Project** means the CLLMM Program funded project to support Ngarrindjeri participation and core capacity development.
- 2.4.13 **NRA** means Ngarrindjeri Regional Authority Inc.
- 2.4.14 **NRC** means Ngarrindjeri Ruwe Contracting Pty Ltd; the commercial contracting arm of NRA.
- 2.4.15 **Parties** means the entities listed at clause 2.5.
- 2.4.16 **Ramsar** means The Convention on Wetlands of International Importance (Ramsar Convention) and is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.
- 2.4.17 **Ruwe/Ruwar** means country, body and spirit.
- 2.4.18 **Site Plans** means site specific translocation management plans that define species, methodology and other site specific actions to manage specific sites.
- 2.4.19 **Statement of Commitment (SOC)** means this document.
- 2.4.20 **Yarluwar–Ruwe** means Ngarrindjeri sea country.

2.5 Parties

The Parties to this SOC are the:

- Ngarrindjeri Regional Authority Incorporated ('NRA')
- Coorong, Lower Lakes Murray Mouth (CLLMM) Program, Department of Environment, Water and Natural Resources ('DEWNR')

2.5.1 Parties Representatives

- NRA is represented by Daryle Rigney, Grant Rigney, Steve Hemming, Tim Hartman and nominated NRA representatives
- DEWNR is represented by Katherine Ryan, Lachlan Sutherland and nominated DEWNR representatives.

2.6 Geographic Scope

- 2.6.1 The geographic extent of the SOC will cover the area identified and known as the Ngarrindjeri and Others Native Title Claim area.
- 2.6.2 The geographic extent of the Ruppia Translocation Project is the Coorong National Park plus potential and suitable donor sites containing healthy populations of *Ruppia* to be identified in the Implementation Plan.

3. Ngarrindjeri and SA Government Strategic Platform

A number of strategies underpin the SOC including:

- 1998, Ngarrindjeri perspectives on Ramsar Issues: Ngarrindjeri / Ramsar Working Group report.
- 2002, The Murray Mouth – Exploring the implications of closure or restricted flow.
- 2006, Ngarrindjeri Yarluwar-Ruwe Plan.
- 2006-2007, The Lower Lakes, Coorong and Murray Mouth Icon Site Environmental Management Plan.
- 2008, Ngarrindjeri Regional Partnership Agreement ('NRPA').
- 2009, (Whole of Government) Kungun Ngarrindjeri Yunnan Agreement (KNYA) (NRA and South Australian Government).
- 2009, CLLMM Long Term Plan Business Case: Ngarrindjeri Partnerships component.
- 2012, CLLMM Ngarrindjeri Partnerships Funding and Service Agreement

4. Principles

The Ngarrindjeri people have occupied, enjoyed, managed and used their inherited lands and waters within the area of the River Murray, Lower Lakes, Coorong and adjacent areas since creation. Creation stories and oral traditions have been passed down from generation to generation and with them a detailed knowledge of *Yarluwar-Ruwe* (sea country).

Ngarrindjeri have a unique philosophy regarding the connectivity of country / body / spirit. Ngarrindjeri Ruwe/Ruwar (country / body / spirit) concerns Ngarrindjeri rights and responsibilities as traditional owners and consideration that all things are connected. Ngarrindjeri also see their homelands as a cultural landscape, shaped during the creation by Ancestral beings and by the management of Ngarrindjeri as custodians of the land. Ngarrindjeri oral histories document changes in the ecological character of the region over millennia and their traditional ecological knowledge of the Ramsar site, including connectivity with the surrounding lands is deep.

Ngarrindjeri have had little participation in natural resource management planning undertaken in the CLLMM region over the past decades partly because of inappropriate engagement and consultation methodologies. Ngarrindjeri desire to establish new ways of working in partnership to ensure cultural values and Ngarrindjeri aspirations are respectfully, equitably and appropriately integrated into natural resource management planning and subsequently implementation.

These Ngarrindjeri philosophies give rise to the following principles as defined in the KNYA that will guide this SOC and future interactions between NRA and DEWNR:

1. Respectful processes, time and support to Ngarrindjeri to care for country (that means caring for people, past, present and future)
2. Ngarrindjeri actively involved in planning and review of Ruppia Translocation Implementation Plan linked to Ngarrindjeri Ruwe / Ruwar – (country/body/spirit)
3. Cultural Knowledge and intellectual property protected across Ngarrindjeri engagements with government and research organisations
4. Ngarrindjeri cultural values integral to all planning and future management arrangements
5. Active Ngarrindjeri participation in planning and future management arrangements through employment, education and training opportunities.

5. Outcomes and Activities

In making this SOC, the Parties have committed to work together in partnership on Ruppia Translocation for the CLLMM region over the duration of the CLLMM program.

The key outcomes of this SOC include:

1. Culturally appropriate processes for Ngarrindjeri engagement in development and review of the Ruppia Translocation Implementation Plan.
2. Ngarrindjeri cultural values and aspirations for restoring the ecological character of the CLLMM region are identified by Ngarrindjeri and appropriately integrated into the Ruppia Translocation Project
3. The NRA and DEWNR follow the Cultural Knowledge management protocols to ensure knowledge is protected while being appropriately applied throughout the Ruppia Translocation Project.

The Outcomes listed above will be achieved through the implementation of the Activities provided below. A more detailed breakdown of related Actions for each Activity are set out in the **Action Plan at Attachment 1**:

Activity 1: Commitment to develop and review the Ruppia implementation strategy including prioritisation of works

DEWNR have developed a Ruppia implementation strategy for the Ruppia Translocation Project. Development and ongoing review will facilitate Ngarrindjeri involvement to ensure the strategy reflects the commitments between DEWNR and NRA under this SOC, the intent of the KNYA and adequate recognition of Native Title and Ngarrindjeri heritage matters. A range of opportunities will be developed to support Ngarrindjeri to contribute to building on prioritisation during planning, and allow information on cultural priorities to be realised and included in implementation.

Annual planning and review will occur during July-December for each year of the project by integrating results from compliance monitoring and improvements in delivery techniques. A working group meeting during July - December will facilitate update on monitoring results and enable Ngarrindjeri input into project strategy improvements.

Activity 2: Improve understanding of Ngarrindjeri engagement through governance

A range of governance arrangements consider the development of the Ruppia Implementation Plan: CLLMM Ruppia Translocation Project, Project Advisory Group, KNYA Taskforce Meetings; the Working Group. It is essential that the different stakeholders engaged in these governance arrangements are aware of this SOC, the Working Group and Ngarrindjeri engagement in the planning. This will seek to ensure greater understanding and consideration in planning and future implementation. It is proposed that a standing item on Ngarrindjeri engagement be tabled at the Project Advisory Group and KNYA Taskforce meetings.

Activity 3: Integrating Ngarrindjeri values and perspectives in the development of the Ruppia Translocation Plans

The Ruppia Translocation Plans will consider how the *Ruppia* species diversity and Coorong habitat has changed over time by looking at pre-European landscapes (where available) and historical or more recent impacts. This information will be used to inform what our actions should be and justify changes from the ecosystems original state. This process will acknowledge the depth of knowledge Ngarrindjeri have regarding change over time. Ngarrindjeri representatives on the Working Group will contribute to this process following discussions with key elders from their communities.

There may be a specific opportunity in 2014 to assist in validating the accuracy of maps generated from a Ruppia habitat model showing historic distribution in the Coorong.

Activity 4: Review on ground site plans

Translocation Site Plans will be produced throughout the planning phase to ensure funds are spent during each financial year. These will be based on the overarching strategy but may lack a comprehensive justification provided by a completed plan. Ngarrindjeri have the opportunity to review such Site Plans as produced. Given the seasonal restriction of translocation activities, DEWNR and Ngarrindjeri will need to work together to ensure on ground works can continue whilst plans are being considered. The Parties commit that the review of Site Plans will not hold up time dependent site works, unless they are related to matters of Aboriginal heritage. This will ensure ongoing outcomes for the CLLMM region are reached.

Activity 5: Commitment to ensure the plan considers management and maintenance of treated sites over time

Translocation management planning and works should consider monitoring and maintenance over the long term to ensure the success of on ground works. A system of monitoring is required to inform future management decisions. Ngarrindjeri are committed to the appropriate restoration of their lands and waters and would like to be centrally involved in this process into the future. Awareness of the plan amongst stakeholders will be essential and Ngarrindjeri want to be actively engaged in implementing the planning that they have contributed to. The Parties acknowledge that implementation matters are outside the scope of this SOC.

Activity 6: Facilitate heritage assessment processes for site plans

The Working Group will meet and discuss heritage assessment and approvals processes as required to support the implementation of Ruppia Translocation Site Plans. This will enable information sharing and ensure linkages between heritage surveys and Translocation Site Plans are taken into consideration and addressed appropriately.

Activity 7: Commitment to explore collaborative media and engagement opportunities about the project

The Working Group will meet and discuss media and engagement opportunities that showcase both the Ruppia Translocation Project and Ngarrindjeri involvement. This may include interpretation materials such as factsheet and signage. The Parties acknowledge that implementation of certain promotional materials are outside the scope of this SOC.

6. Working Relationship

An established Working Group already exists as part of the CLLMM Vegetation Management Plan Statement of Commitment. This Working Group is highly relevant and will also facilitate the collaboration under this Ruppia Translocation SOC.

The Ruppia Translocation Project is smaller in both scope and complexity compared to the Restoration Project. It is therefore not envisaged that sharing the same Working Group will compromise the ability to collaborate on either project.

