

Estuarine Vegetation Condition Assessment: Baseline data collection

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Estuarine Vegetation Condition Assessment: Baseline data collection

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Jacobs Group (Australia) Pty Limited

Floor 11, 452 Flinders Street
Melbourne, VIC 3000
PO Box 312, Flinders Lane
Melbourne, VIC 8009
Australia

T +61 3 8668 3000
F +61 3 8668 3001
www.jacobs.com

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Executive Summary

Jacobs Group (Australia) in collaboration with Southeast Botanical Consulting were contracted by Melbourne Water in December 2022 to undertake baseline data collection for the Estuarine Vegetation Condition Assessment project. Two pre-established survey methods ('Vegetation Visions' and 'Detailed Assessment') were followed to collect monitoring data for 29 estuaries located between Little River in the west and Bass River in the east of the Melbourne Water service area. The 'Vegetation Visions' survey method was undertaken in all 29 estuaries while the 'Detailed Assessment' survey method was conducted in 69 pre-determined monitoring locations located across 17 of the 29 estuaries.

The following summarises the findings from the baseline assessment:

- All 29 estuaries were successfully assessed. Minor limitations applied to data collection in localised areas (due to access or safety issues), and the location of a small number of Detailed Assessment quadrats were relocated to ensure the targeted vegetation types were surveyed. All changes to monitoring locations are detailed in this report.
- Estuarine vegetation composition and condition varied considerably within and across estuaries.
- A high-level summary of vegetation values and threats is provided for each estuary, along with notes on site access, safety and risks as they relate to undertaking future monitoring events.
- Comparisons were made between the Vegetation Visions method and the Index of Estuary Condition (IEC) method previously developed by the Department of Energy, Environment and Climate Action (DEECA) to determine how results varied from using a coarse vs fine-grain approach.
- Several minor issues relating to the monitoring method and data collection process were encountered. Recommendations have been provided in Section 4 to address these issues and these should be considered and addressed as appropriate prior to the next round of monitoring.

1. Introduction

This project establishes the baseline data for the Estuarine Vegetation Condition Assessment project. Two pre-established survey methods ('Vegetation Visions' and 'Detailed Assessment') were followed to collect monitoring data for 29 estuaries located between Little River in the west and Bass River in the east of the Melbourne Water service area. The 'Vegetation Visions' survey method was undertaken in all 29 estuaries while the 'Detailed Assessment' survey method was conducted in 69 pre-determined monitoring locations located across 17 of the 29 estuaries.

1.1 Background

Vegetation is a specific key value that requires monitoring under the 2018 Healthy Waterways Strategy (Melbourne Water 2018). As part of Melbourne Waters commitment to implementing the Healthy Waterways Strategy, a Monitoring and Evaluation Plan (MEP) specifically for estuaries (Estuaries MEP) was developed and describes the monitoring indicators and reporting requirements needed to effectively track the progress towards targets and objectives set in the Healthy Waterways Strategy.

As specified in the project brief, the Estuaries MEP's primary focus is on broad-scale monitoring objectives that aim to:

- track condition against long term targets;
- understand landscape scale changes; and
- identify where management intervention is required.

