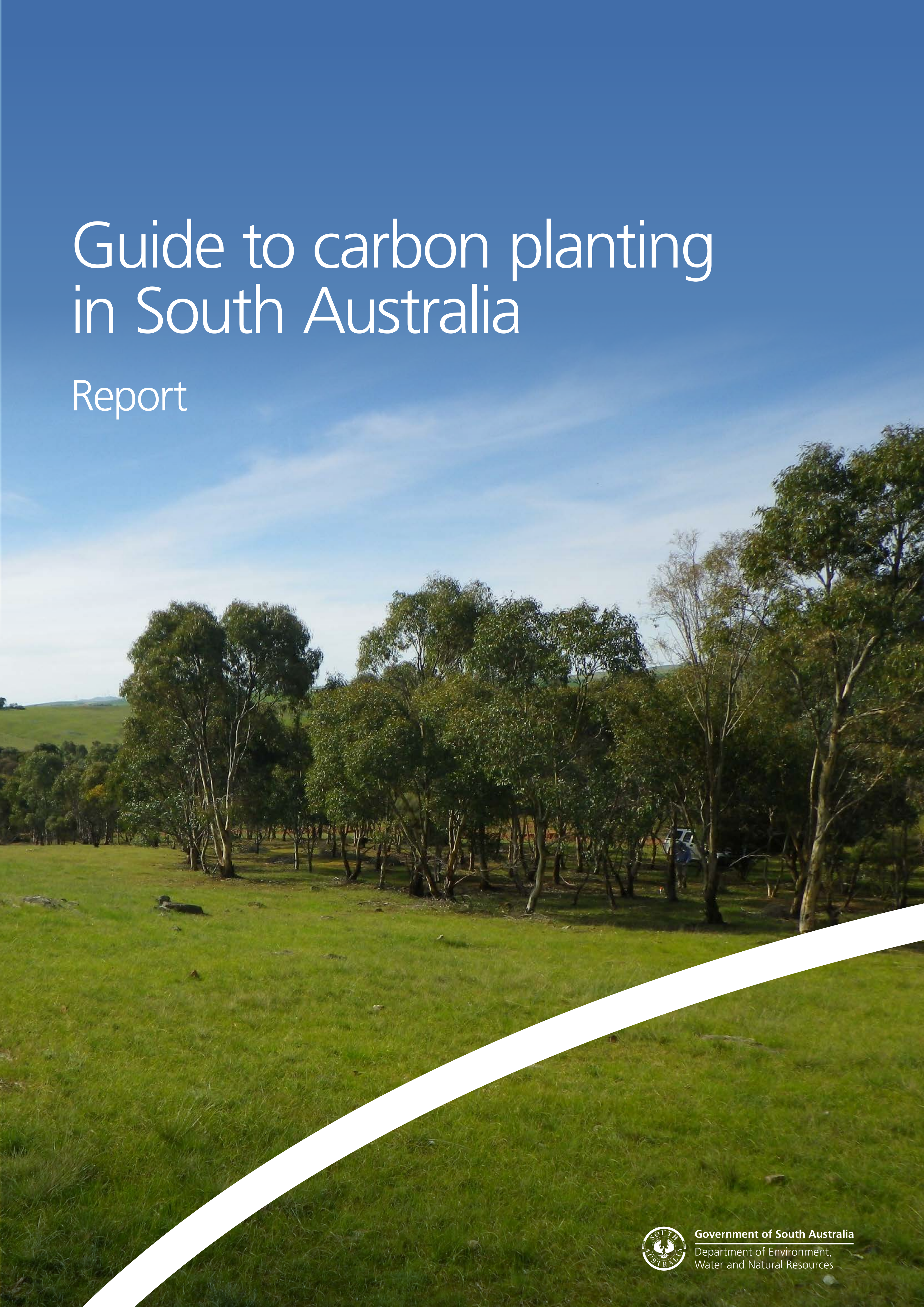
Guide to carbon planting in South Australia

Report



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

Why are carbon plantings created?

The marked global increase in atmospheric greenhouse gases (particularly carbon dioxide and methane) due to human activity has resulted in ongoing changes in climate at global and regional scales. Climate change poses a major threat to Australia's economy, environment and the way our society functions. Climate change mitigation describes a suite of activities that aims to reduce the amount of greenhouse gases being released into our atmosphere. This can be achieved either by reducing emissions at the source, for example phasing out fossil fuels, or by increasing the capacity of carbon sinks, such as planting woody vegetation to sequester or "lock up" carbon dioxide and other greenhouse gases.

A carbon planting is a deliberate planting of vegetation for the purpose of sequestering carbon with the aim of selling this stored carbon as a carbon credit. The sale of carbon credits is achieved through various market-based schemes. Carbon plantings can vary in their intent. A woodlot or monoculture of fast-growing tree species could be planted where the primary aim is to store as much carbon as possible in as short a period of time as possible to maximise returns through carbon financial markets (Figure 1).

In contrast, an environmental planting is a mixed-species planting of native species that could have a primary aim of providing biodiversity benefits, with storing carbon as a secondary objective. Other co-benefits could include providing shelter for stock, minimising erosion, reducing salinity and/or improving water quality – while at the same time potentially boosting income by generating carbon credits.

A carbon planting is a deliberate planting of vegetation for the purpose of sequestering carbon

What is a carbon planting?

We define carbon planting as being permanent, or plantings of a minimum lifespan as defined by an approved Australian Government carbon offset methodology.

This includes all plantings with a commercial component through the sale of carbon credits. It does not include plantings done specifically for environmental or aesthetic values without the sale of carbon credits.

