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South Australian South East NRM Region Land Use Mapping Project

Project Summary and Accuracy Report

AUGUST 2014

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ENVIRONMENT

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Background

This land use survey has been completed for the Commonwealth Department of Agriculture. The survey was completed following the principles of the Australian Collaborative Land Use and Management Program. The purpose of this document is to detail the assumptions, limitations and outcomes of the survey. For further detailed information about the survey structure please refer to the *"Guidelines for land use mapping in Australia: principles, procedures and definitions – A technical handbook supporting the Australian Collaborative Land Use and Management Program 4th edition, 2011."*

1. Land Use Survey Data Creation

Outlined below is the process and datasets that were utilised to form the basis of the 2014 Landuse dataset.

1.1 Land use dataset

A copy of the 2008 Australian Collaborative Land Use and Management Program (ACLUMP) dataset was sourced from the Department for Environment Water and Natural Resources (DENWR). This dataset formed the basis for the 2014 survey.

The Land Use and Management (ALUM) Version 6 classifications from the 2008 land use dataset were converted to ALUM Version 7 classifications as detailed in the ACLUMP 4th edition 2011 supplied by the Australian Bureau of Agricultural and Resource Economies and Sciences . This included changing all the Irrigated vine fruits 4.4.4 to Irrigated grapes 4.4.5

1.2 Imagery

In order to assist with the desktop component of the survey, high quality aerial imagery was sourced from DENWR. The imagery was flown between January and March 2013 and has a pixel resolution of 50cm. Imagery of this quality allows for the verification and adjustment of features in the Land use dataset at the desktop. It is possible to accurately enter land use variation in the office reducing the number of edits required in the field survey component of the project.

1.3 Background datasets

There were a number of other datasets used as references to assist with the survey they included.

- Forestry Reserves
- Native Vegetation Heritage Agreements
- Wetlands
- Mining and Production Tenements
- PIIMS Registrations
- Aquaculture Leases and Licenses
- Dairy Locations

It was decided to use these datasets as references to assist with the categorizations of land use rather than merging them with the Land use 2014 dataset. Merging the data can cause problems with spatial alignment and also a number of these datasets had not been completely field verified in a recent timeframe. Because of this it was more appropriate to use these datasets in conjunction with the imagery to assist with assigning the most accurate land use for a feature.

2.0 Survey Strategy

Due to the short timeframe for the completion of the project a strategy was required to enable the desktop review and field survey to occur in tandem with each other. Therefore the South East NRM Region was divided into six subregions enabling the desktop process to move forward and deliver sections (regions) out to the field teams upon completion and then move onto the next region. This strategy enabled time efficiency to ensure the project was delivered in time and also reduced the amount of downtime for both the field and desktop teams.

2.1 Desktop Process

Using the imagery captured in January 2013 the desktop analyst using ESRI's ArcGIS software would review every feature in the region from the initial 2014 dataset. Then using the imagery and other reference datasets make a decision on whether the boundary of the feature had changed and if the land use assigned was valid, the analyst would then make changes to the spatial and attribute information if required.

Over the course of the desktop process any spatial alignment issues identified from the 2008 survey were resolved.

Once the desktop review was complete the land use dataset for the region was forwarded to the field teams for the field survey to be conducted.

2.2 Field Survey

The field survey was a comprehensive and time consuming process. It involved teams driving approximately 21,500 kilometers of roads in the region with a mobile device (motion flow) mounted in the vehicle. The motion flow had ESRI's ArcGIS software loaded and was GPS enabled. The GPS tracked the movements of the vehicle in real time allowing the field officer to accurately identify each feature as they passed it. If the map detailed a different land use classification or the area on the ground was different to the map features they were updated as required.

Due to the difficult nature of performing complex edits in the field the Field Officer had the opportunity to record the feature as *"office edit required"* and document the required changed on the Edits Identified for Office Fix form. These forms along with the region dataset were returned to the desktop spatial analyst for review and updating.

3.0 Data Management

Data management was a critical component of the project especially considering that the dataset was divided up into separate sub-regions. An instruction document was created that outlined the process for data upload and download and then the spatial analyst would perform a quality assurance process on each section prior to merging into the final dataset.