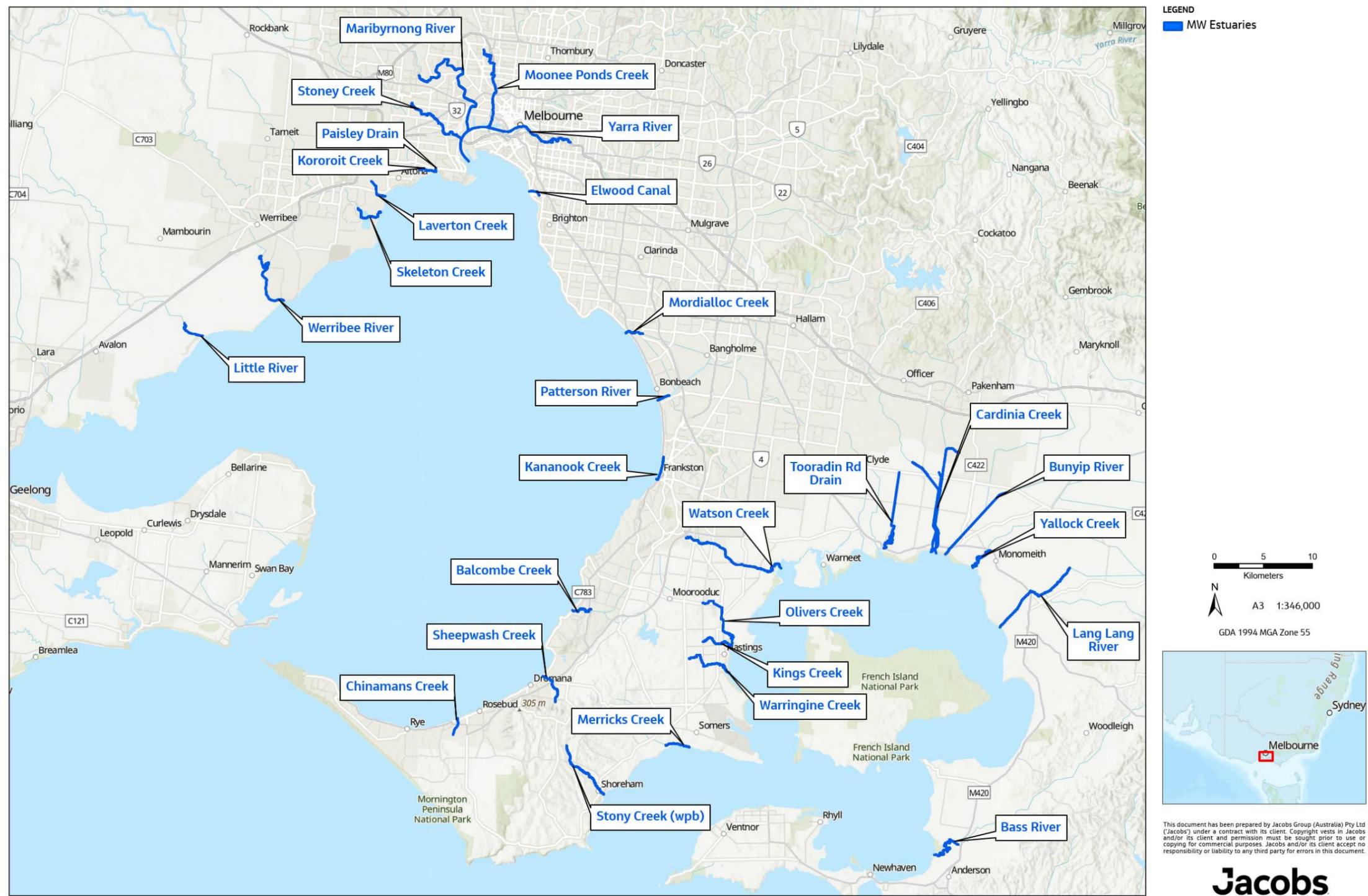
As detailed in the Healthy Waterways Strategy estuarine vegetation scores across the five catchment areas encompassed within the project area (Table 1-1) are generally low to very-low (moderate for Port Phillip and Westernport), with current trajectories for all catchments declining. Targets for catchments vary from avoiding further decline to improving by one condition category (i.e. very-low to low, or low to moderate) (Melbourne Water, 2018). Data collected as part of this project will provide a baseline for tracking the condition of estuarine vegetation over the lifespan of the Healthy Waterways Strategy and into the future.

1.2 Project Area

The Project Area encompasses 29 estuaries located across five Melbourne Water catchment areas located between Little River in the west and Bass River in the east. Table 1-1 below lists each estuary, the catchment and sub-catchment in which it is located, the length of the waterway survey area and number of Vegetation Visions plots and Detailed Assessment transects assessed. The location of each estuary is shown in Figure 1-1.

