

Coastal Acid Sulfate Soils Program (CASSP) Milestone Report: 30th July 2001.

Project title: Demonstrating amelioration of Acid Sulfate Soils, Barker Inlet / Gillman area, South Australia

Funding agency: Environment Australia's Coastal Acid Sulfate Soils Program (CASSP).

Project Manager: Ms Shanti Ditter.

Project Steering committee: The Barker Inlet and Port Estuary Committee (BIPEC) – Contact/secretary Harry Pitrans.

Project duration: 1st January 2001 to 31st December 2002.

Due date for milestone report: 30th July, 2001.

Project Consortium: Port Adelaide Enfield Council, CSIRO Land & Water, Land Management Corporation, Penrice Soda Products, Department of Environment and Heritage, Salisbury Council, Torrens Catchment Water Management Board, Northern Adelaide & Barossa Catchment Water Management Board and the St Kilda Mangrove Trail & Interpretative Centre.

Research officer: Dr Rob Fitzpatrick (CSIRO Land & Water).

Appointments: PhD student/ project officer, Mr Brett Thomas.

Project objectives:

- quantify the biogeochemical and physical processes in various acid sulfate soils and construct a series of conceptual models, which will point to options to better manage ASS in the Barker Inlet/Gillman area,
- develop and trial a series of innovative remediation techniques such as bioremediation, liming using waste by-products and sea water flushing,
- publish recommended remediation techniques and applicability to potential landuses,
- participate in holding field days,
- produce educational materials (St Kilda Mangrove Trail & Interpretative Centre),
- present findings at national scientific meetings, and report work in peer-reviewed literature,
- develop a set of ASS planning policies at local government level (for Port Adelaide Enfield Council, Salisbury Council, Torrens Catchment Water Management Board and Northern Adelaide & Barossa Catchment Water Management SA.).

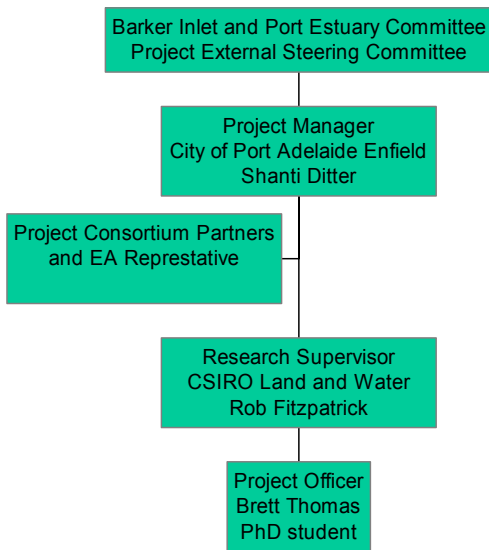
Achievement criteria for milestone report due 30th July 2001:

- 1.1 Establish steering committee and confirm roles.
- 1.2 Review literature on ASS at the Project area.
- 1.3 Undertake site characterization and identify suitable experimental trial sites.
- 1.4 Review all possible suitable rehabilitation management techniques.
- 1.5 Prepare equipment for experiment technique trials.
- 1.6 Develop detailed proposals for remediation trials: experimental aims and designs for the proposed workshop in November.

1.1 Establish steering committee and confirm roles

The Barker Inlet and Port Estuary Committee (BIPEC) (contact/Secretary: Mr Harry Pitrans) was established as the external steering committee.

The following diagram illustrates the various roles of committees overseeing the CASSP project entitled: "Demonstrating amelioration of Acid Sulfate Soils, Barker Inlet / Gillman area, South Australia":



All meetings will be attended by each of the consortium partners, a representative from EA (i.e. Trevor Costa will attend if available - agenda's, minutes will be mailed) and BIPEC will be represented. The consortium consists of: Port Adelaide Enfield Council (Shanti Ditter - Project Manager), CSIRO Land & Water (Rob Fitzpatrick - Research supervisor and Brett Thomas - Project officer and PhD student), Land Management Corporation, Penrice Soda Products, Department of Environment and Heritage, Salisbury Council, Torrens Catchment Water Management Board, Northern Adelaide & Barossa Catchment Water Management Board and the St Kilda Mangrove Trail & Interpretative Centre. Appendix D (minutes of meetings) lists all consortium contact details. Mr Harry Pitrans, who is secretary of BIPEC (The Barker Inlet and Port Estuary Committee) and also represents the Salisbury Council attends our meetings and reports to BIPEC (external steering committee). We communicate to BIPEC on a regular basis through reports (see Appendix A), talks and minutes. Report and media release summarising progress was presented to BIPEC on 11th July 2001 (**Appendix A**).