3.1 Data Review

On completion of the field survey the dataset was returned to the desktop spatial analyst. Firstly to make the edits identified by the field teams using the Edits Identified for Office Fix forms and secondly to fix any spatial and attribute anomalies which may have been created in the field. All new features created by the field teams were extracted and reviewed for spatial accuracy and validity. This was done by using the imagery as a reference layer and checking alignment. This process was necessary due to the difficult nature of creating complex features on a mobile device in the field.

Before all the regions were merged together it was important to ensure there were no geometry errors in the dataset. ESRI's topology checks were performed over each region, these checks make sure there were no gaps between features and the data set is complete. The topology also ensured that there were no overlapping features and finally all small features or slithers are removed or merged with valid features. Every error that was returned by the topology check was reviewed and a decision made as to how to manage it.

3.2 Data Consolidation

Once the field survey had been completed for every region and the attribute and spatial data had been reviewed and cleaned the data was consolidated. A blank master file geodatabase was created and using ArcGIS's data loader each region was added to the master geodatabase. Once all regions were added a final topology check was performed to ensure the regions were merged correctly.

4.0 Data Validation

The target attribute accuracy of the land use survey is 80 percent. Figure 1 is a map that illustrates the location and class of the randomly selected field validation sites.

4.1 Validation Criteria

The validation process was undertaken as recommended in the Guidelines for land use mapping in Australia: principles, procedures and definitions – 4th edition 2011.

A number of classes were removed from the validation process. The land use for these classes can be reliably determined based on tenure. The following classes were excluded:

- 1.1.0-1.1.7 – Nature conservation
- 1.2.0-1.2.5 – Managed resource protection
- 1.3.0-1.3.4 – Other minimal use
- 5.5.0-5.5.5 – Services
- 5.7.0-5.7.5 – Transport and communication
- 6.1.0-6.1.4 – Lake
- 6.2.0-6.2.3 – Reservoir/dam
- 6.3.0-6.3.3 – River/dam
- 6.4.0-6.4.3 – Channel/aqueduct
- 6.5.0-6.5.4 – Marsh/wetland
- 6.6.0-6.6.3 – Estuary/coastal waters

Using a stratified random sampling strategy from the remaining classes it was identified that 947 features would be validated. These features were randomly selected using an add in for ArcGIS called Sampling Design Tool for ArcGIS which was downloaded from ArcGIS website. The selection was performed as defined in Table 5 within the Guidelines for land use mapping in Australia: principles, procedures and definitions – 4th edition 2011.

4.2 Validation Method

The validation was carried out in a similar fashion to the initial field survey. A team was provided with a mobile device with ESRI's ArcGIS software loaded and a feature class of the randomly selected features requiring validation. The field team visited each of these sites to confirm whether the land use classification applied to it was correct or required adjustment. If the classification was flagged if was incorrect and the correct classification applied.