The Working Group includes representatives from the Ngarrindjeri Regional Authority, NRA Research, Policy and Planning Unit (NRA RPPU) and Coorong Lower Lakes Murray Mouth Program team, Department of Environment, Water and Natural Resources. The role of the Working Group is to oversee the implementation of this SOC and to ensure the intended targets and outcomes are achieved. The Working Group will provide input to Plans as per this SOC, Ngarrindjeri capacity and within the timeframes established by DEWNR and will provide an endorsement role in regards to the cultural heritage related matters within the plans and planning. The Working Group does not have an approval role as this role sits with the CLLMM Program internal Project Control Group.

The Working Group will:

- Jointly develop and commit on baseline principles, actions and outcomes that can be reported against for the duration of this SOC;
- Meet quarterly (or otherwise agreed) to assist in the implementation, management and monitoring of activities under this SOC;
- Be responsible for the implementation of the activities contained in Attachment 1 of this SOC;
- Monitor and evaluate progress against the targets outlined in the Action Plan contained in Attachment 1 of this SOC; and,
- Table Working Group reports to KNYA Taskforce meetings.

The DEWNR Ngarrindjeri Partnerships Coordinator will facilitate the Working Group meetings and provide support to the DEWNR Ruppia Translocation Project Officer in preparations for meetings.

The Working Group will not be involved in discussing delivery matters regarding CLLMM Ruppia Translocation. Aboriginal Heritage Risk Management for these delivery matters is managed through a separate process under the Ngarrindjeri Partnerships Project and coordinated by a Ngarrindjeri Cultural Heritage Management Team.

7. Ngarrindjeri consultation processes

Ngarrindjeri representatives on the Working Group will undertake consultation with relevant Ngarrindjeri elders to inform the activities discussed above. These consultations will occur as required and may require flexibility in timing given cultural protocols and the availability of the right people. It is understood that Cultural Knowledge and the reasons behind specific Ngarrindjeri decisions may not be divulged but the outcomes will be incorporated into the planning process. This will ensure Ngarrindjeri values are integrated into the plan as core and not a cultural addition.

8. Duration of Statement of Commitment

This SOC commences on the date of signing by all Parties and will continue for the duration of the CLLMM Ruppia Translocation project or until the Parties agree to terminate the SOC or prepare another document that replaces this SOC.

This Statement of Commitment was made on the of November 2013

Signed for and on behalf of the PARTIES

Mr Tim Hartman
Chairperson
Ngarrindjeri Regional Authority Inc.

Janice Goodwins
Program Manager
Coorong, Lower Lakes and Murray Mouth Recovery Project
Major Projects
Department of Environment, Water and Natural Resources

Attachment 1 – Statement of Commitment Action Plan for 2013/14

Activity 1: Commitment to develop and review Ruppia Implementation Plan including prioritisation of works

- DEWNR Ruppia Translocation Senior Project Officer to provide update on 2013 results and strategy for 2014 at a Working Group Meeting in November 2013
- Ngarrindjeri representatives to consider the results, strategy and priorities and consider contributing a specific section on cultural values of Ruppia species in the Coorong by mid-January 2014

Activity 2: Improve understanding of Ngarrindjeri engagement through governance

- DEWNR Ruppia Translocation Senior Project Officer to establish standing item on the SOC at relevant CLLMM Ruppia Translocation project committee meetings including the Project Advisory Group
- DEWNR and Ngarrindjeri representatives to provide updates on Working Group progress at KNYA Taskforce meetings.

Activity 3: Integrating Ngarrindjeri values and perspectives in the development of the Ruppia Translocation Plans

- Working Group formulate processes to address this item as required during the CLLMM program
- Working Group to discuss process for considering how aspects of Ngarrindjeri cultural landscapes and Coorong habitat reconstruction priorities can be integrated into the Implementation Strategy and processes to address any conflicts between ecological and cultural matters if they arise

Activity 4: Review on ground site plans

- Review and input to Translocation Site Plans as produced to achieve seasonal on ground works plans in time for works.

Activity 5: Commitment to ensure the plan considers management and maintenance of treated sites over time

- Working Group to consider long-term management as part of their discussions and informing the planning.
- Working Group to consider Ngarrindjeri involvement in plan, monitoring and review processes and imbed in planning documents and governance.
- Working Group to support Ngarrindjeri involvement in community “Ruppia Watch” monitoring opportunities.

Activity 6: Facilitate heritage assessment processes for site plans

- Working Group table and discuss heritage assessment requirements for Ruppia Translocation project as required
- Working Group to direct and facilitated development and agreement on heritage assessment and notification processes

Activity 7: Collaborative media and engagement opportunities

- Working Group to discuss and explore promotional and educational opportunities for the project.

10.4 Summary Assessment of potential impacts under EPBC Act

Summary of Assessment of potential Significant Impacts to Matters of National Environmental Significance (NES) associated translocation of *Ruppia* vegetation species to the Coorong, South Australia.

Detailed Project Risk Assessment

Method of assessment

This assessment of potential impacts has been undertaken in line with *EPBC Act Policy Statement 1.1 (Significant Impacts Guidelines)*. Only matters of NES that are likely to occur in the project area are considered in the assessment.

The following matters of NES have not been considered due to their proximity to the proposed action:

- Marine animals (reptiles, birds and mammals)
- Heritage places
- Ecological communities outside the project area (Peppermint Box Grassy Woodland of South Australia and Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions).

The matters of NES that are considered by this assessment are:

- Wetlands of international importance
- Listed threatened species and ecological communities
- Migratory species protected under international agreements.

The listed threatened species and ecological communities, and migratory species protected under international agreements which occur in the Coorong South Lagoon and Lake Cantara are listed in the attached EPBC Act Protected Matters Report generated for this self-assessment.

This self-assessment assesses the potential impacts against the significant impact criteria set-out in the *Significant Impact Guidelines 1.1*. Assessments have been undertaken for both the donor and treatment sites.

Ruppia Translocation

Large scale, physical translocation of *Ruppia tuberosa* will be undertaken using a seed sediment approach. This involves taking the top layer of sediment containing seed from a donor site and then embedding it into exposed mudflats of the Coorong. The seed sediment approach was developed through research and monitoring work conducted since 2009.

Seed collection and translocation is planned for March 2013 to take advantage of when both the donor and treatment sites are dry.

Seed Sediment Collection

Ruppia tuberosa seeds are approx 1mm in size, black and tear-dropped shaped. At Lake Cantara (200ha) they are in high density in the top layer of sediment.

The top 15mm of sediment will be collected across an area of 2.6ha of Lake Cantara. This equates to 390 cubic meters (based on 15mm depth) and approximately 650 tonnes of seed sediment. Collection pattern is to be in excavator wide strips, leaving even width gaps to facilitate faster recovery of the collection site seed bank. Refer to Photo 1.

Lake Cantara North and South is divided by a causeway through the centre of the Lake. It is proposed that a small, 5 tonne excavator is used to operate off this causeway, using track mats to reduce both impact and risk of bogging. Once water returns in winter, the lake bed sediment should even out so that the excavated strips are no longer visible when the ephemeral system dries again over the subsequent summer. At least ten collected strips will be marked by survey pegs to enable follow up compliance monitoring.

No medium/long term negative impacts are envisaged with only 1.3% of seed to be taken from donor site Lake Cantara and spaced strip collection pattern will further facilitate the coalescence of *Ruppia* across impacted sections.



Photo 1: Seed Sediment Collection Method Trial at Lake Cantara on 21 January 2013.

Image shows level of disruption of top 15mm across 5m², which filled two woven polypropylene sacks as shown.

Translocation Planting

At treatment sites in the Coorong, at least 20 hectares of mudflats will be sown with seed sediment. Treatment sections will cover specific bathymetry of the site where water levels needs for optimal growth are predicted to be.

The treatment technique involves lightly agitating the mudflat surface with a rake or spiked roller, scattering the seed sediment and then embedding it with a screed bar or smooth roller. The rake/spike depth will be no more than 20mm deep to ensure any seed can successfully germinate.

No medium/long term negative impacts are envisaged at treatment sites as work will be conducted on the exposed mudflats and only disturb the top 20mm of sediment.

Assessment of *Ruppia* Translocation

Table 1 below summarises the assessment of potential impacts to both the donor and treatment sites against the significant impact criteria set-out in the *Significant Impact Guidelines 1.1*.

In summary, the assessment has found that *Ruppia* Translocation is unlikely to have significant impacts on the matters of national environmental significance identified in the attached protected matters report.

A minor and temporary impact upon the habitat of native species at the donor site was identified, however this impact will be minimised by collecting sediment layers in strips, which will enable faster recovery of the *Ruppia* population at the donor site.