Roles of members of the steering committee are given in Table 1. The main objective of the steering committee is to provide direction with respect to obtaining the planned outcomes. It also provides a platform upon which technical advice can be transferred to the represented councils and companies.

1.2 *Review literature on ASS at the Project area.*

A literature review on ASS within the project area has been completed (**Appendix B**) and will be published as a CSIRO Land & Water Technical Report. This document will be readily available on the CSIRO Land & Water web site.

1.3 *Undertake site characterization and identify suitable experimental trial sites/Preparation of equipment for experiments*

The lack of detailed information on ASS in the Gillman area prompted a characterisation and mapping initiative by the technical CSIRO Land & Water Acid Sulfate Soil investigation team. The intention of this survey was to determine the extent of the deposition of ASS deposits in the small geographic area of Gillman, based on:

- Preparing a brief field trip guide using limited previous information (**Appendix C**),

- Conducting three field trips with key members of the consortium and the National Coastal Acid Sulfate Soils committee who met in Adelaide in November 2000 to gain ideas and feedback (**Appendix C** used as handouts),
- Holding regular monthly meetings with members of the consortium and committees overseeing CASSP project as well as stakeholders (see **Appendix D** with minutes kept).
- Obtaining a series of digital aerial orthophotographs and point information of the Gillman area from the GIS group in Port Adelaide Enfield Council.
- Developing a preliminary land characterisation assessment of the Gillman area from the orthophotography and field studies.
- Interpreting all previous reports and publications, which had relevance to ASS (see literature review in Appendix B) e.g. soils, geological, vegetation, hydrological, and water quality data.
- Conducting some preliminary core sampling to try to optimise approaches to sampling for site characterisation (**Appendix E**).
- Constructing an indicative ASS map, which broadly flags ASS areas occurring in the Gillman area (**Appendix E**).

Findings from the preliminary data gathered has been summarised and presented in the form of:

- A preliminary ASS map of the area (**Appendix E**).
- Transect diagram, illustrating the depth of ASS and the wide variety of soils encountered (**Appendix E**).

A contrasting range of ASS and related soils was encountered in this relatively small geographic area because of the complex geomorphic framework, disturbed or drained areas; and different vegetation and landuses (**Appendix E**).

1.4 Review all possible suitable rehabilitation management methods

We have compiled a comprehensive review of all possible suitable rehabilitation management methods that could be conducted in the project area (**Appendix F**). This report was compiled with prior knowledge of the preferred landuse of the area gained after consultation with members of the consortium and other stakeholders. It is intended that this information, together with further investigations, will be used to design and develop the final proposals (including detailed experimental designs) for the remediation trials, which will be presented and discussed at a proposed workshop in November 2001. Consequently, not all the possible proposed methods discussed in **Appendix E** will be trialed.

Based on the literature review (**Appendix B**) and compilation of a preliminary ASS map of the Gillman area (**Appendix E**), we have identified several types of ASS soils in the study area. This information has been used to select key sites in the Gillman area and St. Kilda area (Mangrove walk) that most typify this range of ASS (e.g. paired sites that are associated with mangrove swamps and drained areas with different geochemistry). The paired site approach will be used to sample, monitor and verify the biogeochemical and physical soil changes that occur when PASS is drained or disturbed. The selected ASS monitoring sites will encompass typical ASS for the area, and represent typical land use/land management categories as shown in the "Preliminary Land Characterisation Map" (Figure 6 in **Appendix E**). At each selected site very detailed field investigations will be conducted to characterise the soils using backhoe pits or hand/mechanical augering as well the land use, geomorphology, geology, hydrology and vegetation.

1.5 Prepare equipment for experiment technique trials

1.6 Develop detailed proposals for remediation trials: experimental aims and designs for the proposed workshop in November.