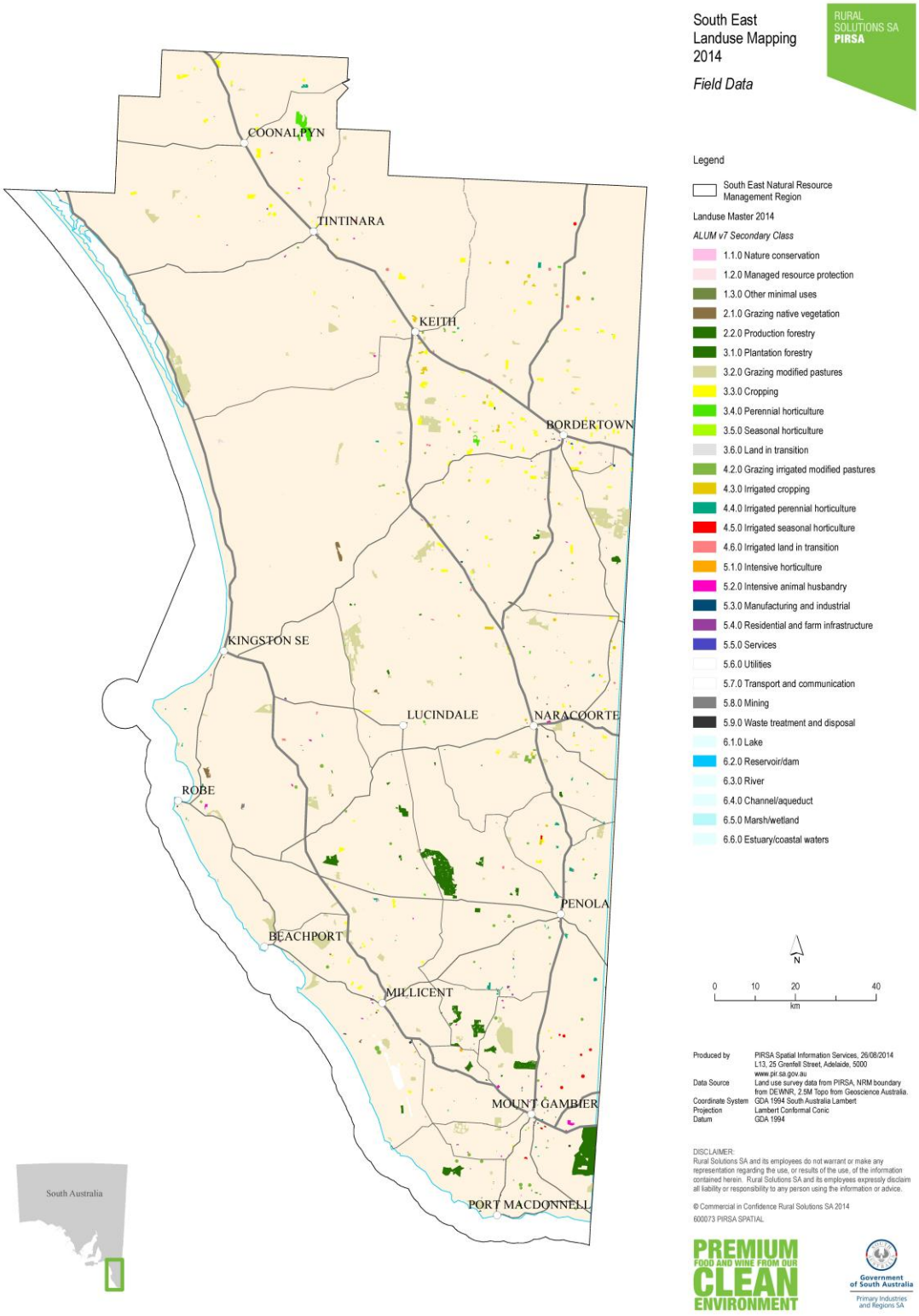


Figure 1: Map showing the location of the Field Validation sites by secondary class level

4.3 Validation Results

The validation survey returned an accuracy rate of 93%. Of the 947 sites surveyed 64 were identified as having the incorrect land use allocation and a different land use category was applied to the site. There are some conditions that apply to this accuracy rate of 93%. There were 40 sites which were unable to be accessed during the validation process due to access issues highlighted previously. If all of these 40 sites were classed as incorrect during the validation survey the effect on the overall final accuracy would have reduced it to an accuracy rate of 89%.

There were also 144 sites that had the land use changed from the secondary to tertiary level within the same class for example 3.2.0 Grazing modified pastures to 3.24 Pasture legume/grass mixtures. Due to the timing of the original survey May/June a tertiary class allocation was not able to be applied with any confidence.

Table 1 shows the error matrix at the secondary level for the validation survey. As discussed above it details the fact all classes were mapped predominately correctly in the Initial desktop and field survey. For example, 77 survey sites were originally identified as *Plantation forestry* the validation survey found 72 points to be mapped correctly while 5 were incorrectly classified 3 being *Production forestry* and the remaining 2 sites Perennial horticulture.

The field validation data was used to update and create the final master dataset. The data has been used to create a South East Landuse map which can be seen in Appendix B.