Table 1: Summary of assessment of *Ruppia* Translocation Activities on both donor site (Lake Cantara) and treatment site (South Lagoon Coorong)

Significant Impact Criteria	Donor site (Lake Cantara)	Treatment site (South Lagoon Coorong)
Wetlands of International Importance		
Areas of the wetland being destroyed or substantially modified	<p>✘ The top 15mm of sediment will be removed from approximately 2.6 ha of Lake Cantara. In total, the donor site is approximately 200 ha. 2.6 ha equates to approximately 1.3% of the total area of the site.</p> <p>In addition, the proposed seed collection method will enable the <i>Ruppia</i> population in Lake Cantara to recover as quickly as possible.</p>	<p>✘ Translocation of <i>Ruppia</i> to the South Lagoon Coorong will contribute to improving the ecological condition of the Coorong by helping to re-establish the keystone vegetation species.</p>
A substantial and measureable change in the hydrological regime of the wetland, for example a substantial change to the volume, timing duration, and frequency of ground and surface water flows to and within the wetland	<p>✘ Lake Cantara receives flows predominantly from local rainfall in the South East. The proposed activity is not expected to impede or restrict these flows.</p>	<p>✘ The additional sediment containing seed proposed to be translocation in the South Lagoon Coorong will have negligible impact on water levels.</p>
The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependant upon the wetland being seriously affected	<p>✘ Only the very top surface across 1.3% of the site will be impacted. Work is to be conducted at the time of year when the lakebed is dry. This will not seriously impact the habitat or lifecycle of native species.</p>	<p>✘ Translocation of <i>Ruppia</i> to the South Lagoon Coorong will contribute to improving the habitat and lifecycle of native species.</p>
A substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health	<p>✘ Potential impacts to turbidity levels will be mitigated by undertaking the proposed seed collection when the ephemeral lake is in the dry part of its cycle. Any sediment disruptions should be settled well before rewetting occurs.</p>	<p>✘ Any potentially increases in turbidity levels are likely to be small and short-term. Planting will be undertaken by hand to minimise any potentially increase in turbidity.</p> <p>In addition, translocation will be timed to take advantage of low</p>

				<p>water levels, which will further minimise any potential increase to turbidity.</p> <p>Planting will be undertaken predominantly on exposed mudflats, reducing any potential impacts to water quality.</p>
An invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland	✘	<p>It is unlikely that an invasive species will be introduced as a result of the proposed seed sediment collection.</p> <p>Excavation equipment will be washed down at the large wash down bays in Meningie before work is commenced to reduce this risk.</p>	✘	<p>It is unlikely that an invasive species will be introduced as a result of the proposed seed sediment collection.</p> <p>Research and emergence trials have been conducted to ensure that taking seed sediment from Lake Cantara and placing it into the Coorong does not result in any unexpected/unwanted invasive species that are harmful</p>
Listed Threatened Species and Ecological Communities				
Critically Endangered and endangered species				
Lead to a long-term decrease in the size of a population	✘	It is unlikely translocation of <i>Ruppia</i> will lead to population impacts on endangered species	✘	Not applicable. Translocation should increase suitable habitat and support food webs for endangered species
Reduce the area of occupancy of the species	✘	It is unlikely translocation of <i>Ruppia</i> will lead to reduction in occupancy of endangered species	✘	Not applicable. Translocation should increase the area of <i>Ruppia tuberosa</i> population occupancy.
Fragment an existing population into two or more populations	✘	Not applicable. The seed collection method is only taking 1.3% of the total area and in small, spaced strips that will not fragment the overall population.	✘	Not applicable. Translocation of <i>Ruppia</i> should improve habitat connectivity in the Coorong by increasing the area of <i>Ruppia tuberosa</i> population occupancy.
Adversely affect habitat critical to the survival of a species	✘	Given the small percentage of the donor site being affected (1.3% of the	✘	Not applicable. Translocation should improve critical habitat for

		total area of the site), it is unlikely that habitat will be adversely affected by seed collection. The seed collection method has been designed to minimise disruption and promote quick recovery of the disrupted <i>Ruppia</i> population.		endangered species.
Disrupt the breeding cycle of a population	x	Not applicable. The critically and endangered species of birds, whale, bandicoot, orchids and turtles listed in the attached EPBC Act Protected Matters Report do not breed on the dry lake bed at Cantara.	x	It is unlikely translocation activities of <i>Ruppia</i> on the exposed mudflats of the Coorong will disrupt any breeding cycle activity for endangered species listed.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	x	Given the small percentage of the donor site being affected (1.3% of the total area of the site), it is unlikely that habitat quality or availability will be adversely affected by seed collection. The seed collection method has been designed to minimise disruption and promote quick recovery of the disrupted <i>Ruppia</i> population.	x	Not applicable. Translocation should improve and increase habitat for endangered species.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	x	It is unlikely that an invasive species will be introduced as a result of the proposed seed sediment collection. Excavation equipment will be washed down at the large wash down bays in Meningie before work is commenced to reduce this risk.	x	Research trials have been conducted to ensure that taking seed sediment from Lake Cantara and placing it into the Coorong does not result in any unexpected/unwanted invasive species that are harmful.
Introduce disease that may cause the species to decline	x	It is unlikely that a disease will be introduced as a result of the proposed seed sediment collection. Excavation equipment will be washed down at the large wash down bays in	x	Research trials have been conducted to ensure that taking seed sediment from Lake Cantara and placing it into the Coorong does not result in any unexpected/unwanted disease that

		Meningie before work is commenced to reduce this risk.		is harmful.
Interfere with the recovery of the species	x	It is unlikely translocation of <i>Ruppia</i> will interfere with endangered species	x	It is unlikely translocation of <i>Ruppia</i> will interfere with endangered species
Vulnerable species				
Lead to a long-term decrease in the size of an important population of a species	x	It is unlikely translocation of <i>Ruppia</i> will lead to population impacts on vulnerable species	x	Not applicable. Translocation should increase suitable habitat and support food webs for vulnerable species
Reduce the area of occupancy of an important population	x	It is unlikely translocation of <i>Ruppia</i> will lead to reduction in occupancy of vulnerable species	x	Not applicable. Translocation should increase the area of <i>Ruppia tuberosa</i> population occupancy.
Fragment an existing important population into two or more populations	x	It is unlikely translocation of <i>Ruppia</i> will fragment vulnerable species	x	Not applicable. Translocation of <i>Ruppia</i> should improve habitat connectivity in the Coorong by increasing the area of <i>Ruppia tuberosa</i> population occupancy.
Adversely affect habitat critically to the survival of a species	x	Given the small percentage of the donor site being affected (1.3% of the total area of the site), it is unlikely that habitat will be adversely affected by seed collection. The seed collection method has been designed to minimise disruption and promote quick recovery of the disrupted ruppia population.	x	Not applicable. Translocation should improve critical habitat for vulnerable species.
Disrupt the breeding cycle of an important population	x	It is unlikely translocation of <i>Ruppia</i> will disrupt breeding cycle for vulnerable species	x	It is unlikely translocation activities of <i>Ruppia</i> on the exposed mudflats of the Coorong will disrupt any breeding cycle activity for vulnerable species listed.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	x	Given the small percentage of the donor site being affected (1.3% of the total area of the site), it is unlikely that habitat quality or availability will be adversely affected by seed collection. The seed collection method has been designed to minimise disruption and promote quick recovery of the disrupted <i>Ruppia</i> population.	x	Not applicable. Translocation should improve and increase habitat for vulnerable species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	x	It is unlikely that an invasive species will be introduced as a result of the proposed seed sediment collection. Excavation equipment will be washed down at the large wash down bays in Meningie before work is commenced to reduce this risk.	x	Research trials have been conducted to ensure that taking seed sediment from Lake Cantara and placing it into the Coorong does not result in any unexpected/unwanted invasive species that are harmful.
Introduce disease that may cause the species to decline	x	It is unlikely that a disease will be introduced as a result of the proposed seed sediment collection. Excavation equipment will be washed down at the large wash down bays in Meningie before work is commenced to reduce this risk.	x	Research trials have been conducted to ensure that taking seed sediment from Lake Cantara and placing it into the Coorong does not result in any unexpected/unwanted disease that is harmful.
Interfere substantially with the recovery of the species	x	It is unlikely translocation of <i>Ruppia</i> will interfere with vulnerable species	x	It is unlikely translocation of <i>Ruppia</i> will interfere with vulnerable species
Critically endangered and endangered ecological communities				
Reduce the extent of an ecological community	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within Lake Cantara.	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within the Coorong South Lagoon.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters

or transmission lines		occur within Lake Cantara.		Report do not occur within the Coorong South Lagoon.
Adversely affect habitat critical to the survival of an ecological community	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within Lake Cantara.	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within the Coorong South Lagoon.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within Lake Cantara.	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within the Coorong South Lagoon.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within Lake Cantara.	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within the Coorong South Lagoon.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: <ol style="list-style-type: none"> 1. assisting invasive species, that are harmful to the listed ecological community, to become established, or 2. causing regular mobilisation of fertilisers, herbicides, or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community 	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within Lake Cantara.	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within the Coorong South Lagoon.
Interfere with the recovery of an ecological community	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within Lake Cantara.	x	Not applicable. Threatened ecological communities identified in the EPBC Act Protected Matters Report do not occur within the Coorong South Lagoon.
Listed Migratory Species				

Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	✘	Only the very top surface across 1.3% of the site will be impacted and this will be taken in strips to further reduce the overall impact.	✘	Translocation of <i>Ruppia</i> to the South Lagoon Coorong will contribute to improving the habitat for migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	✘	It is unlikely that an invasive species will be introduced as a result of the proposed seed sediment collection. Excavation equipment will be washed down at the large wash down bays in Meningie before work is commenced to reduce this risk.	✘	Research trials have been conducted to ensure that taking seed sediment from Lake Cantara and placing it into the Coorong does not result in any unexpected/unwanted invasive species that are harmful.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	✘	Work is to be conducted at the time of year when the lakebed is dry and not utilised by migratory species. Only the very top surface across 1.3% of the site will be impacted and should not significantly impact lifecycles of migratory birds when water returns.	✘	Translocation of <i>Ruppia</i> to the South Lagoon Coorong will contribute to improving the lifecycle of migratory species.

10.5 Seed Sediment Collection Plan 2014

Background

The Coorong, Lower Lakes and Murray Mouth (CLLMM) Program was established in May 2009 and is part of the South Australian Government's Murray Futures Program, funded by the Australian Government's Water for the Future Initiative.