As outlined in **Appendix F**, a wide range of laboratory analyses and field monitoring measurements will be conducted in typical soils and land use/land management categories demarcated in the Gillman area (i.e. in each map unit shown in the "Preliminary Land

Characterisation Map" shown in Figure 6, **Appendix E**) and at St. Kilda mangrove walk area (e.g. paired sites in mangrove, samphire and drained/ bunded areas). The following soil analyses will be conducted: Soil chemical (e.g. pH, Eh, EC, TAA, TSA, TPA, Chromium reducible sulfur, total carbon, SAR and redox potential, as appropriate), physical (e.g. bulk density, soil water characteristics and hydraulic conductivity), mineralogical (e.g. salt type, layer silicates, sand size and heavy minerals), geochemical (major and trace elements, isotopes) and biology (microbes, vegetation). Field monitoring will include depth to water table, bulk density, pH, Eh and depth to ASS/PASS measurements. The status of preparing and acquiring equipment is as follows: (i) already acquired and assembled (total carbon, pH, EC, TAA, TSA, TPA, XRD, XRF, ICP etc.), (ii) currently being built (Eh electrodes and data loggers, water samplers and piezometers) and (iii) currently being purchased (Eh dataloggers and Chromium reducible sulfur for pyrite determination).

The information gained from acquiring and interpreting data will be used to construct a series of conceptual process models, which will explain the sequence of changes that can occur in each ASS type (Figure 6 in **Appendix E**), to **point to optimum approaches to remediation**. The final report will contain a series of such case studies for each trial site.

Communication

Activities have included the following:

- Regular local operating group meetings (**Appendix B**), and reporting to the high-level the Steering Committee (BIPEC) (**Appendix A**).
- Prepared DRAFT media release, which was discussed and approved by members of the consortium and BIPEC (**Appendix A**). Amended and approved media release (**Appendix H**) through LMC by Minister's Armitage's office (Department of Environment & Heritage, South Australia).
- Government (**Appendix A**), and will be released in the first week of August, 2001.
- Organised and held several project planning meetings and field trips (**Appendix D**).
- Published a popular article in Ecos (March 2001) (**Appendix G**).
- Supplied written information, gained from NatCASS in the form of pamphlets and booklets about ASS, to the communication/education Co-ordinator (Mr Steve Vines) at the St Kilda Mangrove Walk
- Erected two EA signage boards at the St Kilda Mangrove Trail & Interpretative Centre and at the Gillman site.
- Numerous other briefings.

Variations required to future milestones

None

Human Resource Issues

Appointment of PhD student/ project officer, Mr Brett Thomas.

List of Appendices

Appendix A: Report to BIPEC meeting, 11th July 2001 by Rob Fitzpatrick.

Appendix B: Literature Review of Acid Sulfate Soils and the environment in the Barker Inlet/ Gillman area by Brett Thomas, Rob Fitzpatrick and Richard Merry.

Appendix C: Field trip guide to suitable areas for demonstrating amelioration of Acid Sulfate Soils in the Barker Inlet/ Gillman area by Rob Fitzpatrick.

Appendix D: Minutes to CASSP consortium meetings by Brett Thomas and Shanti Ditter.

Appendix E: Preliminary characterization of Acid Sulfate Soils in part of the Barker Inlet/ Gillman area by Rob Fitzpatrick, Brett Thomas and Phil Davies.

Appendix F: Review of possible suitable rehabilitation management methods applicable to ameliorate Acid Sulfate Soils in the Barker Inlet/ Gillman area by Warren Hicks, Brett Thomas, Rob Fitzpatrick and Richard Merry.

Appendix G: Articles published during this reporting period by Rob Fitzpatrick.

Appendix H: Press Release - approved by Minister's Armitage's office (Department of Environment & Heritage, South Australia).