Table 1: South East Landuse Mapping Field Validation Error Matrix

	1.1.0 Nature conservation	2.1.0 Grazing native vegtation	2.2.0 Production forestry	3.1.0 Plantation Forestry	3.2.0 Grazing modified pastures	3.3.0 Cropping	3.4.0 Perennial horticulture	3.5.0 Seasonal horticulture	3.6.0 Land in transition	4.2.0 Grazing irrigated modified pastures	4.3.0 Irrigated cropping	4.4.0 Irrigated perennial horticulture	4.5.0 Irrigated seasonal horticulture	4.6.0 Irrigated land in transition	5.1.0 Intensive horticulture	5.2.0 Intensive animal husbandry	5.3.0 Manufacturing and industrial	5.4.0 Residential and farm infrastructure	5.5.0 Services	5.6.0 Utilities	5.8.0 Mining	5.9.0 Waste treatment and disposal	6.2.0 Reservoir/dam		Total	Proportion (%)
2.1.0 Grazing native vegetation	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10	1.06%
2.2.0 Production forestry	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		4	0.42%
3.1.0 Plantation forestry	1	0	0	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		73	7.71%
3.2.0 Grazing modified pastures	0	0	0	0	190	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		190	20.06%
3.3.0 Cropping	0	0	0	0	6	135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		141	14.89%
3.4.0 Perennial horticulture	0	0	0	2	1	1	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		22	2.32%
3.5.0 Seasonal horticulture	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5	0.53%
3.6.0 Land in transition	0	0	0	0	1	4	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30	3.17%
4.2.0 Grazing irrigated modified pastures	0	0	0	0	3	0	0	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0		52	5.49%
4.3.0 Irrigated cropping	1	0	0	0	0	0	0	0	0	2	53	0	0	0	0	0	0	0	0	0	0	0	0		56	5.91%
4.4.0 Irrigated perennial horticulture	0	0	0	0	2	0	0	0	0	0	1	51	0	0	0	0	0	0	0	0	0	0	0		54	5.70%
4.5.0 Irrigated seasonal horticulture	0	0	0	0	3	0	0	0	0	0	0	0	13	0	0	0	0	0	1	0	0	0	0		17	1.80%
4.6.0 Irrigated land in transition	0	0	0	0	3	0	0	0	0	2	0	0	0	18	0	0	0	0	0	0	0	0	0		23	2.43%
5.1.0 Intensive horticulture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0		5	0.53%
5.2.0 Intensive animal husbandry	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	41	0	4	1	0	0	0	1		52	5.49%
5.3.0 Manufacturing and industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0		19	2.01%
5.4.0 Residential and farm infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	0	0	0	0	0		95	10.03%
5.6.0 Utilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	30	0	0	0		33	3.48%
5.8.0 Mining	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0		21	2.22%
5.9.0 Waste treatment and disposal	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	1	0	0	40	0		45	4.75%
6.2.0 Reservoir/dam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0.00%
Total	4	10	1	77	214	140	18	4	25	53	54	52	13	18	4	42	19	104	4	30	20	40	1		947	100.00%

5.0 Project Limitations

Below is a summary of the project limitations encountered throughout the project including data, timing, the field survey and then key points for using the data for comparative studies.

5.1 Data

The 2008 land use survey was used as a baseline dataset for this survey. During the desktop component a number of spatial anomalies in the baseline data were identified. These anomalies are the result of a number of factors the main ones being:

Improved Imagery – the imagery used in the 2008 survey may not have been of a sufficient quality to accurately input fence lines and classification changes.

Multiple merged datasets – In 2008 a number of datasets were merged to form the baseline dataset for the survey, these included cadastral, wetlands, remnant native vegetation and forestry data. As a consequence a number of slithers and overlaps occurred it appears not all of these were rectified.

Spatial improved cadastre – Since the 2008 land use survey there has been a State Government program to improve the accuracy of the cadastre across South Australia. There a number of urban areas across the South East were this has occurred. As a consequence there is some variation between the land use survey and the updated cadastre. It has been decided that this shift doesn't compromise the 2014 land use survey and no action was taken to address this variation.

5.2 Timing

Timing of the field work was not ideal as when it was started (12th May 2014) landholders were in the process of seeding their crops or preparing for cropping to begin. It is recommended that timing for field work be incorporated into any future Landuse mapping surveys to ensure that the data captured can be taken with confidence to the tertiary level.

5.3 Field Survey

The field survey was completed using only public roads. The field teams did not have permission to enter private property. There were some occasions where access or a visual inspection of some sites was not possible. In these instances the desktop assigned land use was accepted.

Field teams have approached the survey from an agricultural perspective. A priority has been given to agricultural land use categories. Care should be taken when using Natural Environment classes such as remnant native vegetation and wetlands.

5.4 Comparative Studies

It is important to note a few key point if any comparative studies are undertaken with the 2008 dataset:

1. There has been additional classes added the ALUM Version 7 classifications so when comparing to the Land Use and Management (ALUM) Version 6 classifications applied in 2008 care will need to be taken to take these changes into account as this may skew any statistical results obtained from a comparative study.