The *Ruppia* Translocation project aims to restore the aquatic plant, *Ruppia tuberosa* to the Coorong to improve the CLLMM Sites ecological character and provide long-term benefits to the ecosystem.

In 2014, seed sediment collection is required so that it can then be sown into mudflats of the eastern side of the Coorong South Lagoon. This will be the second year large scale translocation is conducted.

Service conditions and environmental factors

Services will be undertaken on Lake Cantara which is part of the Coorong National Park. Contractor is required to adhere to access and communication protocols by both the DEWNR project staff and relevant DEWNR Park staff.

The Contractor is advised that the southern sections of the Coorong National Park will be closed to the public from 23 to 29 March 2014. However this will not affect this project as special permission will be granted to the Contractor to continue operating under this Agreement. Further detail regarding access during this week will be discussed further with the Principal's Representative, the Contractor and relevant Principal's Park Staff.

Translocation operations are occurring on traditional Ngarrindjeri land. If any Ngarrindjeri heritage objects are uncovered it should be reported to the Principal's Representative immediately and work ceased in that particular location.

Statement of Requirements

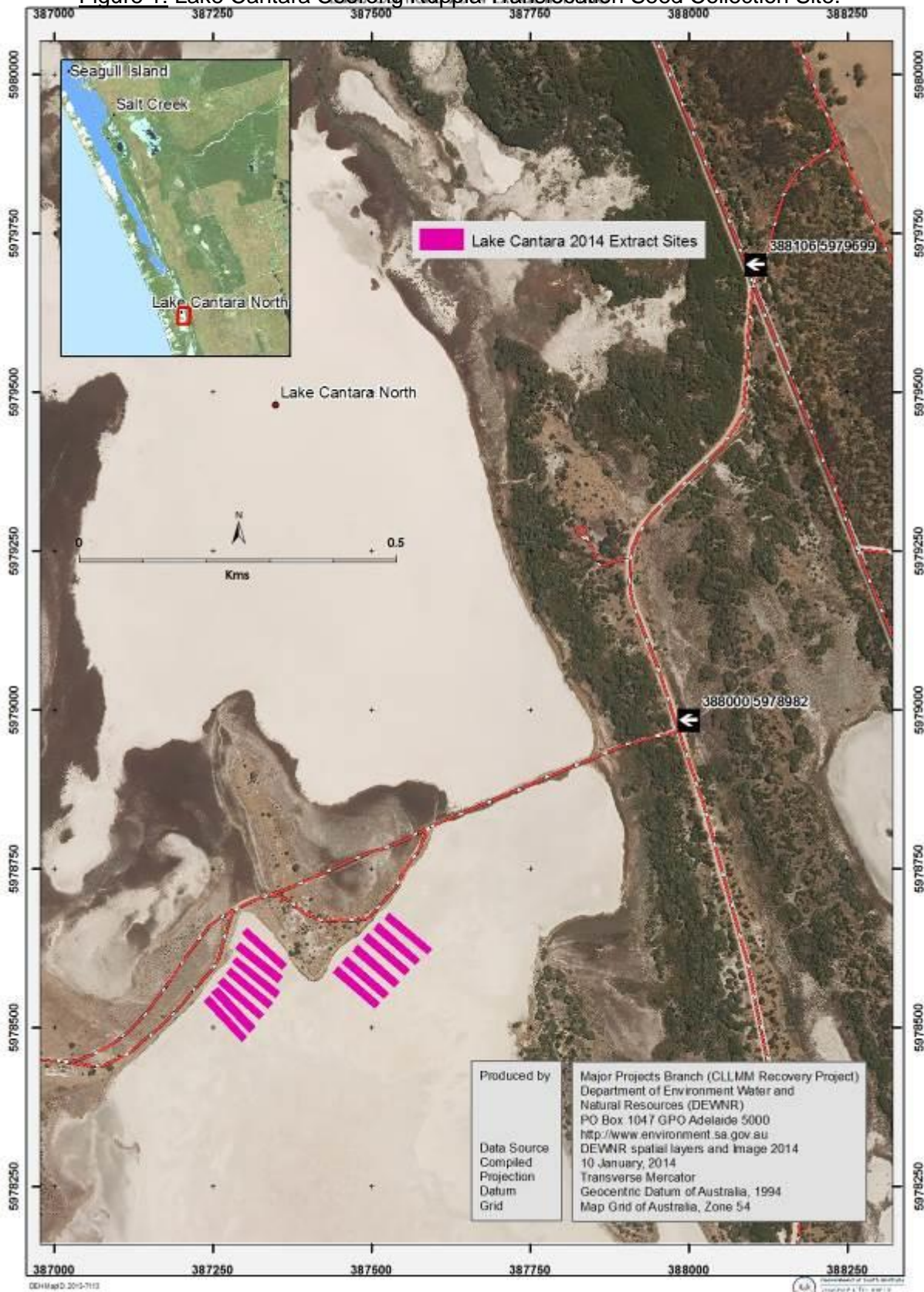
Key Outcomes

Extraction of up to 1.75ha to an average depth of 15mm sediment containing *Ruppia tuberosa* seeds from Lake Cantara in an efficient and low impact manner as possible.

Location

Lake Cantara is approx 233 kms SE of Adelaide on the Princess Highway (sealed road). The sediment site is 700m from the main highway across unsealed roads and park tracks.

Figure 1: Lake Cantara Coorong Ruppia Translocation Seed Collection Site.



Services

Ruppia tuberosa seeds are approx 1mm in size, black and tear-dropped shaped. At Lake Cantara they are in high density in the top layer of sediment.

- The top 15mm (aim for 10-20mm) of sediment needs to be collected across an area of up to 1.75ha of Lake Cantara. This equates to up to 455 cubic meters (based on 15mm depth) and approximately 760 tonnes of seed sediment (depending on soil weight).
- Lake Cantara North and South is divided by a causeway and park track through the centre of the Lake. It is proposed that a small (no more than 5 tonne) excavator is used to operate off this track.
- Use of track mats is required to work and operate safely on the clay lake bed for the excavator and track loader. A total length of 100m worth of suitable mats will be required.
- Collection pattern is to be in excavator wide strips, leaving even width gaps to facility faster recovery of the collection site seed bank.
- Collected strips to be marked at each end by survey pegs to enable follow up monitoring.
- Removal of all mats and remediation of any damage to track and/or causeway.
- Depositing of seed sediment spoil to flat grassed area, adjacent extraction sites North West of the main track into 20 tonne lot piles.

Safety and Clean Up

Contractor must ensure that the work area is kept safe and neat at all times.

Weight bearing on the lake bed surface was as low as 15kpa on 10 January 2013. This will vary depending on weather conditions, but caution should be taken at all times to ensure safe operation of machinery in meeting project objectives.

All waste and other materials generated from translocation activities are to be cleaned up and removed from the sites by the Contractor at the completion of each day.

Contractor must notify the Principal's Representative immediately where any hazard that may impact on the individual, community or environment is identified.

Mandatory Safety Requirements

Contractor must adhere to the following mandatory safety requirements:

- Notify the Principal's Representative of daily movements.

- No work is to be undertaken when temperature exceeds 35 degrees Celsius. Contractors may choose to start working earlier and finish earlier avoiding higher temperatures.
- A water knapsack, fire extinguisher or similar fire control equipment must be present at all times.
- Appropriate personal protective equipment must be used by staff at all times.
- Adhere to policies and instruction specified in section 4 above.
- A worksite induction will be undertaken with Contractor prior to the commencement of services (this will occur on the first day and take 30mins).
- The Principal's Representative must be notified of ANY personnel injury, whether professional medical treatment is sought or not, within five hours (includes but not limited to cuts, strains, sprains, broken bones etc.) of the injury occurring.
- Non-injury WH&S incidents (chemical spill, vehicle/equipment roll-over, collision etc) must be reported to the Principal's Representative within 5 hours of the incident.

Security

The Contractor is required to maintain confidentiality of personal and commercial information.

Contractor equipment must be safeguarded against interference and theft. There is potential to store equipment within the locked park gates at Lake Cantara. A set of keys will be provided by the Principal's Representative.

Documentation

The Contractor will be required to report on services provided and participate in a contract closure interview to assist in a project review and provide recommendations on improvements to future translocation work.

10.6 Seed Sediment Preparation and Delivery Plan 2014

Item 1. The Services

This Agreement will enable Ngarrindjeri to carry out bagging and delivery of sediment containing *Ruppia tuberosa* seed as part of the Ruppia Translocation project in the culturally significant Coorong.

The service measures and budget for this Agreement are defined in Item 2 of this Schedule 5, Annexure 1.

The key objectives for this Agreement are:

- Engage Ngarrindjeri people in the Ruppia Translocation Project.
- To continue restoration activities on culturally significant Aboriginal land.

Key Outcomes

- Bag a minimum of 17,800 and up to 27,000 woven polypropylene sacks with seed sediment at Lake Cantara.
- Deliver a minimum of 20,800 and up to 30,000 seed sediment bags to the Department for the Ruppia Translocation program.
- Bagging and delivery to be completed at a minimum rate of 840 bags per day, aiming for 1000 or more bags per day.

The number to be bagged is less than the number to be delivered due to 3,000 pre-packed bags remaining from translocation in 2013.

A site map of delivery locations is included in Item 3. All delivery sites (including potential additional sites) are located within a 15km stretch of the Princes Highway, between Fat Cattle Point and Salt Creek on the eastern side of the South Lagoon Coorong. The collection site is at Lake Cantara, 39km south from the furthest delivery site.

