



**PPWCMA identification of priorities  
for carbon plantings and protection  
of carbon stores in the Port Phillip &  
Western Port Region**

**June 2016**

## 1 Purpose of this report

This report describes the priorities for carbon planting across the Port Phillip & Western Port region. Carbon planting is the use of revegetation to increase carbon storage in plants and soils.

The report also identifies areas where existing carbon stores in soils and vegetation are significant and their conservation is a high priority.

## 2 Analysis

The PPWCMA has considered eight integrated catchment management factors to set priorities for carbon planting:

1. Biodiversity conservation
2. Private land and productive agriculture
3. Public land area, distribution and uses
4. Environmental risks and community concerns
5. Biolinks and urban forestry
6. RCS directions for 'Nature Links'
7. Mapping environmental asset sensitivity to climate change
8. Mapping areas of carbon sequestration potential

These factors are detailed below:

### 2.1 Biodiversity conservation

Carbon planting solely for its carbon sequestration value is unlikely to be economic. At plausible future carbon prices, few areas will be economically viable for schemes focussed on carbon farming. (See [Southern Slopes Information Portal Report, SCARP, P107](#) or download the document [HERE](#)). Co-benefits in nature conservation will be required. They could include protecting or enhancing high value waterways, wetlands, native vegetation and habitats, coastal ecosystems and agricultural land.

### 2.2 Private land and productive agriculture

Over 4.5 million people live in this region. Much of its private land is highly urbanised or fragmented across thousands of individual owners. These factors make large-scale revegetation dependent on cooperation and shared purpose by many more landholders than in rural regions.

Urbanisation occupies about 20% of the region's land area. This proportion will expand as urban growth occupies designated growth corridors.

The region's Hinterland<sup>1</sup> covers about 670,000 hectares; about 51% of the region. In 2008, the hinterland was held in about 35,000 individual properties<sup>2</sup>. Very few were larger than 1,000ha and 30% of the total were between 40 and 100ha. Properties larger than 1,000ha were generally used for commercial agriculture. None of these were larger than 1,850ha.

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<sup>1</sup> Defined as private rural land zoned 'Green Wedge', 'Rural Living', 'Farming', 'Rural Conservation' or 'Special Use'

<sup>2</sup> Final Report of the Rural Land use and Sustainable Green Wedges project PPWCMA/Dept Agriculture, 2008, pp14-15.

Land used for commercial agriculture in this region is highly productive and large-scale revegetation is not economically attractive. Intensive horticulture, wine-grapes, nursery and flower production make it the most productive agricultural region in Victoria on a gross-income-per-hectare basis.

High land values on non-commercial properties are also a likely barrier to large-scale revegetation. The Mornington Peninsula and Yarra Ranges areas have the highest estimated carbon sequestration potential in the region but, in June 2016, 'hobby farms' under 20ha in these municipalities range in price from \$500,000 to \$2.5million.

### 2.3 Public land area, distribution and uses

Public land occupies only 12% of the 29 municipalities making up the greater metropolitan area<sup>3</sup>. Half of this is held in protected areas (largely Kinglake National Park and Bunyip State Park). About one third is natural and semi-natural areas and about one-fifth in municipal parks, gardens and sporting facilities. Much of the remaining public land is in National and State Parks and State Forest. Opportunities and needs are limited for carbon-planting through revegetation in these areas.

### 2.4 Environmental risks and community concerns

Water production is a major environmental risk identified for extensive carbon plantings. However, the vast majority of this region's water is harvested from forested and closed water supply catchments where the potential for carbon-planting through revegetation is very low.

The localised effects of carbon plantings on farm dams and groundwater supplies will need to be negotiated as required.

Consultations with the PPWCMA's immediate partners and wider community circles show a range of community interests need to be addressed in planning large scale revegetation or carbon planting projects in this region.

- Land speculation
- Development restrictions
- Fire risk
- Private property rights
- Potential damage to indigenous heritage

### 2.5 Biolinks and urban forestry

Many of the region's government and community-based organisations in the greater metropolitan area are planning to improve the connectivity of existing vegetation and/or growing networks of green spaces. Their aims centre on enhancing the city's natural values for social amenity, human health and well-being. *Plan Melbourne* and *Resilient Melbourne* are two such region-scale strategies.

Several municipalities are pursuing complementary, smaller-scale 'urban forestry' and 'biolink' strategies for biodiversity conservation and social amenity. These also offer collective carbon-sequestration benefits although the potential magnitude of these benefits is unknown.

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<sup>3</sup> Melbourne Metropolitan Investigation, Victorian Environmental Assessment Council, State of Victoria, 2011.