Renewable biomass production for bioenergy (which can also offset carbon emissions) is not in scope for this document, but these industries are likely to follow similar risk and opportunity considerations. Relevant data layers can be provided via the Australian Government Australian Renewable Energy Agency 'Australian Renewable Energy Mapping Infrastructure' (AREMI) at **nationalmap.gov.au/renewables**

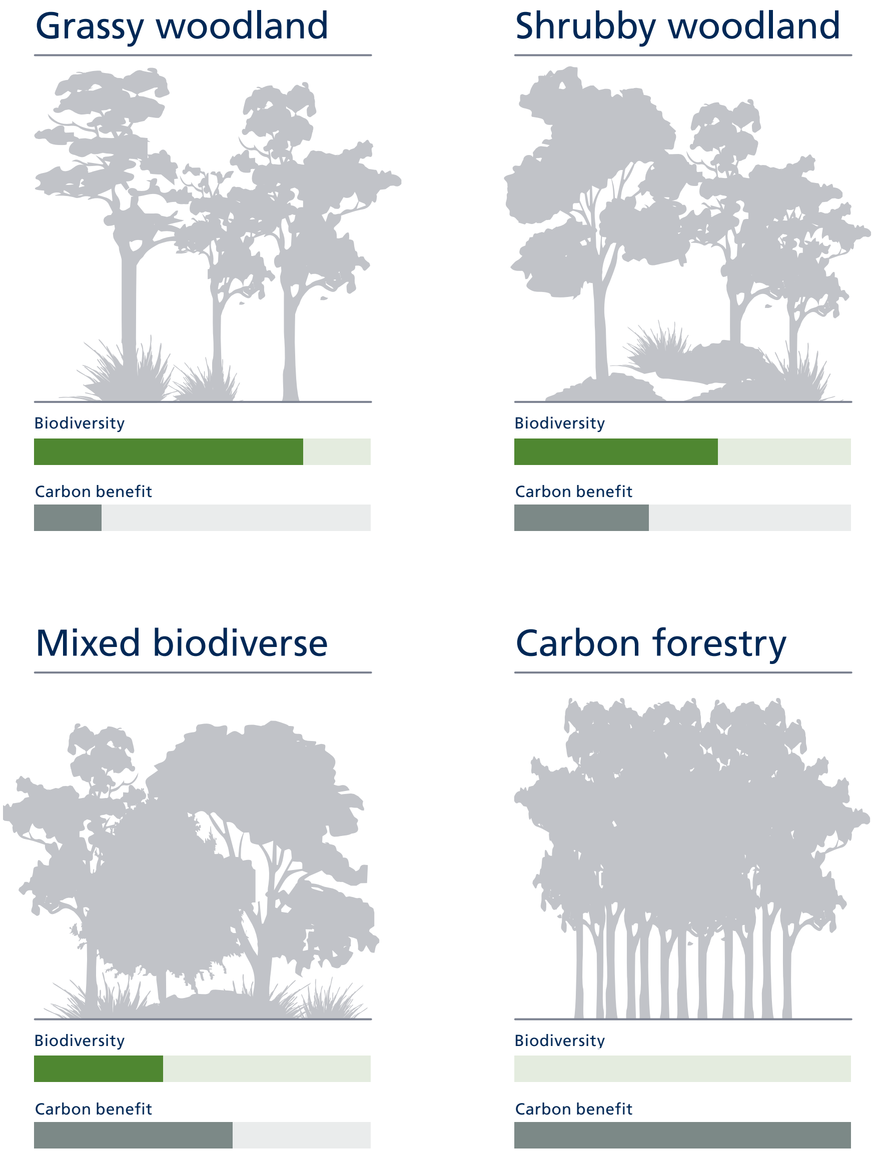


Figure 1. Carbon planting types vary in their biodiversity and carbon benefits

What is the guide to carbon planting in South Australia?

The *Guide to Carbon Planting in South Australia* contains a range of spatial data layers, summary maps and this report. The aim is to provide background information that may help guide decisions by landholders, industry groups, non-government organisations, and others involved with carbon farming (also known as carbon credits or carbon off-setting schemes). These information products provide context to landscape-scale planning and are not intended for use at the local or property-scale.

This report outlines information on the potential environmental risks and opportunities of carbon planting in South Australia. This includes land use policy considerations and how to interpret the provided spatial data layers. It is not intended to inform any financial risk or opportunity.

From here on the term 'risk' is used to describe where carbon plantings may result in a negative biophysical outcome as a consequence of woody vegetation being planted at a given locality (e.g. intercepting groundwater that could be used for irrigation or sustain groundwater-dependent ecosystems). The term 'opportunities' describes where there may be a positive outcome from planting woody vegetation (e.g. when a planting intercepts groundwater and reduces incidences of rising water tables and dryland salinity). Risks and opportunities are highly dependent on the designs of proposed carbon plantings, and in each case further expert advice may be required to evaluate the magnitude of these risks or opportunities.

How does the guide to carbon planting in South Australia help?

The information presented in this package is derived from detailed modelling. It has been compiled to support broad feasibility assessments and as a general introductory guide. While some of the information may be able to inform site location, design and effectiveness, this is not its primary purpose and more detailed assessments are likely to be required.

The information presented in this package is summary in nature. It has been compiled to illustrate geographic variation in issues and some basic scenarios relating to carbon plantings. Because site selection and planting design are constrained by location and the type of outcomes desired (landscape, social, financial), 'optimisation' in planning a carbon planting is informed by a series of decisions. The *Guide to Carbon Planting in South Australia* has been designed as an introduction to inform decisions for carbon plantings in South Australia.

The guide has been developed primarily to inform landscape-scale planning

Landscapes are an area of land containing a group of interacting ecosystems. The area is typically bigger than an individual property holding. While some of the spatial data is at a high resolution (e.g. 1 ha for carbon sequestration potential) generally the data sets are intended to inform landscape-scale decision-making and not individual projects under a carbon mitigation scheme.