Table 1: Roles of members of the steering committee
1.1 Activities and milestone

Committee Member (Alternate staff member)	Representative	Role
Port Adelaide Enfield Council.	<p>Ms Shanti Ditter Policy Planner City of Port Adelaide Enfield 163 St Vincent St. Port Adelaide, SA PO Box 110 Port Adelaide SA 5015 Tel: (08) 8405 6727 Mob: 0404 035 784 Fax: (08) 8405 6666 Email: sditter@portenf.sa.gov.au</p>	<ul style="list-style-type: none"> • Project Manager • Attend meetings • Policy developer • Liaise with GIS staff and supply data
Port Adelaide Enfield Council.	<p>Gary Baker City of Port Adelaide Enfield 163 St Vincent St. Port Adelaide, SA PO Box 110 Port Adelaide SA 5015 Tel: (08) 8405 6745 Fax: (08) 8405 6666 Email: gbaker@portenf.sa.gov.au</p>	<ul style="list-style-type: none"> • Attend meetings • Supply engineering information • Assist in engineering / earthworks • Supply earthwork infrastructure and staff
Port Adelaide Enfield Council.	<p>Andrew Cowley City of Port Adelaide Enfield 163 St Vincent St. Port Adelaide, SA PO Box 110 Port Adelaide SA 5015 Tel: 0471 820 673 Fax: (08) 8405 6666 Email: acowley@portenf.sa.gov.au</p>	<ul style="list-style-type: none"> • Attend meetings • Supply field knowledge for wetlands and Gillman site general • Assist with the understanding of function and efficiency of the windmills and tidal gates
Environmental Scientist Delta Environmental Consulting	<p>Peri Coleman Environmental Scientist Delta Environmental Consulting C/o Penrice Soda Products Pty Ltd. Magazine Rd Dry Creek, SA. Tel: (08) 8280 5910 Mobile: 0412 077 685 Email: peri@deltaenvironmental.com.au</p>	<ul style="list-style-type: none"> • Contact for Penrice Soda Products P/L • Attend meetings • Supply information and literature on Gillman, St Kilda, Saltfields, and wetland ecology and environments • Collaborate with monitoring experiments at St Kilda mangroves
Penrice Soda Products Pty Ltd.	<p>Alistair McLachlan Saltfields and Purchasing Manager Solvay Rd. Osborne, SA 5017 Tel: (08) 8402 7248 Fax: (08) 8402 7269 Mobile: 0417 881 201 Email: abm@penrice.com.au</p>	<ul style="list-style-type: none"> • Contact for Penrice Soda Products P/L • Attend meetings • Provide access to Penrice land • Supply liming materials (Penrice Product) • Supply chemical analysis of Penrice Product

Land Management Corporation.	<p>Stuart Taylor Senior Project Manager-Environmental Level 8 North Riverside Centre North Terrace, Adelaide, SA 5000 GPO Box 698 Adelaide, SA 5001 Tel: (08) 8207 0801 Fax: (08) 8207 0830 Mobile: 0413 054 109 Email: taylor.stuart@lmc.sa.gov.au</p>	<ul style="list-style-type: none"> • Contact for Land Management Corporation • Attend meetings • Supply access to LMC land • Supply LMC reports • Inform on the possible future land uses for the study site
Manager Infrastructure Planning City of Salisbury & BIPEC Executive Officer.	<p>.Harry Pitrans (BIPEC Executive Officer Manager Infrastructure Planning City of Salisbury. 12 James St. Salisbury, SA 5108 Tel: (08) 8406 8205 Fax: (08) 8406 8324 Mobile: 040 1984 799 Email: hpitrans@salisbury.sa.gov.au</p>	<ul style="list-style-type: none"> • Representative for the Salisbury Council • Attend meetings • BIPEC liaison • Supply information and access to the St Kilda Mangrove Centre
Torrens Catchment Water Management Board.	<p>Keith Downard Technical Manager Torrens Catchment Water Management Board. 4 Greenhill Rd, Wayville, SA 5034 Tel: (08) 8271 9190 Mobile: 0417 818 623 Email: kdownard@cwmb.sa.gov.au</p>	<ul style="list-style-type: none"> • Contact for Torrens Catchment Water Management Board • Supply information on the functioning, engineering and infrastructure of the Barker Inlet Wetlands
Environment Australia	<p>Trevor Costa CASSP coordinator Department of the Environment PO Box 787 Canberra ACT 2601 Tel: (02) 62741030 Email: trevor.costa@ea.gov.au</p>	<ul style="list-style-type: none"> • Contact for Environment Australia • Attend meetings when available or required • Manage the contract with PAEC • ensuring milestones are met in timely fashion (oversee project progress) • Provide project funding
St Kilda Mangrove Trail and Interpretive Centre	<p>Steve Vines St Kilda Mangrove Trail and Interpretive Centre RSD Mangrove St St Kilda SA 5110 Tel: (08) 8280 8172 Email: mangrove@bigpond.com</p>	<ul style="list-style-type: none"> • Provide access to the St Kilda mangrove experiment sites • Supply literature • Distribute information on ASS and the CASSP project to the public • Pamphlets provided by Brett
Office of Coast and Marine Dept. of Environment & Heritage	<p>Doug Fotheringham Dept. of Environment & Heritage SA Water House, 77 Grenfell St. 6th flr Adelaide, SA Tel: (08) 82070825 Email: fotheringham.doug@saugov.sa.gov.au</p>	<ul style="list-style-type: none"> • Contact for the DE&H • Attend meetings • Supply vegetation survey information • Supply aerial historical photographs