Table 1-1. Breakdown of estuary survey locations

Estuary/waterway	Length (km)	No. Veg Visions plots (left and right)	No. transects	Sub-catchment	Catchment
Balcombe Creek	2.69	26	2	Mornington Peninsula	Western Port
Bass River	6.03	60	5	Lower Bunyip, Lang Lang and Bass	Western Port
Bunyip River	8.96	89	3	Cardinia	Western Port
Cardinia Creek/Deep Creek (encompasses 4 separate waterways)	37.07	105, 63, 75, 125	12	Cardinia	Western Port
Chinamans Creek	1.84	18	-	Mornington Peninsula	Western Port
Elwood Canal	1.26	12	-	Dandenong	Dandenong
Kananook Creek	2.59	25	-	Dandenong	Dandenong
Kings Creek	3.79	37	5	Mornington Peninsula	Western Port
Kororoit Creek	2.11	20	8	Cherry, Kororoit, Laverton, Skeleton	Werribee
Lang Lang River	10.65	105	-	Lower Bunyip, Lang Lang and Bass	Western Port
Laverton Creek	2.46	24	5	Cherry, Kororoit, Laverton, Skeleton	Werribee
Little River	2.80	27	4	Werribee and Little River Lowlands	Werribee
Maribymong River	15.87	158	-	Lower Maribymong	Maribymong
Merricks Creek	2.62	26	2	Mornington Peninsula	Western Port
Moonee Ponds Creek	10.29	102	-	Lower Yarra	Yarra
Mordialloc Creek	2.00	19	-	Dandenong	Dandenong
Olivers Creek	7.80	77	5	Mornington Peninsula	Western Port
Paisley Drain	0.3	3	-	Cherry, Kororoit, Laverton, Skeleton	Werribee
Patterson River	1.29	12	-	Dandenong	Dandenong
Sheepwash Creek	3.76	37	-	Mornington Peninsula	Western Port
Skeleton Creek	3.56	35	4	Cherry, Kororoit, Laverton, Skeleton	Werribee
Stoney Creek	7.89	78	1	Lower Maribymong	Werribee
Stony Creek (WPB)	7.45	74	-	Mornington Peninsula	Western Port
Tooradin Rd Drain	11.65	116	5	Cardinia	Western Port
Warringine Creek	6.67	59	4	Mornington Peninsula	Western Port
Watson Creek	12.92	129	5	Mornington Peninsula	Western Port
Werribee River	8.25	82	2	Werribee and Little River Lowlands	Werribee
Yallock Creek	5.19	50	2	Lower Bunyip, Lang Lang and Bass	Western Port
Yarra River	16.00	162	-	Lower Yarra	Yarra



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Figure 1-1. Estuarine Vegetation Condition Assessment: monitoring estuaries

2. Methodology

This report provides the baseline data for the Estuarine Vegetation Condition Assessment project which was collected in accordance with two previously established survey methods developed to directly address the objectives of the Healthy Waterways Strategy (Dell 2020a) - 'Vegetation Visions' and 'Detailed Assessment'.

As detailed by (Dell 2020a) there was a need to divide the estuarine monitoring into two approaches to deal with two different landscape contexts. Therefore, Vegetation Visions was developed to survey inland linear waterways with limited extent of lateral riparian vegetation, and Detailed Assessment was developed to survey coastal flats with broader reserves of associated coastal vegetation.

2.1 Vegetation Visions

The Vegetation Visions method was developed by Dell (2020b) and updated with additional considerations for estuarine vegetation in Dell (2020a). A final version was developed by Melbourne Water (date unknown) that provides minor amendments to the scoring of some structural components – this is the version utilised for this project and is documented below in Section 2.1.2.

2.1.1 Background information

The Vegetation Visions method (also referred to as Rapid Vegetation Condition Assessment) is a rapid visual estimation of vegetation condition that enables inexpensive repeated data collection over many sites. Vegetation Visions uses a set of descriptors for vegetation condition that guides the assessor to one of five categories of vegetation condition, being Vegetation Structure, Richness, Instream vegetation, Patch shape and fragmentation and Regeneration. It relies on expert experience and opinion to reach a final score for the site, including prior understanding of vegetation condition concepts and a view of the relative variation of condition across the assessed landscape. The Vegetation Visions method requires the score for each category to be recorded, with total scores added and summarised to 0-5. The total scores can be used to detect finer-scale difference in vegetation condition values (0-25), whereby a score of 0 indicates the absence of one or more vegetation elements. The combinations of scores allow for the compositional structure to be defined per different condition states.