## 2.6 RCS directions for *Nature Links*

The above initiatives in biolinks and urban forestry complement the Regional Catchment Strategy provisions for *Nature Links*. Accordingly, the PPWCMA is involved in their development. Its aim is to optimise their coordinated development and possibly to provide the RCS and its Interactive Map as a central record of their locations, development and benefits.

The RCS Nature Links are parts of the landscape considered to offer major, realistic and high-value opportunities for creating large-scale vegetation corridors. They aim to:

- Generate north-south and east-west connections between existing habitats
- Enable species transit
- Improve ecosystem resilience to climate change and habitat fragmentation.
- Create carbon planting opportunities

*Nature Links* are identified where at least some of the above barriers to large-scale revegetation and carbon plantings might be overcome. Where experience shows:

- There is strong potential for revegetation to improve connectivity for existing vegetation.
- They are the subject of existing major projects that involve numerous organisations.
- They already have in-principle support from local governments and/or Landcare networks.
- Long-term commitment by other organisations is likely.
- Involvement by local communities and landholders is likely.

### [Regional Catchment Strategy Nature Links](#)



## 2.7 Mapping environmental asset sensitivity to climate change

The likely vulnerability of natural assets to climate change was assessed for seven CMA regions by the *Impact and Vulnerability Assessment* project, Spatial Vision, 2014.

The project:

1. Identified rising **temperatures** and declining **rainfall** as important climate change stressors on natural assets. The project rated these stressors into five classes of severity.
2. Identified six natural **asset types**: native vegetation, wetlands, estuaries, rivers, land and soils and coastal wetlands.
3. Assigned **sensitivity** ratings to each natural asset. *Sensitivity* is defined as the asset's anticipated response, *very low* to *catastrophic*, to climate change stressors.
4. Calculated the potential **impact** on each asset type. *Impact* is the magnitude of change an asset is likely to face – according to its sensitivity and exposure to stress. Impact was determined by multiplying exposure ratings by sensitivity. ( $I = E \times S$ )
5. Calculated the **worst potential impact** on assets by either rising temperatures or declining rainfall.
6. Assessed likely **adaptive capacity**, *very low* to *very high*, for each asset type according to its observed ability to adjust to likely climate change stresses.
7. Calculated **vulnerability** – the measure of possible harm for each asset type. Harm included loss of species diversity, and ecosystem function, local extinction, loss of resilience etc. This step involved calculating the Vulnerability of an Asset Class, to anticipated changes in a given climate stressor (within a given time period and under a given climate emissions scenario), based the Worst Potential Impact and Adaptive Capacity, based on the following algorithm:

$$\text{Vulnerability (V)} = [\text{Worst Impact (W)} - \text{Adaptive Capacity(A)} \times 2] \text{ plus } 10.$$

The RCS shows maps and interpretations for *Asset Sensitivity*, not vulnerability.

Each vulnerability rating is the product of estimates and assumptions for which there are no absolute answers. Each was supported by available data and knowledge and scrutinised by an expert panel. For each step in the process there is significant error, and when combined, creates great uncertainty in the data.

## 2.8 Mapping areas of carbon sequestration potential

The map below shows where replanted native vegetation is estimated to have relatively low (brown); moderate (green and gold); and high (blue) capacities to sequester carbon as it grows.

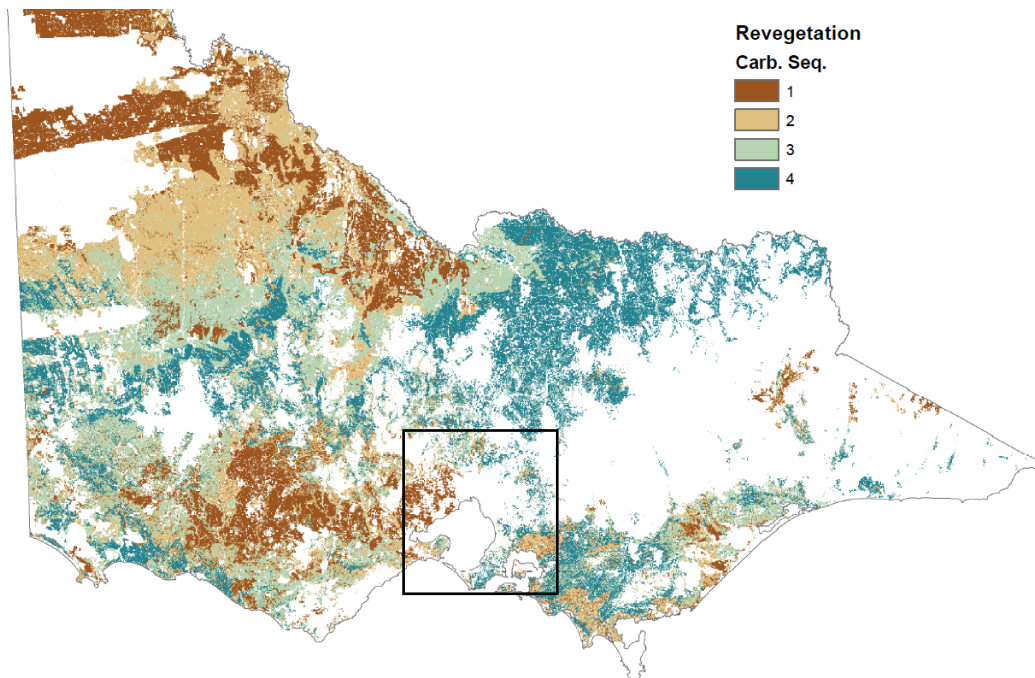
The map is based on a model to estimate forest growth. This uses data about the effect of factors such as soil type, water availability and evaporation on Eucalyptus species to grow and sequester carbon (CO<sub>2</sub>-e t/ha/yr).