CSIRO Land & Water	<p>Robert Fitzpatrick Affiliate Senior Lecture in Dept. Soil and Water CSIRO Land & Water Adelaide Laboratories Waite Rd, Urrbrae, SA PMB No. 2, Glen Osmond, SA 5064 Tel: (08) 8303 8511 Fax: (08) 8303 8550 Mobile: 040 882 4215 Email: rob.fitzpatrick@adl.clw.csiro.au</p>	<ul style="list-style-type: none"> • Lead/ Manage scientific activities • Media outlet • Supervise Brett's PhD project • Pedology (mineralogical processes) • Understanding remediation trials
CSIRO Land & Water/ Adelaide University, Soil and Water	<p>Brett Thomas (PhD student) CSIRO Land & Water Adelaide Laboratories Waite Rd. Urrbrae, SA PMB No. 2, Glen Osmond, SA 5064 Tel: (08) 8303 8482 Fax: (08) 8303 8550 Mobile: 043 8844 298 Email: brett.thomas@adl.clw.csiro.au</p>	<ul style="list-style-type: none"> • Project Officer • Take meeting minutes • Set up pyrite analysis equipment • Underpinning experiments • Drilling, Mapping, Descriptions • Site characterisation • Field monitoring • Install and monitor soil/ water pH and Eh • Soil solutions/ soil chemistry, Mineralogy, Pedology • Reporting, modeling, communicating
(CSIRO Land & Water)	<p>Richard Merry CSIRO Land & Water Adelaide Laboratories Waite Rd, Urrbrae, SA PMB No. 2, Glen Osmond, SA 5064 Tel: (08) 8303 8422 Fax: (08) 8303 8550 Email: richard.merry@adl.clw.csiro.au</p>	<ul style="list-style-type: none"> • Investigate (assisting Brett Thomas) the use of by-product liming materials in ASS management. • Contribute to planning, establishment, monitoring and evaluation of field trials. • Site characterisation • Reporting.
(CSIRO Land & Water)	<p>Warren Hicks Bruce E. Butler Laboratory CSIRO Land & Water GPO Box 1666 Canberra, ACT 2601 Tel: (02) 6246 5949 Fax: (02) 6246 5965 Email: warren.hicks@cbr.clw.csiro.au</p>	<ul style="list-style-type: none"> • Conduct soil chemistry • Geochemistry on soil solutions • Assist with interpretation and analysis
(CSIRO Land & Water) Brisbane	<p>Freeman Cook C/- QDNR, 80 Meiers Rd, Indooroopilly, QLD. 4074 Tel: (07) 3896-9465 Fax: (07) 3896-9591 Email: cookf@dnr.qld.gov.au</p>	<ul style="list-style-type: none"> • Contribute to planning, establishment, monitoring and evaluation of lime field trials. • Advise on soil physical measurements • Advise on soil-water modelling
Northern Adelaide and Barossa Catchment Water Management Board.	<p>Keith Smith Northern Adelaide and Barossa Catchment Water Management Board. 1st floor, 59 Commercial Rd Salisbury SA 5108. Tel: (08) 8285 2033 Mobile: 0412 697 138 Email: ksmith@cwmb.sa.gov.au</p>	<ul style="list-style-type: none"> • Contact for Northern Adelaide and Barossa Catchment Water Management Board • Attend meetings • Supply records of land ownership