2.1.2 Method

Prior to survey a GIS specialist mapped all waterways with 20m wide x 100m long survey plots along both sides of the waterway, for the entire length of the Project Area. A GIS Field Maps project utilising linked Survey 123 forms was created to allow for data capture of all elements detailed below.

Each plot was surveyed by an ecologist. Ecologists worked in pairs surveying separate sides of the waterway. Assessments took between 5 and 15 minutes per plot. Data was collected on field tablets paired with handheld GPS units on a 30cm accuracy subscription.

The following data collection process was followed as per the Melbourne Water Vegetation Visions methods document (date unknown).

1. Record the date, site name, assessor name, area being surveyed and the location of the site.
2. Determine the relevant Ecological Vegetation Class (EVC) for the vegetation being assessed (note: native vegetation does not need to meet 25% native cover as per Victorian Vegetation Quality Assessment method). This should be based on landscape context, remnant vegetation and estimated/modelled EVC information.
3. Identify if the vegetation type (Table 2-1, Figure 2-2) you are in is either:
 - a. forest and woodland
 - b. woody non-treed vegetation (e.g., scrubs and heath)
 - c. non-woody, non-treed vegetation (e.g., herbaceous, grassland).

Note: This may be able to be defined from the EVC you have identified, e.g., Lowland Forest under 'forest or woodland', Plains Grassland under 'non-woody non-treed vegetation', etc. If it is a forest or woodland which has been cleared of trees, it should still be assessed as that vegetation type.

4. Familiarise yourself with Table 2-1 and walk over the selected 0.2 ha site taking note of the composition and cover of vegetation elements (spend 3 to 5 minutes). Assign component scores (spend 2 to 10 minutes) for:

- a. Component A (one score in A1, A2 or A3) – See also Figure 2-3
- b. Component B (one score in B1, B2 or B3) – See also Table 2-3 for a list of lifeforms.
- c. Component C, D and E (giving a score to each) – See also Table 2-3 for instream lifeforms.

Record each of the component scores separately on the right-hand side column of Table 2-1, and calculate the Overall Score by tallying up the individual component scores. To get a Relative Score, take the Overall Score and refer to Table 2-2. For example, an Overall Score of 8 would get a Relative Score of 2.

5. Record the weediness of the site (Table 2-1) separately to the above components.
6. Using Table 2-3, record the terrestrial and instream lifeforms present.
7. Using Table 2-4, record the presence or absence of any threats present in the survey area.

Understanding the different components	
Structural components (A1-A3)	<p>This component evaluates the total site cover (not relative cover) by monitoring the number of strata present at a site as well as the percentage cover of native species. The site needs to have >10% native vegetation cover for it to get a score above zero (see Figure 3 and Table 1).</p> <p>Care should be taken to assess treeless examples of woodland EVCs under A1. Grassland and similar vegetation with a closed structure is not penalised for potential influence on plant diversity. This is regarded a short-term disturbance factor and dominance of indigenous components over weeds is preferred. Vegetation cover in escarpment or rocky outcrop EVCs is influenced by the availability of recruitment space. Total site cover should be assessed on a horizontal plane. Bryophyte and lichen cover on rock surfaces should be included in combined plant cover estimates.</p>
Native plant species richness (B1 to B3)	<p>This component evaluates the native plant species richness at a site, which is assessed independently of plant age or size. There is no requirement to record the species present at the site, but provide an estimate of the species richness (Table 1). Count only species that are indigenous to the site, and only include lifeforms (Table 3) that are present at the time of assessment.</p>
Instream vegetation (C)	<p>Count number of instream plant lifeforms (Table 3) or species and assign them a relevant score based on Table 1.</p>
Patch shape and fragmentation (D)	<p>Assess the component at approximately a 1 ha scale (50 m up and downstream from the site and 50 m laterally from the waterway). A patch is contiguous native vegetation of any EVC which would gain a structure score of 2 or more within this larger area. Assign a score according Table 1.</p>
Regeneration (E)	<p>Regeneration assesses recruitment across vascular plant lifeforms. A recruit is any plant which is estimated to be 1 to 3 years old. Current season seedlings should not be included in this evaluation as we want to record successful recruit survival. Evidence of a recruit varies depending on species and it is up to the assessor to interpret the age of plants depending on site conditions. Fertile material is a poor predictor of plant maturity and should not be relied upon on its own. Recruits may include vegetative re-sprouts which are capable of growing into a new individual.</p>
Weediness	<p>Weeds include any plant taxon which is not regarded to be indigenous to the Melbourne region. Some taxa which are indigenous but have become weedy outside of their assumed natural range may be assessed as weeds. Weed cover is assessed as relative cover (i.e. percentage of total vegetation cover at the site). Reference to 'Highly Invasive' weeds in White et al. (2018) is required to determine the Weediness score, which is an estimate of the species capacity to invade and persist in natural ecosystems.</p>