The model used to make the map used climate data from 1900-2014 and assumed revegetation with the types of vegetation thought to be present before 1750.

The model also assumed that revegetation would occur where existing native vegetation is estimated to have a condition score lower than 25%. If the vegetation condition score at a

particular point is 20%, the model calculates the remaining 80% is available for improvement.

The above parameters mean the map does not show areas where native vegetation is largely intact or in good condition. The map also excludes public land, urban land and land-uses such as intensive agriculture and horticulture.



This modelling and map provide the following advice for effective carbon plantings in each RCS planning area:

#### Moorabool, Melton, Wyndham and Greater Geelong area

- Relatively low rainfalls and poor soils outside areas of intensive agriculture limit this sub-region's potential for carbon planting.
- The volcanic plains grasslands provide the largest areas for carbon planting but relatively low sequestration rates per hectare.
- Higher rainfall localities in the Bacchus Marsh-Ballan districts of the upper Werribee catchment and the southern slopes of the Great Divide in Moorabool Shire are identified as this sub-region's best carbon planting sites.

#### Macedon Ranges, Hume, Mitchell and Whittlesea area

#### Yarra Ranges and Nillumbik area

#### Casey-Cardinia-Baw Baw area

#### South Gippsland-Bass Coast & Islands area

#### Mornington Peninsula

#### Urban Melbourne

### Protecting existing 'blue carbon' stores in coastal wetlands

Saltmarsh, mangroves, and seagrass meadows sequester nearly equivalent quantities of organic carbon as their terrestrial counterparts while comprising only 0.05% of terrestrial plant biomass.

'Blue Carbon' research (*Distribution and Abundance of 'Blue Carbon' within Port Phillip & Western Port*, P. Carnell et al, 2015) predicts that coastal wetland protection in the PP&W region could store up to 40 times more carbon per hectare than in dryland environments. The report points out that 'Blue Carbon' may be stored for centuries compared to the decades-life of terrestrial carbon storage.

The Port Phillip & Western Port region contains significant areas of habitat suitable for the conservation and sequestration of 'blue carbon'. The most prospective areas are on Western Port and the Port Phillip Bay western coastline. These are also designated Ramsar sites in good environmental condition so the co-benefits of protecting these ecosystems and their carbon stores makes them a high priority.

### **Recommended priority areas for new carbon sequestration planting and protection of carbon stores**

<b>Action/Priority</b>	<b>Where</b>	<b>Status and Rational</b>
Protect existing carbon stores Very High Priority	North Western Port coastal wetlands (including French Island) and Western Port Nature Link	Protecting and restoring coastal Ramsar wetland vegetation is a high priority action. Carbon planting will be consistent with priority goals of multiple managers. Risk of land use conflict is low.
Protect existing carbon stores Very High Priority	Port Phillip Bay Western Shoreline Nature Link	As above
New Carbon Planting Very High Priority	'Grow West' Nature Link	Well advanced with wide support from landholders, local government and water authorities
New Carbon Planting Very High Priority	Mornington Peninsula Nature Link	Under development by Landcare Network and Morning Peninsula Shire Council
New Carbon Planting Very High Priority	Warrandyte-Kinglake Nature Link	Under development by Nillumbik and Yarra Ranges Shire Councils and Parks Victoria
New Carbon Planting Very High Priority	Bass Hills Nature Link	Under development by Western Port Biosphere and Bass Coast Shire Council
New Carbon Planting High Priority	Macedon-Cobaw-Kinglake Nature Link	Some planning progress by the <a href="#">Central Victorian Biolinks Alliance</a> and Landcare networks and Moorabool Shire Council. Part of larger vision for a <i>Melbourne Ark</i> .
New Carbon Planting Moderate priority	Other revegetation projects	