The package presents biophysical data only

Biophysical data includes the physical environment (e.g. water availability, soil erosion etc.) and biological activity (e.g. plants). While economic information may be of general interest and would inform cost-benefit analysis on the merits of carbon sequestration compared with agriculture, the purpose of the *Guide to Carbon Planting in South Australia* is not to provide investment advice. Individual project proponents need to consider the business case for a planting on a project-by-project basis, including issues of tenure or native title.

The guide identifies higher and lower opportunity/risk areas for planting instead of 'go' and 'no-go' zones

The *Guide to Carbon Planting in South Australia* identifies areas with higher or lower risk. The principle of identifying higher or lower risk areas does not automatically prohibit plantings in higher risk areas or guarantee beneficial responses in higher opportunity areas. Appropriate species selections, planting designs and placement of new plantings may address potential adverse outcomes and requires careful consideration. The concept of 'go' and 'no go' zones was not in scope for this work as it requires setting criteria in relation to all the factors listed in Table 1. Seeking agreement as to how these criteria should be applied is difficult and likely to vary across the state.

1 Planning a carbon planting

Taking action on the land to store carbon can produce benefits for agricultural productivity, biodiversity and local communities. However, the wrong project in the wrong place could have adverse impacts.

Table 1, (page 6) suggests factors and key questions to:

- consider risks and opportunities
- check eligibility for your project to receive carbon credits
- understand compliance with state planning and environmental legislation and regulations (e.g. water allocation plans, regional NRM plans, environmental protection policies, development planning)
- discuss with relevant authorities.

There is a range of factors that will influence land use in Australia in the future, including climate change, changing demands for food and rising energy prices. Changes in land use will reflect responses to these challenges. For example, shifting from agriculture to plant-based carbon sequestration may make a more profitable alternative land use if rising energy and/or carbon prices respond to market demand. However, improvements in technological progress and how climate influences the agricultural productivity of different land uses will also influence decisions. Essentially, this is similar to any other long-term investment choice, in that a decision will be made based on incomplete information about the future.

Table 1. Summary of the factors, opportunities and risks to consider before commencing a carbon planting

<table>
<tr><th colspan="4">Key considerations</th></tr>
<tr><th>Factors</th><th>Category</th><th>What do you need to consider?</th><th>Key questions</th></tr>
<tr><td>Carbon sequestration</td><td>Opportunity</td><td>Storage of atmospheric carbon dioxide as wood in vegetation.

See spatial data layers of opportunity for carbon sequestration (Table 2).</td><td>Does your planting design maximise the amount of carbon sequestered? For example:
• mix of species
• density of planting
• species selected for location.</td></tr>
<tr><td>Biodiversity</td><td>Opportunity or risk</td><td>Opportunity: Plantings to provide an opportunity to improve biodiversity in a given area.

Risk: Plantings that impact on remnant vegetation.</td><td rowspan="2">Will the planting provide other public or private benefits? For example:
• biodiversity habitat or ecological linkages
• amenity planting
• wind-breaks
• habitat for integrated pest management
• pollination services
• protection of erosion prone soils.</td></tr>
<tr><td>Soil stabilisation</td><td>Opportunity</td><td>Revegetation helps to reduce erosion of soil by water and wind.

See spatial data layer of opportunity for soil stabilisation (Table 2).</td></tr>
<tr><td>Surface water</td><td>Risk</td><td>Plantings can divert rainfall from surface water flows by reducing runoff.

See spatial data layer of surface water interception likelihood (Table 2).</td><td rowspan="2">Does the planting need approval under water related SA legislation? For example:
• water resources (e.g. NRM plan water-affecting activity permit or water allocation Plan requirements through the relevant authority under the NRM Act 2004).</td></tr>
<tr><td>Groundwater</td><td>Opportunity or risk</td><td>Opportunity: Plantings intercept groundwater and reduce incidence of rising water tables and dryland salinity.

Risk: Plantings intercept groundwater resources and reduce water availability for other economic and environmental uses.

See spatial data layer of groundwater interception likelihood (Table 2).</td></tr>
<tr><td>Land use</td><td>Risk</td><td>Plantings can be at odds with land uses preferred in a region as described in relevant development plans

Development plans, see: http://www.sa.gov.au/topics/planning-and-property/development-plans</td><td>Does the planting need approval under any land use related SA legislation? For example:
• development approval for a change in land use (e.g. development approval against the development plan policies)
• vegetation clearance (e.g. Native Vegetation Council)
• irrigating with wastewater (e.g. Environment Protection Authority)
• pastoral lease (e.g. Pastoral Board)
• Native Title.

Refer to Section 4 for further information.</td></tr>
</table>

Key considerations (continued)

Factors	Category	What do you need to consider?	Key questions
Design and methodology	Risk	The *Carbon Credits (Carbon Farming Initiative) Act 2011* establishes over-arching legal framework for issuing Australian carbon credit units in relation to eligible offset projects. Schemes can be established that meet the *Carbon Credits (Carbon Farming Initiative) Act 2011* but the Act can apply additional criteria to different initiatives, depending on their focus. Governments cannot and do not legislate and regulate for every action or possible combination of actions. A carbon planting may carry unacceptable levels of risk of causing harm to other members of the public or the environment.	Does the project meet the criteria of the carbon planting scheme? For example: • basic eligibility, e.g. < 600 mm rainfall • not ineligible ('negative listed') unless exempted refer to the Australian Governments "Carbon Farming Initiative salinity guidelines" for more information • is it consistent with the regional NRM plan • complies with an approved methodology. Can any design and management requirements be met? For example: • setbacks from dwellings, watercourses and power lines • firebreaks and access for fire fighting • weed, pest and disease control.
Agricultural production	Risk	Planting could occur on high value agricultural land limiting production of food and fibre.	What are the trade-offs between different land uses? How much, and what type of land can be set aside for the long-term commitment to a carbon planting?