Understanding the different components	
Woody versus non-woody	To determine if a plant is woody, at least the basal part of the main stem should be conspicuously woody (non-photosynthetic and +/- rigid). Some small shrubs in Chenopodiaceae and other families may appear herbaceous. It is therefore important that the taxon is recorded against lifeforms so that any inconsistencies can be considered in data analysis.

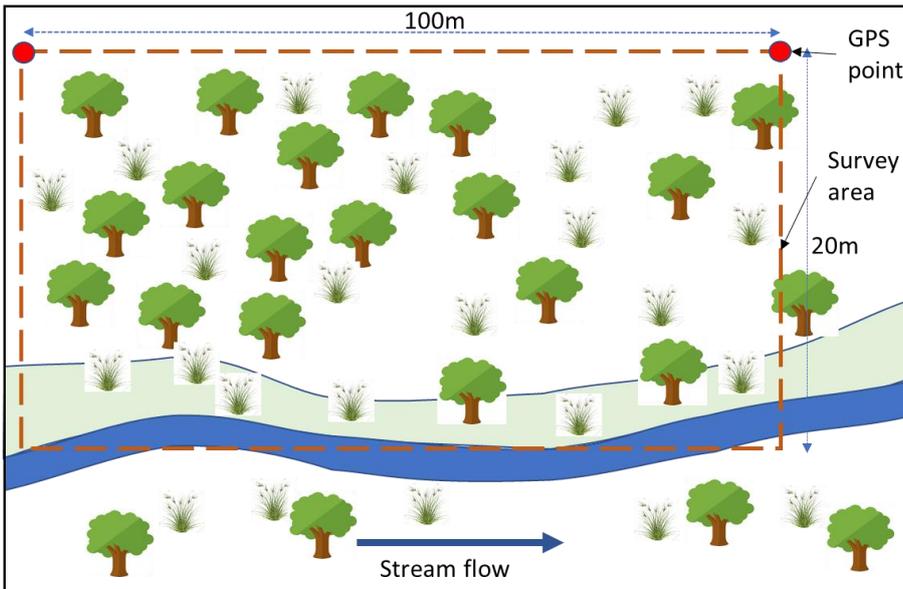


Figure 2-1. Survey area for the Vegetation Visions field assessment (source: Melbourne Water)