2. When compared to the 2008 Landuse dataset this 2014 version has been able to apply more features to the Tertiary level than that of 2008.

6.0 Land Use Classification Assumptions

Below is an outline of some of the assumptions used at the desktop level when applying a selected class to a feature. Not all classes are listed, only those whereby general assumptions were or could be made. Note this only applies to the South East Region – some of these assumptions could be transferred to other regions, but not all.

1.0 Conservation and natural Environments

1.1.0 -1.1.6 Natural conservation

Have been attributed from NPWSA data which already has IUCN data attached. A few Parks have been manually attributed because they were not attributed in the original data.

1.1.7 Other conserved area

Generally Heritage Agreements.

1.2.4 Landscape

Areas of land in between the cadastre and the coastline, or strips of land along the coastline.

1.3.3 Residual native cover

Comes from the SA Vegetation data. Sometimes inconsistent and has areas of paddock trees which shouldn't really be in there.

2.0 Production from Relatively Natural Environments

2.1.0 Grazing native vegetation

Greater than 50 per cent dominant native species. Will generally be found in the pastoral region.

3.0 Production from Dryland Agriculture and Plantations

3.1.4 Environmental forest plantation

Prevention of land degradation, windbreaks, shade and shelter.

3.2.0 Grazing modified pastures

Paddock has lines through the middle, at gates or at water points. Sometimes you can see the stock.

3.2.2 Woody fodder plants

Saltbush etc.

3.3.0 Cropping

You can see cropping lines or a paddock of tall grasses.

3.3.3 Hay and silage

You can see recently cut paddock with bales of hay within the paddock or on the side.

3.6 Land in transition

Burnt off areas.

4.0 Production from Irrigated Agriculture and Plantations

4.2.0 Grazing irrigated modified pastures

Paddock looks very green in comparison to surrounding pastures. Sometimes you can see livestock.

4.3.0 Irrigated cropping

Paddock looks very green in comparison to surrounding pastures. You can see cropping lines or a paddock of tall grasses. ***Centre pivots-*** If there is more than one visible land use type, do not separate them.

4.4.0 Irrigated perennial horticulture

Trees which are square planted are generally olives.

5.0 Intensive Uses

5.3.0 Manufacturing and Industrial

Includes scrap yards.

5.4.1 Urban residential

Shacks can be coded 5.4.0. House blocks in town/vacant urban. Car parks within towns.

5.4.2 Rural residential with agriculture

Hobby farms on the perimeter of towns. Map whole block as 5.4.2 even if partially vegetated. Excludes livestock as pets and gardens.

5.4.3 Rural residential without agriculture

Includes livestock as pets and gardens.

5.4.5 Farm buildings/infrastructure

Houses, building, sheds and other infrastructure associated with farming.

5.6.1 Electricity generation/transmission

Wind farms.

5.7.2 Roads

Have been left as they were.

6.0 Water

6.1.1 Lake -conservation

Lakes within national parks or other conserved areas (1.1.1 - 1.1.7) should be coded separately. This also applies to Rivers, Marsh/wetland and Estuary/coastal waters.

Appendix A: ALUM Version 7 classifications as detailed in the ACLUMP 4th edition 2011 – Highlighting class changes from Version 6 in Red

AUSTRALIAN LAND USE AND MANAGEMENT CLASSIFICATION Version 7 (Revision as at 19 May 2010)

1	Conservation and Natural Environments
1.1.0	**Nature conservation**
1.1.1	Strict nature reserves
1.1.2	Wilderness area
1.1.3	National park
1.1.4	Natural feature protection
1.1.5	Habitat/species management area
1.1.6	Protected landscape
1.1.7	Other conserved area
1.2.0	**Managed resource protection**
1.2.1	Biodiversity
1.2.2	Surface water supply
1.2.3	Groundwater
1.2.4	Landscape
1.2.5	Traditional indigenous uses
1.3.0	**Other minimal use**
1.3.1	Defence land - natural areas
1.3.2	Stock route
1.3.3	Residual native cover
1.3.4	Rehabilitation

minimum level of attribution

2	Production from Relatively Natural Environments
2.1.0	**Grazing native vegetation**
2.2.0	**Production forestry**
2.2.1	Wood production
2.2.2	Other forest production