Item 2. Service Measures and Budget

Table 1, Item 4, Schedule 3 and Table 2 of Item 2, Schedule 5 are central to the payment reporting and payment processing.

Table 2 Description of activities – 2014

The Description table below outlines each Milestone listed in Schedule 3, Item 4 Table 1.

(1) Induction and Set Up of Bagging Area

Induction

The Ngarrindjeri must participate in safety and site induction on project commencement at Collection Site and Delivery Sites.

Set Up of Bagging Area

The Ngarrindjeri must set up bagging work area at Lake Cantara to include shaded area, woven polypropylene sacks, appropriate road works signage, fire spray unit, tools and turn around area.

Site WH&S

The Ngarrindjeri must ensure that all necessary WH&S measures are taken when carrying out works associated with the grant agreement, and as outlined in Clause 27.

The Ngarrindjeri must ensure there is adequate WH&S for all staff, by (but not limited to):

- Ngarrindjeri carrying out WH&S inductions with Ngarrindjeri staff;
- providing appropriate and safe working environments; and
- providing appropriate equipment.

(2) Seed Sediment Bagging

Bagging

The Ngarrindjeri must bag 10-15kg of sediment containing *Ruppia tuberosa* seed into provided woven, polypropylene sacks using appropriate methods. Careful attention to WH&S manual handling and rotation of roles strongly recommended.

A minimum rate of 840 bags a day is expected, however this should easily be surpassed.

The spoil pile of sediment will be provided on site at Lake Cantara, split into set spoil 'lots' to enable easier tracking of volume.

At least 17,800 bags are required to be completed prior to 14 April 2014.

(3) Delivery

Delivery

At least 20,800 bags are required to be delivered to planting sites in the Coorong South Lagoon by 14 April 2014 as per locations and volumes below.

A minimum delivery rate 840 bags a day is expected. Sites are to be fully delivered one by one before moving onto another site.

Drivers must stick the park tracks and unload the bags at the base of tracks, as shown during the induction.

Delivery Location	Site Name	Bags
Fat Cattle Point	North Bay	4350
	South Bay	3700
Jack Point	Jack Point	12750
	Total	20800

(4) Additional Seed Sediment Bagging

Bagging

Pending final commercial tender contracts and progress during on ground works, there is potential for additional sites to be treated which will require additional seed sediment bags.

Up to additional 9,200 bags **may** be required to be completed prior to 2 May 2014.

Approval to proceed with additional bagging and exact volumes will be negotiated during the grant period between the Departments and Grantees Representative and confirmed in writing.

(5) Additional Seed Sediment Delivery**Delivery**

Pending final commercial tender contracts and progress during on ground works, there is potential for additional sites to be treated which will require additional seed sediment bags to be delivered.

Up to additional 9,200 bags **may** be required to be delivered to planting sites in the Coorong South Lagoon by 2 May 2014 as per locations and volumes below.

Approval to proceed with additional bagging and exact volumes will be negotiated during the grant period between the Departments and Grantees Representative and confirmed in writing.

Delivery Location	Site Name	Bags
Policeman Point	Policeman Point	1450
Seagull Island	Seagull Island	6950
Salt Creek	Salt Creek	850
Total		9200

(6) Site Clean Up

Bagging site must be left clean of equipment and rubbish to the satisfaction of DEWNR at end of 5 May 2014. Pad lock keys provided must be returned.

(7) Contract Closure**Final Report**

A short final report is a stand alone document that provides a whole picture of what was conducted under this funding agreement as outlined in Schedule 4, Item 4.

Note: the document can be used for public information and dissemination.

Ruppia 2014 Planting & Excavation Site Overview



Produced by
Major Projects Branch (CLMM Recovery Project)
Department of Environment Water and
Natural Resources (DEWNR)
PO Box 1047 GPO Adelaide 5000
<http://www.environment.sa.gov.au>
DEWNR spatial layers and Image 2014
10 January, 2014
Projection
Datum
Grid
Transverse Mercator
Geocentric Datum of Australia, 1994
Map Grid of Australia, Zone 54

Planting Sites 2014
Lake Cantara Extraction Site



10.7 *Ruppia* Translocation Planting Plan 2014

Background

The Coorong, Lower Lakes and Murray Mouth (CLLMM) Program was established in May 2009 and is part of the South Australian Government's Murray Futures Program, funded by the Australian Government's Water for the Future Initiative.

The *Ruppia* Translocation project aims to restore the aquatic plant, *Ruppia tuberosa* to the Coorong to improve the CLLMM Sites ecological character and provide long-term benefits to the ecosystem.

This will be the second year large scale translocation is conducted.

Service conditions and environmental factors

Services will be undertaken on Lake Cantara which is part of the Coorong National Park. Contractor is required to adhere to access and communication protocols by both the DEWNR project staff and relevant DEWNR Park staff.

The Contractor is advised that the southern sections of the Coorong National Park will be closed to the public from 23 to 29 March 2014. However this will not affect this project as special permission will be granted to the Contractor to continue operating under this Agreement. Further detail regarding access during this week will be discussed further with the Principal's Representative, the Contractor and relevant Principal's Park Staff.

Translocation operations are occurring on traditional Ngarrindjeri land. If any Ngarrindjeri heritage objects are uncovered it should be reported to the Principal's Representative immediately and work ceased in that particular location.

Statement of Requirements

Key Outcomes

Translocation of up to 30,000 bags of seed sediment across up to 42.2ha of Coorong mudflats using an effective and efficient deployment method which enables opportunity for *Ruppia tuberosa* to germinate when water levels rise

Location

All sites are along the western shore of the Coorong South Lagoon, approx 200 kms SE of Adelaide on the Princess Highway (sealed road). Refer to Figure 1 for an overview of key site locations.

Ruppia 2014 Planting & Excavation Site Overview



Figure 1: Coorong Ruppia Translocation areas of Interest 2014

Services

Sediment containing *Ruppia tuberosa* seed needs to be sown across mudflats at the locations and densities outlined in the attached site maps.

Mudflat surfaces (where access and low water levels permit), be pre-treated with customised spiked roller that hitches to back of 4WD Gator to create small divots for the sediment to settle within.

Minimum of 20,800 and up to 30,000 bags of seed sediment will be provided by the Principal on site in woven polypropylene bags. Bags will weigh 10-15kg each to be translocated.

All treatment sites, specified area plots are required to be treated with seed sediment. Planted areas have been marked out with galvanised star droppers with reflective caps by the Principal.

Two key densities will be used at planting sites, which have been highlighted on maps and summary table (refer Table 2 and Figures 2 through 6) as zones 1 – 3;

Zone 1: Low density

Zone 2: High density

Zone 3: Low density

- The total length and width of the plots vary as they follow the bathymetry of the site to allow coverage over the predicted critical water levels needed for optimal growth. This detail is provided in the site maps and summary table (refer to Table 2 and Figures 2 through 6).
- Seed sediment is to be deployed in approximately 40 cm wide bands (width of bags), running parallel to the waters edge. Leaving a gap of 1 metre between bands in high density and 3 metre gaps in low density zones.

Bands are to be completed across the full zone or until seed sediment allocated to that zone runs out (appreciating that natural variation in the thickness of deployment layer will impact amount of area able to be covered).

Quantities that were planted each day need to be recorded and supply total planted to the Principal's Representative.

Learnings from work in 2013 showed that a layer of seed sediment simply tipped or spread on the surface germinated successfully. There is no need to physically embed the material, as most seed is already covered in at least some sediment. Some seed and sediment did disperse through wind and water, but more than adequate volumes remained in the target zones.

It is likely that shallow water will be present at the lower end of the mudflats proposed for planting. The bagged seed sediment is deposited directly into the shallow water. Natural wave action should ensure the seed remains within the targeted germination zone.

For safety reasons, successful Tenderer(s) are not to wade out more than 50cm depth of water, even if this means concentrating the amount of seed sediment.

Exact water levels will not be known until time of translocation.

Security

The Contractor is required to maintain confidentiality of personal and commercial information.

Contractor equipment must be safeguarded against interference and theft.

Table 2: Numbers of seed sediment bags and area to be treated per zone, per site.

Site	Zone 1 Low Density		Zone 2 High Density		Zone 3 Low Density		Site Total	
	Area (ha)	Bags (#)	Area (ha)	Bags (#)	Area (ha)	Bags (#)	Area (ha)	Bags (#)
<i>Minimum Sites</i>								
Fat Cattle Nth	1.5	750	3.3	3000	1.3	600	6.1	4350
Fat Cattle South	1.2	600	2.7	2500	1.5	600	5.4	3700
Jack Point	4.1	2000	9.9	9100	4.0	1650	18.0	12750
<i>Additional Sites</i>	Sub Total						29.5	20800
Policeman Point	0.5	250	1.0	900	0.6	300	2.1	1450
Seagull Island	2.7	1300	5.5	5000	1.3	600	9.5	6900
Salt Creek	0.6	300	0.5	500	0.1	50	1.2	850
	Sub Total						12.8	9200
	Overall Total						42.2	30000

Safety and Clean Up

The Contractor must ensure that the work area is kept safe and neat at all times.

Weight bearing on the exposed mud flats is low. John Deere Gator vehicles are allowed to be used on the mudflats, however caution should be taken at all times to ensure safe operation.

All waste and other materials generated from translocation activities are to be cleaned up and removed from the sites by the Contractor including bags and bag ties.

The Contractor must notify the Principal's Representative immediately where any hazard that may impact on the individual, community or environment is identified.

Mandatory Safety Requirements

Contractor must adhere to the following mandatory safety requirements:

Notify the Principal's Representative of daily movements.