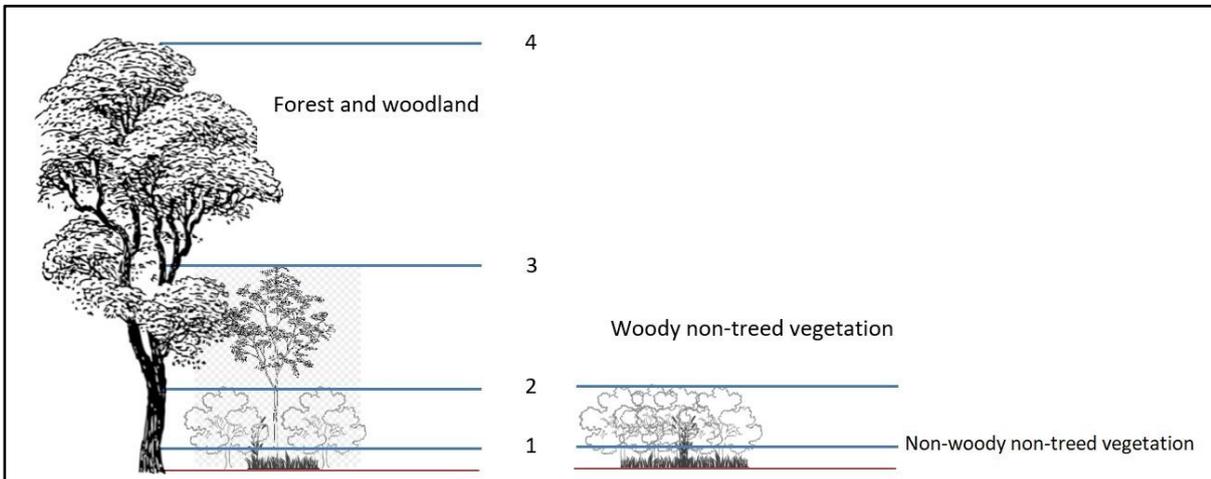


Figure 2-2. The different vegetation strata, from ground layer (1) and understory (2), to midstory (3) and overstory (4) vegetation. Similarly the different vegetation types, from non-woody non-treed vegetation (1 to 2), woody non-treed vegetation (2 to 3) and forest and woodland (3 to 4). (Source: Melbourne Water)

% Native cover	Strata			Score	
	1 strata	2 strata	3 + strata		
No native species					Absent
<10%					Very low
11-30%					Low
31-50%					Medium
51-100%					High
					Very high

Figure 2-3. Scoring system for the structural components of a site (component A). (Source: Melbourne Water)

Table 2-1. Assessment of the different components at a site and their relative score.

Components	Quality						Score (0-5)
	Absent = 0	Very low = 1	Low = 2	Medium = 3	High = 4	Very high = 5	
A1 Structure Forest and woodland	Non-indigenous vegetation	Estimated combined native cover $\leq 10\%$	One to two strata with estimated combined native cover 11–30%. One stratum with estimated combined native cover 31–50%.	One stratum with estimated native cover $>50\%$. Two strata with estimated native cover 31–50%. Three or more strata with estimated combined native cover 11–30%.	Two strata with estimated combined native cover $>50\%$. Three or more strata with estimated combined native cover 31–50%.	Three or more strata with estimated combined native cover $>50\%$.	
A2 Structure Woody non-treed vegetation e.g. scrubs, heaths	Non-indigenous vegetation	Estimated combined native cover $\leq 10\%$	Estimated combined native cover 11–25%	Estimated combined native cover 26–50%	Estimated combined native cover $>50\%$, single stratum	Estimated combined native cover $>50\%$, two or more strata	
A3 Structure Non-woody non-treed vegetation e.g. grassland	Non-indigenous vegetation	Estimated combined native cover $\leq 10\%$	Estimated combined native cover 11–25%	Estimated combined native cover 26–50%	Estimated combined native cover 51–75%	Estimated combined native cover 76–100%,	
B1 Richness Forest and Woodland	Non-indigenous vegetation	Very low species richness (1–3 species)	Low species richness (4–8 species)	Medium species richness (9–15 species)	High species richness (16+ species in less than 8 lifeforms)	Very high species richness (16+ species in at least 8 lifeforms)	
B2 Richness Woody non-treed vegetation diversity e.g. scrubs, heaths	Non-indigenous vegetation	Very low species richness (1 species)	Low species richness (2–6 species)	Medium species richness (7–13 species)	High species richness (13+ species in less than 7 lifeforms)	Very high species richness (13+ species in at least 7 lifeforms)	
B3 Richness Non-woody non-treed vegetation e.g. grassland	Non-indigenous vegetation	Very low species richness (1 species)	Low species richness (2–6 species)	Medium species richness (7–13 species)	High species richness (13+ species in less than 5 lifeforms)	Very high species richness (13+ species in at least 5 lifeforms)	