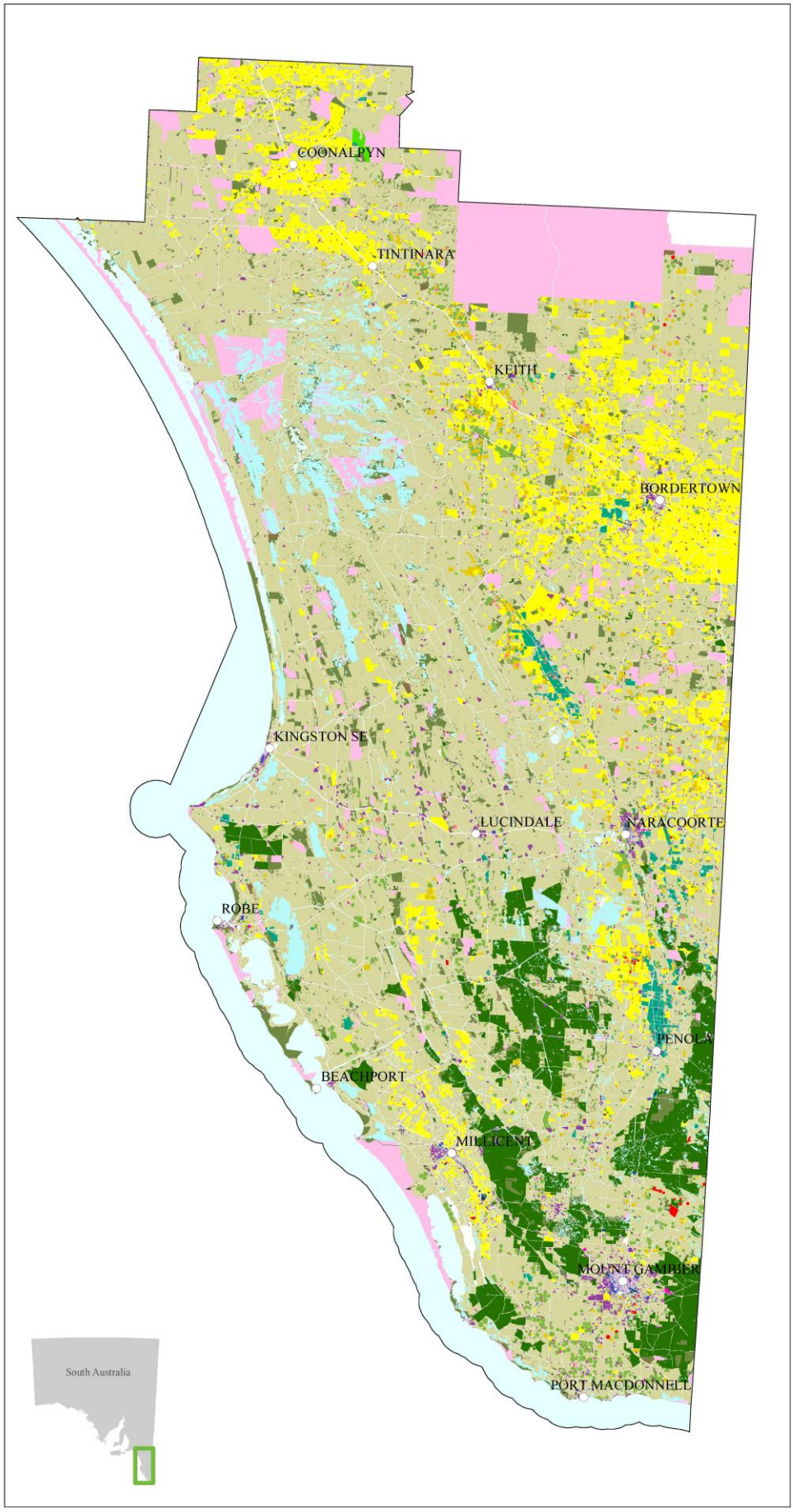
3	Production from Dryland Agriculture and Plantations
3.1.0	**Plantation forestry**
3.1.1	Hardwood plantation
3.1.2	Softwood plantation
3.1.3	Other forest plantation
3.1.4	Environmental forest plantation
3.2.0	**Grazing modified pastures**
3.2.1	Native/exotic pasture mosaic
3.2.2	Woody fodder plants
3.2.3	Pasture legumes
3.2.4	Pasture legume/grass mixtures
3.2.5	Sown grasses
3.3.0	**Cropping**
3.3.1	Cereals
3.3.2	Beverage and spice crops
3.3.3	Hay and silage
3.3.4	Oil seeds
3.3.5	Sugar
3.3.6	Cotton
3.3.7	Alkaloid poppies
3.3.8	Pulses
3.4.0	**Perennial horticulture**
3.4.1	Tree fruits
3.4.2	Oleaginous fruits
3.4.3	Tree nuts
3.4.4	Vine fruits
3.4.5	Shrub nuts, fruits and berries
3.4.6	Perennial flowers and bulbs
3.4.7	Perennial vegetables and herbs
3.4.8	Citrus
3.4.9	Grapes
3.5.0	**Seasonal horticulture**
3.5.1	Seasonal fruits
3.5.2	Seasonal nuts
3.5.3	Seasonal flowers and bulbs
3.5.4	Seasonal vegetables and herbs
3.6.0	**Land in transition**
3.6.1	Degraded land
3.6.2	Abandoned land
3.6.3	Land under rehabilitation
3.6.4	No defined use
3.6.5	Abandoned perennial horticulture