No work is to be undertaken when temperature exceeds 35 degrees Celsius.

Contractors may choose to start working earlier and finish earlier avoiding higher temperatures.

A water knapsack, fire extinguisher or similar fire control equipment must be present at all times.

Appropriate personal protective equipment must be used by staff at all times.

Adhere to policies and instruction specified in section 4 above.

A worksite induction will be undertaken with Contractor prior to the commencement of services (this will occur on the first day and take 30mins).

The Principal's Representative must be notified of ANY personnel injury, whether professional medical treatment is sought or not, within five hours (includes but not limited to cuts, strains, sprains, broken bones etc.) of the injury occurring. Non-injury WH&S incidents (chemical spill, vehicle/equipment roll-over, collision etc) must be reported to the Principal's Representative within 5 hours of the incident.

Documentation

The Contractor will be required to report on services provided and participate in a contract closure interview to assist in a project review and provide recommendations on improvements to future translocation work.

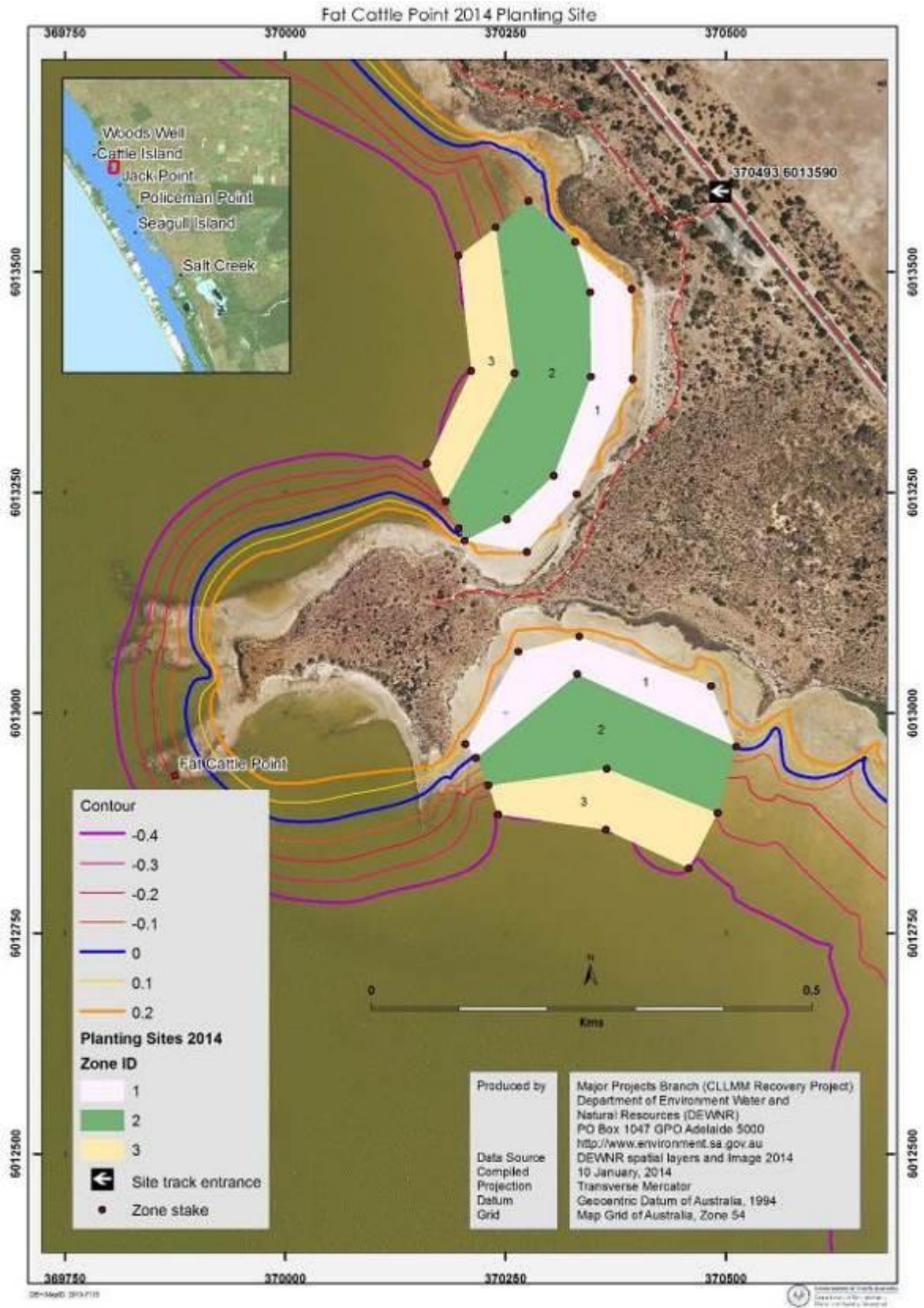


Figure 2: Fat Cattle Point, North and South Bays

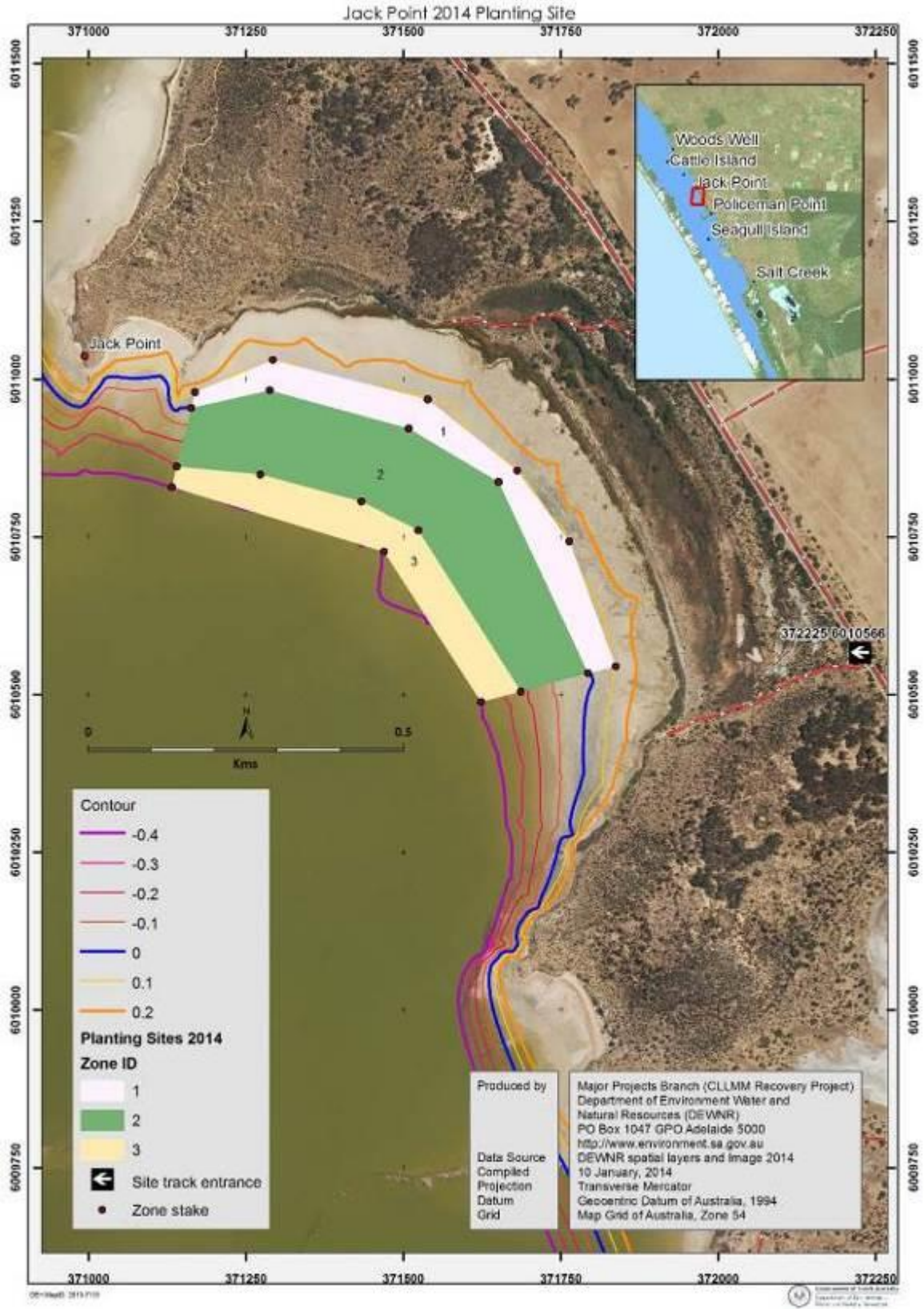


Figure 3: Jack Point

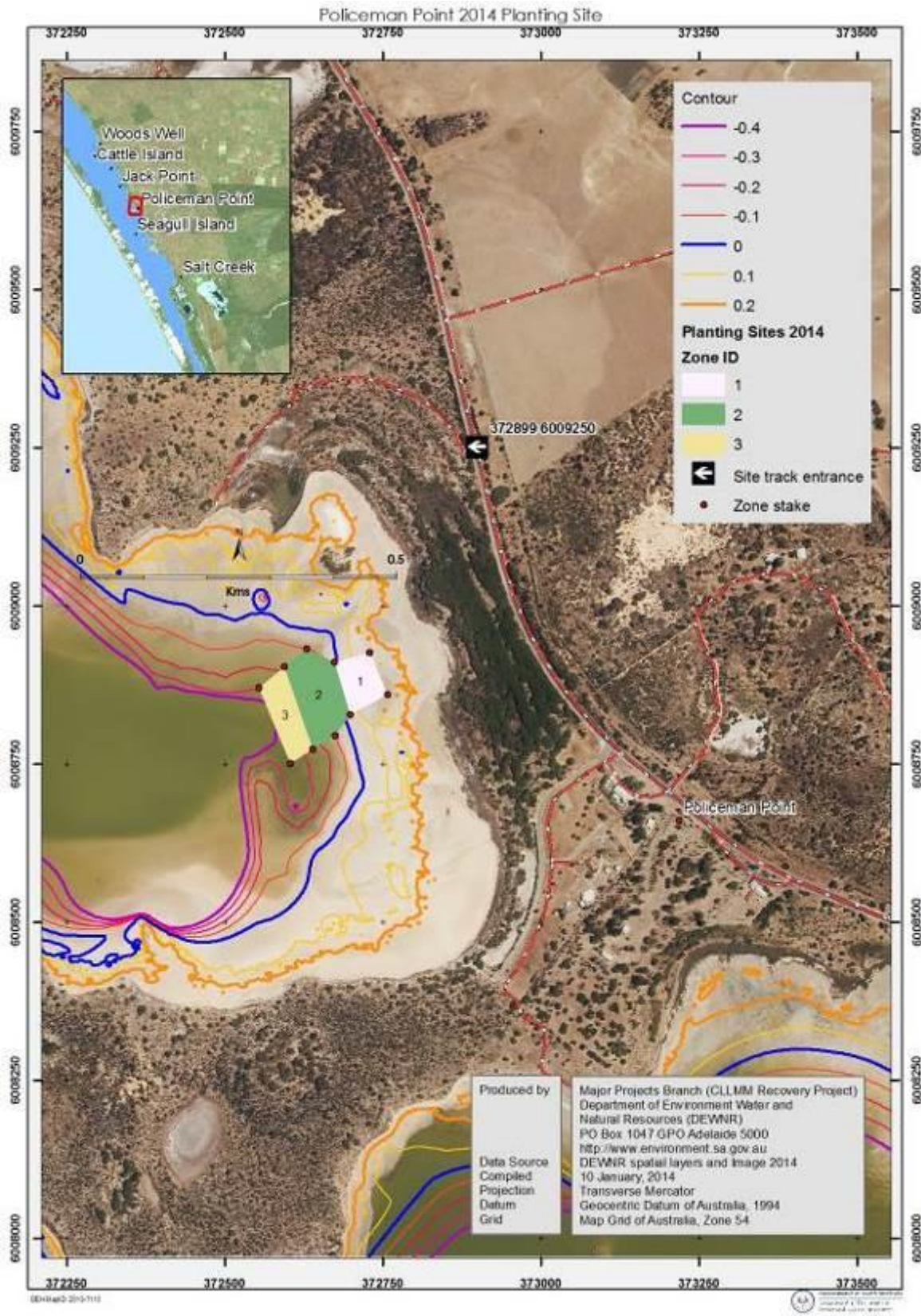


Figure 4: Policeman Point

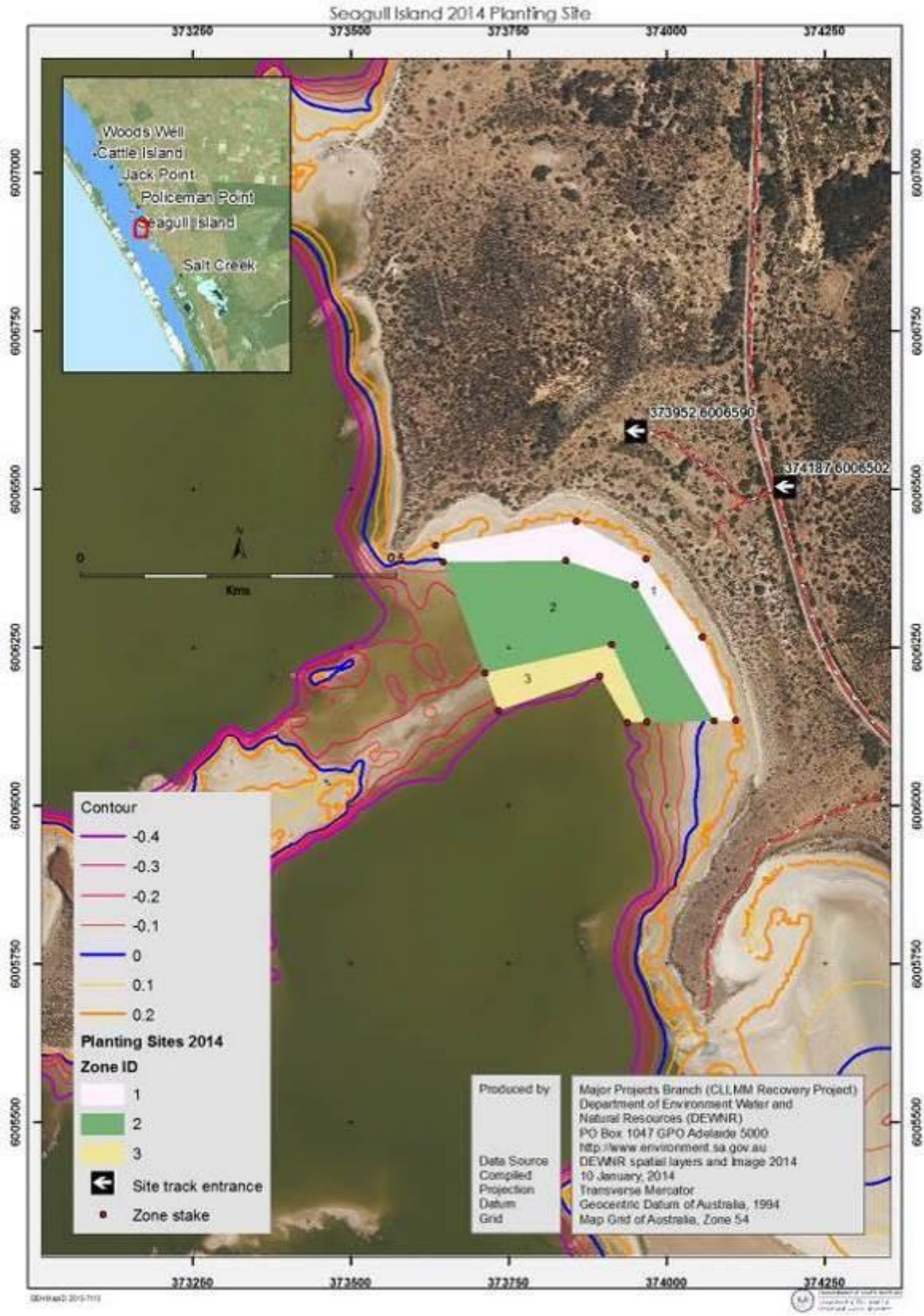


Figure 5: Seagull Island

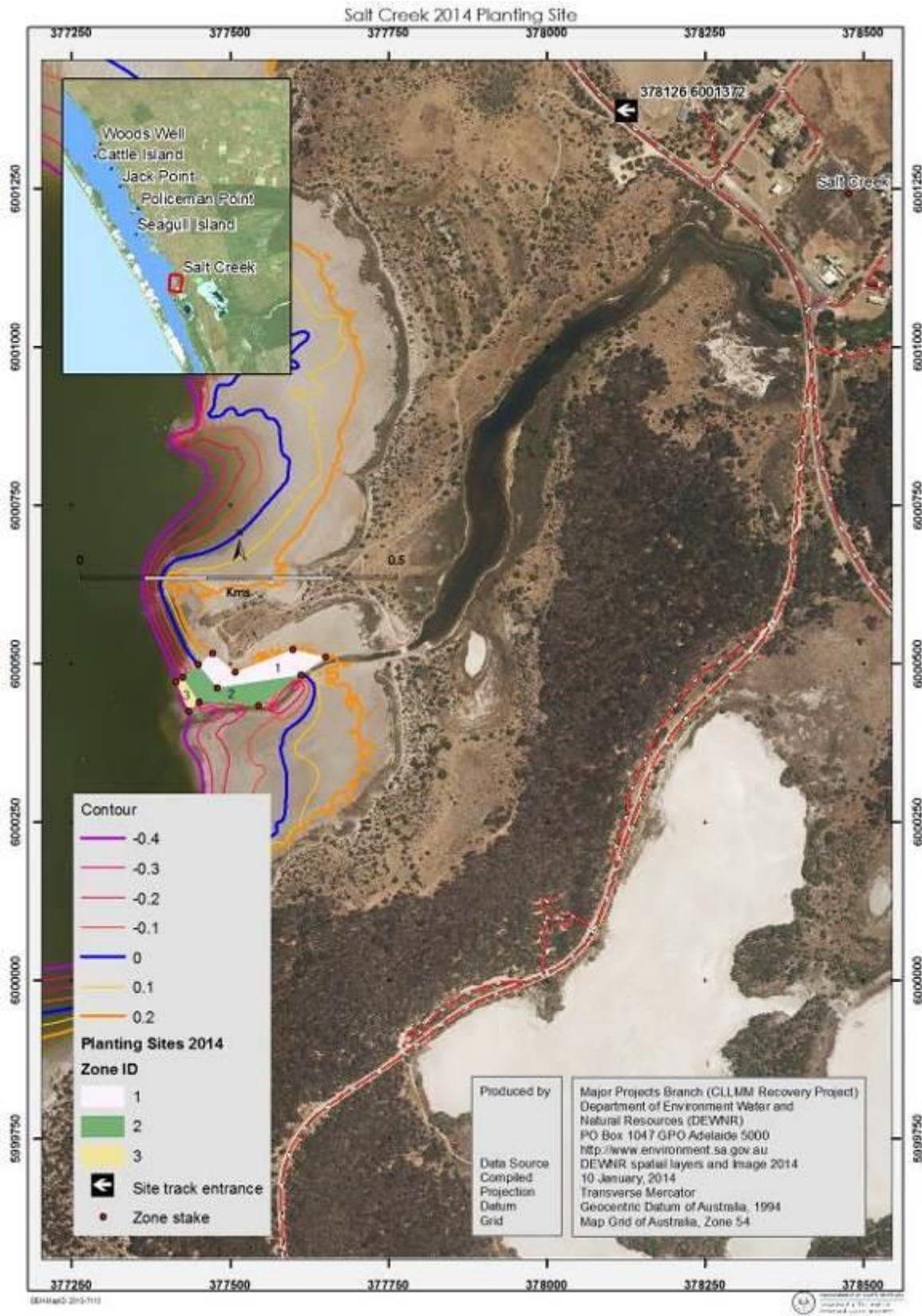


Figure 6: Salt Creek

10.8 Ruppia Translocation Project Risk Assessment Table

Project Name: Ruppia Translocation Project
Project Manager: Katherine Ryan

Likelihood: E=Rare, D=Unlikely, C=Possible, B=Likely, A=Almost Certain **Consequence:** 5=Insignificant, 4=Minor, 3=Moderate, 2=Major, 1=Critical **Residual Risk:** L=Low, M=Medium, H=High **Acceptable:** Y=Yes, N=No

Risk Issue	Impact	Current/Actual				Proposed (If current Residual Risk is unacceptable)				
		Existing Controls	Likelihood	Consequence	Residual Risk	Acceptable?	Mitigation (Controls/Treatments)	Likelihood	Consequence	Residual Risk
Delay in securing contractors	Delay to project commencement	Provide Expression of Interest to seek potential contractors	D	4	L	Y				

Risk Issue	Impact	Current/Actual				Proposed (If current Residual Risk is unacceptable)				
		Existing Controls	Likelihood	Consequence	Residual Risk	Acceptable?	Mitigation (Controls/Treatments)	Likelihood	Consequence	Residual Risk
Procurement Authorisation delays	Project starting delay	Have delegates aware of project deadlines and planned authorisation dates.	C	4	L	Y				
Low response to calls for tender/contractors	Potential high project cost /unskilled contractor	Advertise Expression of Interest	E	4	L	Y				
Inclement weather	Delay project finishing date and financial implication at end of financial year	Plan works to coincide with better weather conditions and allow for Extensions of Time in the program.	E	3	L	Y				
Subcontractor availability	Potential delays in works or quality	Have the contractor provide possible subcontractor listed and check availability /capacity	D	4	L	Y				
Materials availability (eg track mats for excavator)	Delayed completion date	Check sources prior to tendering (specification) and order deadlines prior to delivery	E	4	L	Y				
Contractor teams working in normally quiet/untouched areas of park with nearby landholders	Public objection	Provide local residents letter advising of work Provide Updates at Friends of Coorong AGM Liaise with Park Rangers	D	4	L	Y				
Project Manager Availability	Ability to manage project in a timely manner	Make sure Manger of Project Delivery is aware of any project over commitments	D	4	L	Y				