Note:

1. Carbon planting is a relatively new industry. Existing state legislation and regulation has not fully evolved to address this in a consistent and mature way. This means there may be ambiguity, silence, or inconsistent definitions that cause confusion. We recommend talking to the relevant authorities listed under 'Land use' in Table 1.

2. The information provided is for guidance only, and does not guarantee feasibility of any given project.

Did you know?

- **Carbon plantings in a prescribed area that are equal to or over 20 ha are considered 'commercial forestry' in the *Development Regulations 2008.***
- **Development approval is necessary where there is a change in land use in any area of South Australia unless a local development plan provides different advice or where a permit or a licence is required under the *Natural Resources Management Act 2004.***
- **Approval under the *Native Vegetation Act 1991* is required if the establishment or management of a carbon planting will result in the clearance of native vegetation.**
- **The Pastoral Board approval is required prior to the use of the land on the lease for any other purpose.**
- **Your Natural Resources Centre can provide advice on whether any permits, water licences or water allocations are needed for the establishment of a carbon planting.**

2 Identifying opportunities and risk of carbon plantings

This section discusses the factors and considerations (from the previous section) and how they have been modelled to produce maps of favourable and less favourable conditions for carbon plantings, including how the terms ‘opportunity’ and ‘risk’ apply to the layers provided. Generally the *Guide to Carbon Planting in South Australia* describes ‘opportunity’ to mean favourable conditions and ‘risk’ represents the prospect of less than-favourable-conditions or ‘limitations to a desired outcome’ (this varies from the use of risk to quantify the likelihood and consequences of an action).

2.1 Carbon sequestration potential

There are many spatial data layers that can be generated to describe carbon sequestration potential in South Australia. Sequestration potential is influenced by a number of variables including planting design, age and climate. Sequestration models published in Hobbs et al. 2013 and Hobbs et al. 2016, have been found to more accurately represent carbon sequestration rates observed in South Australia than methodologies using the more generic Full Carbon Accounting Model (FullCAM) as they have limited calibration data for South Australian landscapes.

The sequestration models presented in the *Guide to Carbon Planting in South Australia* (Hobbs et al. 2013) use the following definitions of variables.

1. Planting design – sequestration models are based on three planting designs that broadly match the higher carbon benefit planting types (figure 1):

- Biodiverse planting: aims to provide a greater balance between carbon sequestration and biodiversity benefit and has a lower proportion of trees than traditional planting designs (50% of the planting consists of trees).
- Mixed planting: consists of mixed species with a majority of trees (88% of the planting consists of trees).
- Carbon forestry: assumes the planting is mainly a monoculture designed to maximise the amount of carbon stored and consists only of trees (100% of the planting consists of trees, where a tree is a plant that is at least 2 m high at maturity, consistent with the Kyoto Protocol definition).

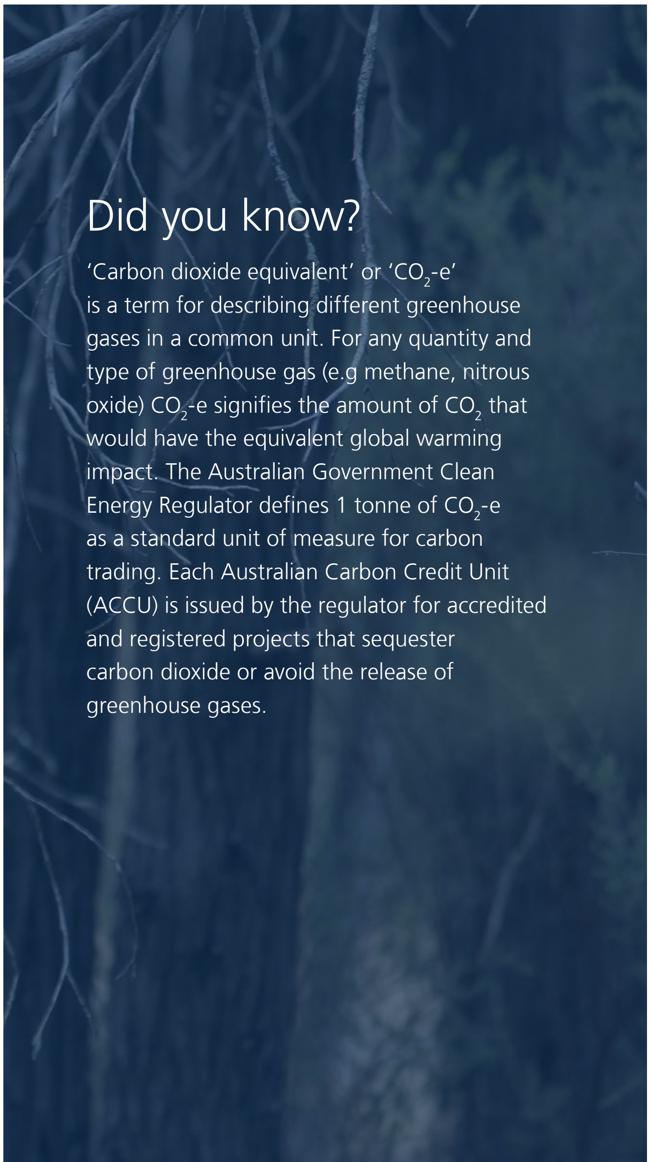
2. Future climate – There are multiple projections of future climate that can be considered, each of which enables different rates of sequestration. Hobbs et al. 2013 considered four future climates based on a range of future emissions scenarios as follows:

- baseline climate from historical weather
- mild climate change (1 °C warmer, 5% drier)
- moderate climate change (2 °C warmer, 15% drier)
- severe climate change (4 °C Warmer, 25% Drier).