4	Production from Irrigated Agriculture and Plantations
4.1.0	**Irrigated plantation forestry**
4.1.1	Irrigated hardwood plantation
4.1.2	Irrigated softwood plantation
4.1.3	Irrigated other forest plantation
4.1.4	Irrigated environmental forest plantation
4.2.0	**Grazing irrigated modified pastures**
4.2.1	Irrigated woody fodder plants
4.2.2	Irrigated pasture legumes
4.2.3	Irrigated legume/grass mixtures
4.2.4	Irrigated sown grasses
4.3.0	**Irrigated cropping**
4.3.1	Irrigated cereals
4.3.2	Irrigated beverage and spice crops
4.3.3	Irrigated hay and silage
4.3.4	Irrigated oil seeds
4.3.5	Irrigated sugar
4.3.6	Irrigated cotton
4.3.7	Irrigated alkaloid poppies
4.3.8	Irrigated pulses
4.3.9	Irrigated rice
4.4.0	**Irrigated perennial horticulture**
4.4.1	Irrigated tree fruits
4.4.2	Irrigated oleaginous fruits
4.4.3	Irrigated tree nuts
4.4.4	Irrigated vine fruits
4.4.5	Irrigated shrub nuts, fruits and berries
4.4.6	Irrigated perennial flowers and bulbs
4.4.7	Irrigated perennial vegetables and herbs
4.4.8	Irrigated citrus
4.4.9	Irrigated grapes
4.5.0	**Irrigated seasonal horticulture**
4.5.1	Irrigated seasonal fruits
4.5.2	Irrigated seasonal nuts
4.5.3	Irrigated seasonal flowers and bulbs
4.5.4	Irrigated seasonal vegetables and herbs
4.5.5	Irrigated turf farming
4.6.0	**Irrigated land in transition**
4.6.1	Degraded irrigated land
4.6.2	Abandoned irrigated land
4.6.3	Irrigated land under rehabilitation
4.6.4	No defined use (irrigation)
4.6.5	Abandoned irrigated perennial horticulture