Personal injury within project site	Public liability issue, adverse media	Ensure all personnel that will be involved with the project are fully trained, erect appropriate signage and bunting, and ensure adequate publicity.	C	3	L	Y		D	3	L
Delays in obtaining the necessary	Delay in implementing works	Ensure the approvals processes are started soon	C	4	L	Y				

Risk Issue	Impact	Current/Actual				Proposed (If current Residual Risk is unacceptable)				
		Existing Controls	Likelihood	Consequence	Residual Risk	Acceptable?	Mitigation (Controls/Treatments)	Likelihood	Consequence	Residual Risk
approvals to commence works										
Expectations of the community or any major stakeholder group are not met	Lack of community support for other CLLMM projects and Long-Term Plan	Manage expectations through providing relevant up to date project information on the DEWNR website, through media releases and the Rangers.	C	4	M	Y				
Estimates of costs and expenditure are exceeded	Additional funds are required from Australian Government or State sources	Ensure all works can be funded within the budget	E	3	L	Y	Review scope, costs and staffing, regular monitoring of project progress	D	4	L
Change of major stakeholder, e.g. Minister	Additional resources are required to ensure briefing papers are up to date and prepared		C	3	M	N	Ensure briefing papers are up to date and prepared, ensure project records are up to date and available			
Waive of tender processes for monitoring and seed sediment delivery components are challenged	Project probity is questioned, delay in implementation	Work with CLLMM Procurement team	D	4	L	Y				
High water levels in Coorong at planting time	Inability to translocate beyond 30cm deep for contractor safety	Flexible with site plans, eg work with project manager to cover wider area across higher patches and/or increase density of seed treatment. Also consider phasing and storing seed across project years.	B	3	H	N		B	4	M
Ngarrindjeri Heritage and Native Title approval is delayed	Delay in project implementation, strain on relationship with Ngarrindjeri	Begin approvals process as soon as possible, NRA updated and involved. Use Ngopamuldi and NRC contractors for key delivery components	C	3	M	N	Track approvals process, ensure NRA have all the necessary project information to provide the approval			

Risk Issue	Impact	Current/Actual				Proposed (If current Residual Risk is unacceptable)				
		Existing Controls	Likelihood	Consequence	Residual Risk	Acceptable?	Mitigation (Controls/Treatments)	Likelihood	Consequence	Residual Risk
Germination success rate is poor	Inability to achieve project objective of maximising ecological objectives	Use compliance monitoring to learn from initial year and improve subsequent year delivery approach, density, depths planted etc.	C	2	H	N	Work with Cultural Rangers and local residents to assist with community monitoring of site to advise project officer of changes and enable fast response.	C	3	M
Herbivory from Swans on germinates is high	Inability to achieve project objective of maximising ecological objectives	Reserve some budget for bird netting and stakes which can be erected as small exclusion zones at translocated sites.	C	2	H	N	Work with Cultural Rangers and local residents to assist with community monitoring of site to advise project officer of changes and enable fast response.	C	3	M
Impact of filamentous green algae on germinates is high	Inability to achieve project objective of maximising ecological objectives	Reserve some project budget for porous screens and stakes which can create an algae buffer and/or gently sweeping the Ruppia to clear off excess algae.	C	2	H	N	Work with Cultural Rangers and local residents to assist with community monitoring of site to advise project officer of changes and enable fast response.	C	3	M