3. Timeframe – The amount of carbon stored in vegetation increases through time as the plant grows. Hobbs et al. 2013 considered timeframes of 25, 45 and 65 years. Given that the models used a baseline time period of 1971 to 2005, this equates to 2030, 2050 and 2070.

This combination of variables generates up to 36 potential carbon sequestration scenarios. These scenarios have also been produced for two different outputs: total carbon sequestration rates (kilograms of CO_2-e per year) and plant density (number of trees per hectare).

This generates a total of 72 spatial data layers. For the general purpose of the *Guide to Carbon Planting in South Australia* a subset of these potential scenarios is included (Section 3). Data relating to the full list of scenarios can be provided on request to interested readers with appropriate software. See metadata in the spatial data layers ZIP file.



Did you know?

‘Carbon dioxide equivalent’ or ‘CO_2-e’ is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas (e.g methane, nitrous oxide) CO_2-e signifies the amount of CO_2 that would have the equivalent global warming impact. The Australian Government Clean Energy Regulator defines 1 tonne of CO_2-e as a standard unit of measure for carbon trading. Each Australian Carbon Credit Unit (ACCU) is issued by the regulator for accredited and registered projects that sequester carbon dioxide or avoid the release of greenhouse gases.

2.2 Biodiverse plantings

While carbon forestry and mixed plantings are designed to maximise carbon sequestration by selecting species that will sequester carbon at high rates, biodiverse plantings seek additional biodiversity outcomes through their design. Combined with the climate scenarios, these planting types represent a very broad approach to biodiversity issues in the data package via the carbon sequestration layers (50%, 88%, and 100% tree percentages).

Biodiverse plantings should consider species with local provenance, although this may not be preferred in some circumstances, for example when species tolerant to warmer and drier conditions are selected as a climate change adaptation measure. Regional native species lists have been created from Department of Environment, Water and Natural Resources (DEWNR) biological databases to guide species selections for mixed or biodiverse plantings in each region (Hobbs et al. 2013). Further advice from local ecologists and regional NRM boards should be sought to ensure the most appropriate species selections for different landscapes, soils, climates and outcomes within each region.

DEWNR studies provide the most authoritative source of information on potential sequestration from revegetation in South Australia (Hobbs et al. 2013, Hobbs et al. 2016). These studies aimed to provide reliable techniques and models to assess carbon stocks and sequestration rates from revegetation activities and native plant communities in the agricultural regions of South Australia. The work quantifies the influence of different ecological planting designs (i.e. vegetation structure and plant density) on carbon sequestration rates over different time scales and undera range of climate change scenarios. This work can be consulted for more information regarding extra biodiversity co-benefits relating to:

- tree density which reduce over time
- landscape design which could put patches of woodland/trees into open woodland.

2.3 Soil stabilisation

The removal of native vegetation has exposed many soils in South Australia to increased rates of erosion from water and wind. Revegetation programs are already undertaken across the state as a way to help stabilise soils. Using carbon plantings to help stabilise soil can generate a co-benefit alongside carbon sequestration.

Soils and landscapes with high susceptibility to erosion represent a high opportunity for stabilisation in the context of a carbon planting. By consulting erosion potential maps, appropriate locations to maximise this benefit can be considered. Opportunity areas for soil stabilisation co-benefits from carbon plantings have been derived from SA Digital Soil Mapping in relation to:

- inherent susceptibility to wind erosion
- inherent susceptibility to water erosion.

The data package contains a combined layer of wind and water erosion potential. As they are derived from SA Soil Landscape mapping, the maps are restricted in extent to the Agricultural Zone only (i.e. not the Arid Zone).

Did you know?

Researchers from the Department of Environment, Water and Natural Resources (DEWNR) have spent several years helping support new woody crop species and industries, carbon accounting methodologies and a better understanding of the growth, productivity and carbon sequestration potential of revegetation and farm forestry in southern Australia.

This information, and more, can be found at: **environment.sa.gov.au**

2.4 Surface water

Carbon plantings present a possible risk to surface water flows. Increasing the area of trees in a catchment will intercept rainfall from surface water flows and reduce runoff. At large scales this could impact other water users and water dependent ecosystems. The amount of reduction in runoff is influenced by a combination of factors, including the species of vegetation planted, local climate, soil type and topography (Farley et al. 2005).

It is generally accepted that areas with mean annual rainfall less than 450 mm generate little to no surface water runoff. In contrast, areas of land with greater than 600 mm of rainfall make a greater contribution to surface water flow, depending on soil type and topography (Latcham et al. 2007). It is recognised that using mean annual rainfall isohyets (a line on a map connecting points having the same amount of rainfall in a given period) is a relatively coarse way of assessing likely effects of plantings on surface water runoff, however, this guideline is consistent with the Australian Government's Carbon Farming Initiative, which discourages carbon planting projects from occurring on land in areas with rainfall greater than 600 mm unless certain conditions are met.

Using mean annual rainfall grids (1960-1990), three long-term average annual rainfall categories are identified as risk zones for decreased runoff:

- Rainfall category 1, Low risk – Areas receiving less than 450 mm mean annual rainfall
- Rainfall category 2, Medium risk – Areas receiving greater than 450 mm but less than 600 mm mean and
- Rainfall category 3, High risk – Areas with rainfall greater than 600 mm.

Plantings should not necessarily be excluded on the basis of whether they are located in the high risk category. Instead, consideration may need to be given as to what would be an appropriate type of planting in such a location. This could include a planting with a low density of deep-rooted trees or a dense planting of low-growing, shallow-rooted vegetation. Plantings may also be acceptable on land with low slope that is known to generate little runoff.