5	Intensive Uses
5.1.0	**Intensive horticulture**
5.1.1	Shadehouses
5.1.2	Glasshouses
5.1.3	Glasshouses (hydroponic)
5.1.4	Abandoned intensive horticulture
5.2.0	**Intensive animal husbandry**
5.2.1	Dairy sheds and yards
5.2.2	Cattle feedlots
5.2.3	Sheep feedlots
5.2.4	Poultry farms
5.2.5	Piggeries
5.2.6	Aquaculture
5.2.7	Horse studs
5.2.8	Stockyards/saleyards
5.2.9	Abandoned intensive animal husbandry
5.3.0	**Manufacturing and industrial**
5.3.1	General purpose factory
5.3.2	Food processing factory
5.3.3	Major industrial complex
5.3.4	Bulk grain storage
5.3.5	Abattoirs
5.3.6	Oil refinery
5.3.7	Sawmill
5.3.8	Abandoned manufacturing and industrial
5.4.0	**Residential and farm infrastructure**
5.4.1	Urban residential
5.4.2	Rural residential with agriculture
5.4.3	Rural residential without agriculture
5.4.4	Remote communities
5.4.5	Farm buildings/infrastructure
5.5.0	**Services**
5.5.1	Commercial services
5.5.2	Public services
5.5.3	Recreation and culture
5.5.4	Defence facilities - urban
5.5.5	Research facilities
5.6.0	**Utilities**
5.6.1	Fuel powered electricity generation
5.6.2	Hydro electricity generation
5.6.3	Wind farm electricity generation
5.6.4	Electricity substations and transmission
5.6.5	Gas treatment, storage and transmission
5.6.6	Water extraction and transmission
5.7.0	**Transport and communication**
5.7.1	Airports/aerodromes
5.7.2	Roads
5.7.3	Railways
5.7.4	Ports and water transport
5.7.5	Navigation and communication
5.8.0	**Mining**
5.8.1	Mines
5.8.2	Quarries
5.8.3	Tailings
5.8.4	Extractive industry not in use
5.9.0	**Waste treatment and disposal**
5.9.1	Effluent pond
5.9.2	Landfill
5.9.3	Solid garbage
5.9.4	Incinerators
5.9.5	Sewage/sewerage

6	Water
6.1.0	**Lake**
6.1.1	Lake - conservation
6.1.2	Lake - production
6.1.3	Lake - intensive use
6.1.4	Lake - saline
6.2.0	**Reservoir/dam**
6.2.1	Reservoir
6.2.2	Water storage - intensive use/farm dams
6.2.3	Evaporation basin
6.3.0	**River/dam**
6.3.1	River - conservation
6.3.2	River - production
6.3.3	River - intensive use
6.4.0	**Channel/aqueduct**
6.4.1	Supply channel/aqueduct
6.4.2	Drainage channel/aqueduct
6.4.3	Stormwater
6.5.0	**Marsh/wetland**
6.5.1	Marsh/wetland - conservation
6.5.2	Marsh/wetland - production
6.5.3	Marsh/wetland - intensive use
6.5.4	Marsh/wetland - saline
6.6.0	**Estuary/coastal waters**
6.6.1	Estuary/coastal waters - conservation
6.6.2	Estuary/coastal waters - production
6.6.3	Estuary/coastal waters - intensive use

Appendix B: Final 2014 South East NRM Region Landuse Map



South East Landuse Mapping 2014

Field Data

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Legend

South East Natural Resource Management Region

Landuse Master 2014

ALUM v7 Secondary Class

- 1.1.0 Nature conservation
- 1.2.0 Managed resource protection
- 1.3.0 Other minimal uses
- 2.1.0 Grazing native vegetation
- 2.2.0 Production forestry
- 3.1.0 Plantation forestry
- 3.2.0 Grazing modified pastures
- 3.3.0 Cropping
- 3.4.0 Perennial horticulture
- 3.5.0 Seasonal horticulture
- 3.6.0 Land in transition
- 4.2.0 Grazing irrigated modified pastures
- 4.3.0 Irrigated cropping
- 4.4.0 Irrigated perennial horticulture
- 4.5.0 Irrigated seasonal horticulture
- 4.6.0 Irrigated land in transition
- 5.1.0 Intensive horticulture
- 5.2.0 Intensive animal husbandry
- 5.3.0 Manufacturing and industrial
- 5.4.0 Residential and farm infrastructure
- 5.5.0 Services
- 5.6.0 Utilities
- 5.7.0 Transport and
- 5.8.0 Mining
- 5.9.0 Waste treatment and disposal
- 6.1.0 Lake
- 6.2.0 Reservoir/dam
- 6.3.0 River
- 6.4.0 Channel/aqueduct
- 6.5.0 Marsh/wetland
- 6.6.0 Estuary/coastal waters

N

0 10 20 40
km

Produced by	PIRSA Spatial Information Services, 21/08/2014 L13, 25 Grenfell Street, Adelaide, 5000 www.pir.sa.gov.au
Data Source	Land use survey data from PIRSA, NRM boundary from DEWNR, 2.5M Topo from Geoscience Australia.
Coordinate System	GDA 1994 South Australia Lambert
Projection	Lambert Conformal Conic
Datum	GDA 1994

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