Definitions

Risk Management – The systematic application of management policies, procedures and practices to the tasks of identifying, analysing, assessing, treating and monitoring risk.

Risk Assessment - A process that assigns a probability of occurrence and severity of consequence to a project risk.

Project Risk - A characteristic of a specific project, a circumstance of the project, or a feature of its environment that is recognized to have a potentially adverse effect on the project or the quality of its deliverables. A risk factor can be viewed from two dimensions – risk probability and risk severity. Risk probability is the estimated likelihood that a certain risk will occur during the project. If the risk occurs, risk severity is an estimate of the extent of its negative impact on the project.

Risk Factor - A characteristic of a project that is recognized to have a potentially adverse effect on the project or the quality of its deliverables.

Risk Management Strategy - A means of minimizing the likelihood and impact of a known risk factor on the project. Risk management strategies are preventive and proactive actions by the Project Manager.

Contingent Action - A pre-planned response designed to minimize or eliminate the impact of a risk on the project should it occur. Contingent actions are reactive responses to project risks.

10.9 Residents Letter Advising Ruppia Translocation Work



Government of South Australia

Department of Environment,
Water and Natural Resources

DENR 298/0896

3 February 2014

Coorong, Lower Lakes,
Murray Mouth Program

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Dear Coorong South Lagoon Resident

The Department of Environment, Water and Natural Resources' has commenced work to repopulate the seagrass *Ruppia tuberosa* in the Coorong's South Lagoon.

This aquatic plant is a vital part of the Coorong's ecosystem, as it provides habitat and food for invertebrates and native fish species, and food for migratory waterbirds.

As many of you would be aware, inadequate flows of fresh water to the region – especially during the recent drought – wiped out much of the *Ruppia* in the South Lagoon.

As part of the *Ruppia* Translocation Project, multiple sites along the eastern shore will be spread with sediment containing *Ruppia* seeds that has been collected and bagged at Lake Cantara, in the Coorong National Park.

The bags of sediment delivered to the area will be stored at the end of tracks close to the mudflat. From early March, workers will plant the sediment. Vehicles similar to a golf buggy will be used to move the bags of sediment.

Sites have been selected for translocation because of suitable soil and slope, which are favourable *Ruppia* growing conditions. You may have noticed that some *Ruppia* has reappeared naturally in the area, highlighting its excellent potential for repopulation.

While this natural return is excellent, it will still take some time for a suitable seed bank to be replenished, so that the plant can survive and respond quickly to future droughts. All sites to be treated were measured in January and confirmed that seed bank is still very low.

The project should help to increase *Ruppia* populations in the South Lagoon during winter, and in turn increase habitat and food sources for the region's bird, fish, and invertebrate species.

If you'd like more information about the *Ruppia* Translocation Project, please contact Kat Ryan (08 8204 9126) katherine.ryan2@sa.gov.au at the CLLMM Recovery Project.

Yours sincerely

Ruppia Translocation Project Team