Surface water policy related limitations also exist in some parts of South Australia. Plantings may be excluded from some prescribed areas in their entirety whereas other areas may have specific planting rules. Potential limitations should be considered on a locality-by-locality basis through consideration of the relevant regional NRM plan or water allocation plan. See section 4 for further information.

None of the water resource risk maps consider potential changes based on future climate and it is reasonable to expect the rainfall isohyets will change as the regional climate changes in the future. Notably, most of the areas in South Australia where carbon plantings could occur are likely to experience a warmer and drier climate and changed rainfall seasonality (Charles and Fu, 2015), which may result in declining runoff. In contrast, climate change could also increase the frequency and intensity of rainfall, which could increase flood and erosion risks in some catchments. Understanding the full range of runoff impacts of climate change requires further hydrological modelling.

2.5 Groundwater

Trees absorb water from surface sources such as rainfall. They also use groundwater if it is shallow enough to reach the root zone, meaning that carbon plantings may have an impact on groundwater. The deeper the water table below roots, the less likely the tree can access groundwater (Eamus et al. 2006). The point at which trees can no longer access groundwater is known as the extinction depth, and this will vary with soil type, climate and vegetation type.

Modelling has determined where trees are likely to access groundwater in the Adelaide and Mount Lofty, SA Murray-Darling Basin, South East, and Northern and Yorke NRM regions. This modelling has not been carried out for the Kangaroo Island, Eyre Peninsula, SA Arid Lands or Alinytjatjara-Wilurara regions.

Plantings should not necessarily be excluded if they are proposed in an area with a high likelihood of intercepting groundwater. In fact, this may be preferred if there is an intended co-benefit of lowering water tables to address dryland salinity issues. If there is concern about affecting an economically important groundwater resource (e.g. that also supports irrigated agriculture), consideration may need to be given as to what would be an appropriate type of planting in such a location. This could include a planting with a low density of deep-rooted trees or a dense planting of low-growing, shallow-rooted vegetation.

To understand policy issues and any requirements for carbon or commercial forestry plantations with respect to groundwater, consult the relevant water allocation plan or regional NRM plan. See section 4 for further information.

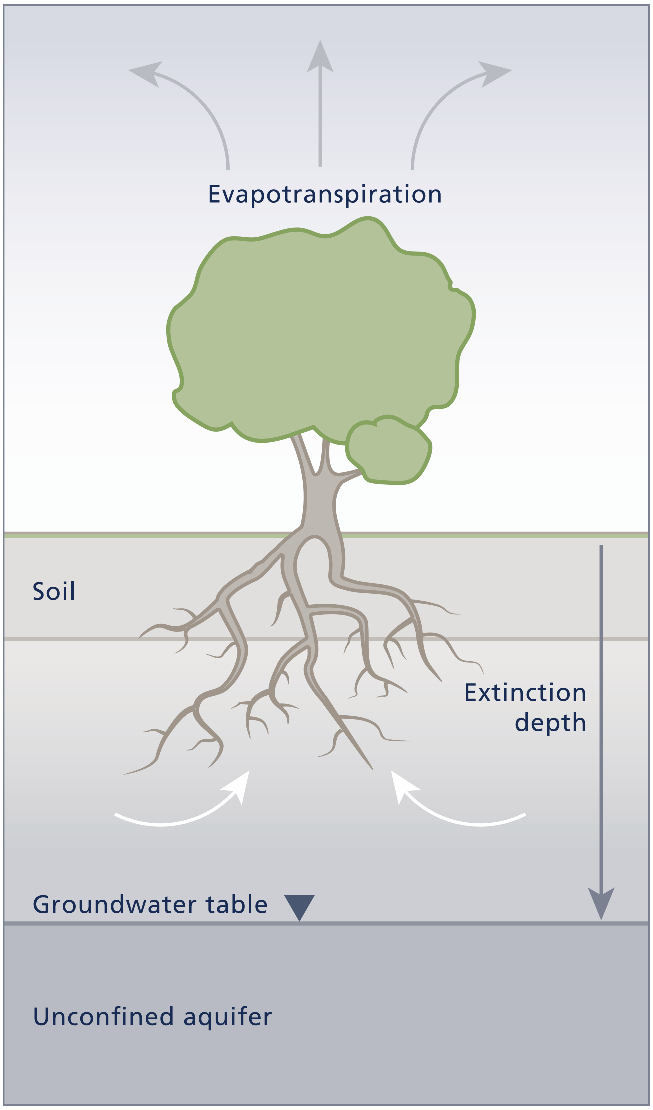


Figure 2. This diagram illustrates extinction depth – that is the depth below ground where plants cannot access groundwater.

3 Maps and data layers

The *Guide to Carbon Planting in South Australia* includes regional maps for each natural resources management region and statewide spatial data layers accompanied by metadata. These represent the issues and models described in Section 2, available at **data.sa.gov.au.**

Table 2 summarises the data layers and modeled scenarios by their themes and provides layer/scenario codes used in the spatial data file names.

3.1 Regional summary maps

Data layers listed in Table 2 under the ‘Baseline to 2030’ climate scenario, have been produced as maps for each natural resources management region. They are available from **data.sa.gov.au.** These maps are accompanied with brief descriptions drawn from this **report**. The purpose of these maps is to display regional data layers to readers without specialist software for displaying spatial data.

3.2 Spatial data layers

Spatial data layers (grids) described in Table 2 are provided in a ZIP file via **data.sa.gov.au.** The files can be viewed in any Geographic Information System (GIS) software platform. The **appendix** lists those layers with more information regarding resolution and units. The ZIP file also contains detailed metadata records including lineage of the layers.

The spatial data layers for the *Guide to Carbon Planting in South Australia* have either a 30 m x 30 m or 90 m x 90 m cell size. The rasters have been compiled with a Lamberts Conformal Conic spatial reference system, GDA94 datum.

Some of the spatial data layers have a statewide extent (carbon sequestration opportunity and surface water layers), while others (wind and water erosion potential and the groundwater layers) are restricted to some or all of the natural resources regions in the SA agricultural zone.

Table 2. Carbon planting in South Australia spatial data layers showing spatial data file codes relating to climate scenarios

Carbon planting spatial data layers				
Theme	**Layer**	**Layer/scenario**		
Carbon sequestration		Climate scenario		
		Historic average	Historic average	4^0 warmer, 25% drier
		Baseline to 2030	Baseline to 2070	Severe to 2070
	Biodiverse planting (50% trees)	BO3_1	BO3_2	BO3_3
	Mixed planting (88% trees)	BO4_1	BO4_2	BO4_3
	Carbon forestry (100%)	BO5_1	BO5_2	BO5_3
Soil stabilisation	Soil erosion susceptibility (southern SA)	BO1		
Surface water	Surface water interception likelihood	BR2		
Groundwater	Groundwater interception likelihood	BR3		

3.3 Metadata

Metadata for the *Guide to Carbon Planting in South Australia* spatial data layers is available from **Location SA metadata System record #1989.**

To better understand technical details and methodology limits of individual spatial data layers, refer to metadata documents contained in the spatial data layers zip files at **data.sa.gov.au.**

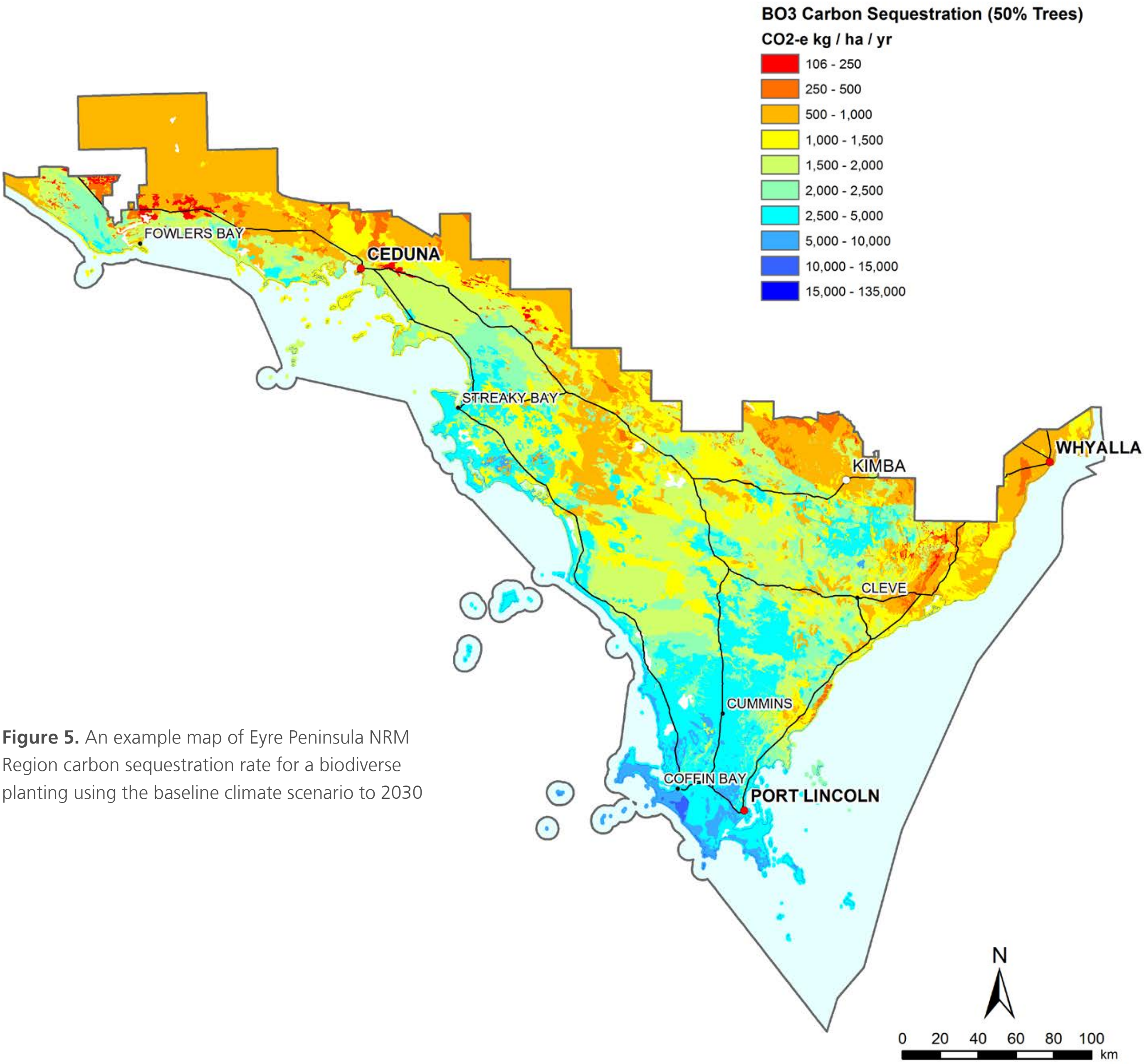


Figure 5. An example map of Eyre Peninsula NRM Region carbon sequestration rate for a biodiverse planting using the baseline climate scenario to 2030

4 Further information

The following web links provide more information on a range of issues that influence carbon plantings in South Australia, including scientific reports, data, strategies, legislation and policy.

Science and data

1. Reports on the science behind carbon from revegetation in South Australia including a carbon sequestration estimation tool can be found here: https://www.environment.sa.gov.au/Science/Science_research/land-condition-sustainable-management/carbon-from-revegetation

   https://data.environment.sa.gov.au/Content/Publications/carbon-sequestration-from-revegetation-estimator-ver.1.1.xlsx

2. Information on potential woodlot species are found in the following FloraSearch reports:

   Developing Species for Woody Biomass Crops in Lower Rainfall Southern Australia - FloraSearch 3a: https://rirdc.infoservices.com.au/items/09-043

   Potential Agroforestry Species and Regional Industries for lower rainfall Southern Australia. FloraSearch 2: https://rirdc.infoservices.com.au/items/07-082

3. The Land Use Trade Off model (LUTO) has been developed by the CSIRO and models carbon payments relative to competing land uses: Australian land-use and sustainability data: 2013 to 2050 can be accessed from: http://doi.org/10.4225/08/5756169E381CC

4. Land use and other map layers can be found in NatureMaps: https://data.environment.sa.gov.au/NatureMaps

5. Projections of future changes in climate in South Australia's NRM regions: https://data.environment.sa.gov.au/Climate/SA-Climate-Ready

Strategies and frameworks

6. South Australia's Climate Change Strategy 2015 - 2050: http://www.environment.sa.gov.au/Science/Science_research/climate-change/climate-change-initiatives-in-south-australia/sa-climate-change-strategy

7. Carbon Neutral Adelaide Action Plan 2016 - 2021: https://www.carbonneutraladelaide.com.au/

8. Australian Government's Carbon Farming Initiative: https://www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/about

9. Natural Resource Management Plans: https://www.environment.sa.gov.au/about-us/our-plans

Regulatory information

10. Local Government: http://www.lga.sa.gov.au/councils

11. Native Vegetation Council: https://www.environment.sa.gov.au/about-us/boards-and-committees/native-vegetation-council

12. Environmental Protection Authority: http://www.epa.sa.gov.au/contact

13. Pastoral Board: http://www.naturalresources.sa.gov.au/aridlands/about-us/pastoral-board/pastoral-unit

14. Regional NRM Boards: https://www.environment.sa.gov.au/about-us/boards-and-committees/natural-resources-management-boards

15. Water Allocation Plans https://www.environment.sa.gov.au/managing-natural-resources/water-resources/planning/water-allocation-plans

5 References

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Appendix

Guide to carbon planting in SA spatial data layers

Theme	Code	Name/description	GIS layer name	Cellsize	Units
Soil Stabilisation	BO1A	Wind Erosion Potential Prediction	BO1_A_DEWNR_EROPOT_WIND_STH_SA_90M	90m	Erosion potential score (0 - 1)
Soil Stabilisation	BO1B	Water Erosion Potential Prediction	BO1_B_DEWNR_EROPOT_WATER_STH_SA_90M	90m	Erosion potential score (0 - 1)
Soil Stabilisation	BO1	Soil Erosion Susceptibility	BO1_DEWNR_EROPOT_WINDWATER_STH_SA_90M	90m	Maximum erosion potential score (0 - 1)
Carbon Sequestration	BO3_1	Biodiverse Planting (50% Trees) Baseline Climate to 2030	BO3_1_DEWNR_CARBON_WTS0C30T50_SA_90M	90m	kg CO2-e / ha / yr
Carbon Sequestration	BO3_2	Biodiverse Planting (50% Trees) Baseline Climate to 2070	BO3_2_DEWNR_CARBON_WTS0C70T50_SA_90M	90m	kg CO2-e / ha / yr
Carbon Sequestration	BO3_3	Biodiverse Planting (50% Trees) Severe Climate to 2070	BO3_3_DEWNR_CARBON_WTS3C70T50_SA_90M	90m	kg CO2-e / ha / yr
Carbon Sequestration	BO4_1	Mixed Planting (88% Trees) Baseline Climate to 2030	BO4_1_DEWNR_CARBON_WTS0C30T88_SA_90M	90m	kg CO2-e / ha / yr
Carbon Sequestration	BO4_2	Mixed Planting (88% Trees) Baseline Climate to 2070	BO4_2_DEWNR_CARBON_WTS0C70T88_SA_90M	90m	kg CO2-e / ha / yr
Carbon Sequestration	BO4_3	Mixed Planting (88% Trees) Severe Climate to 2070	BO4_3_DEWNR_CARBON_WTS3C70T88_SA_90M	90m	kg CO2-e / ha / yr
Carbon Sequestration	BO5_1	Carbon Planting (100% Trees) Baseline Climate to 2030	BO5_1_DEWNR_CARBON_WTS0C30T100_SA_90M	90m	kg CO2-e / ha / yr
Carbon Sequestration	BO5_2	Carbon Planting (100% Trees) Baseline Climate to 2070	BO5_2_DEWNR_CARBON_WTS0C70T100_SA_90M	90m	kg CO2-e / ha / yr
Carbon Sequestration	BO5_3	Carbon Planting (100% Trees) Severe Climate to 2070	BO5_3_DEWNR_CARBON_WTS3C70T100_SA_90M	90m	kg CO2-e / ha / yr
Surface Water	BR2	BOM Mean Annual Rainfall (1960 - 1990)	BR2_BOM_RAIN_MEAN_ANN_SA_30M	30m	mm
Surface Water	BR2	Surface Water Interception Likelihood	BR2_BOM_RAIN_MEAN_ANN_CLASSES_SA_30M	30m	3 classes (High, Moderate, Low)
Groundwater	BR3	Groundwater Interception Likelihood	BR3_DEWNR_GRDWATER_RISK_STH_SA_30M	30m	3 classes (High, Moderate, Low)

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Department of Environment, Water and Natural Resources