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Components	Quality						Score (0-5)
	Absent = 0	Very low = 1	Low = 2	Medium = 3	High = 4	Very high = 5	
C Instream vegetation composition	None or non-indigenous vegetation	Instream vegetation of 1 species.	Instream vegetation of 2 species or lifeforms	Instream vegetation of 3 species or lifeforms	Instream vegetation of 4 species or lifeforms	Instream vegetation of 5+ species or lifeforms	
D Patch shape and fragmentation	Non-indigenous vegetation	Native vegetation confined to 20 m from waterway on one side only, not longitudinally contiguous.	Native vegetation confined to 20 m from waterway on both sides of waterway, not longitudinally contiguous.	Native vegetation either longitudinally <u>or</u> laterally contiguous with native vegetation outside of assessment area, to within 100 m from boundary.	Native vegetation longitudinally <u>and</u> laterally contiguous with native vegetation outside of assessment area, >100 m from boundary in one direction.	Native vegetation longitudinally and laterally contiguous with native vegetation outside of assessment area, >100 m from boundary in both directions.	
E Regeneration	Non-indigenous vegetation	No evidence of recruitment.	Little evidence of recruitment, few recruits present with <u>restricted</u> distribution.	Little evidence of recruitment, few recruits present with <u>scattered</u> distribution.	Recruitment clearly evident with more than a few recruits in <u>less than</u> half of lifeforms present. No evidence of canopy species recruitment in forests and woodlands.	Recruitment clearly evident with more than a few recruits in <u>more than</u> half of lifeforms present. May or may not include evidence of canopy species recruitment in forests and woodlands. OR If Recruitment clearly evident with more than a few recruits in <u>less than</u> half of lifeforms present, then evidence of canopy species recruitment required in forests and woodlands.	
						Overall Score	
Weediness	No weeds detected	Weed species <10%	Weed species <10% relative cover including highly invasive species.	Weed species 10–50% relative cover without highly invasive species.	Weed species >50% relative cover without highly invasive species OR	Weed species >50% relative cover including highly invasive species.	

Components	Quality						Score (0-5)
	Absent = 0	Very low = 1	Low = 2	Medium = 3	High = 4	Very high = 5	
		relative cover without highly invasive species.			Weed species 10–50% relative cover including highly invasive species.		
Weediness (Highly Invasive Species)	No highly invasive weeds.	<10% relative cover of highly invasive species	10-25% relative cover of highly invasive species	26%-50% relative cover of highly invasive species	51-75% relative cover of highly invasive species	76-100% relative cover of highly invasive species	

Table 2-2. Calculation of the Overall Score to the Relative Score

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5

Table 2-3. Assessment of the lifeforms present at the site.

Terrestrial Lifeforms	
Angiosperm Tree	Flowering woody plant with one main stem/trunk
Gymnosperm tree	Conifer with one main stem/trunk
Narrow-leaved upright Shrub*	Woody plant with multiple upright stems, leaves > 4 times longer than width or with leaves reduced and photosynthetic branches
Broad-leaved upright shrub*	Woody plant with multiple upright stems, leaves < 4 times longer than wide
Narrow-leaved prostrate shrub*	Woody plant with multiple stems +/- horizontally spreading, leaves > 4 times longer than width or with leaves reduced and photosynthetic branches
Broad-leaved prostrate shrub*	Woody plant with multiple stems +/- horizontally spreading, leaves < 4 times longer than wide
Narrow-leaved herb*	Herbaceous plant that is not a grass, sedge or rush, leaves > 4 times longer than width or without visible leaves
Broad-leaved herb*	Herbaceous plant that is not a grass, sedge or rush, leaves < 4 times longer than wide
Herb without leaves*	Herbaceous plant with no obvious leaves e.g. some saprophytes.
Tufted grass, sedge or rush	Graminoid with three or more leaves arising from a common base
Spreading grass, sedge or rush	Graminoid with no obvious tufted groups of leaves
Climber, vine or twining plan	Any climbing, trailing or twining plant which when advanced grows on other plants/structures for vertical support
Bryophytes or lichens	Mosses, liverworts, hornworts and lichens combined
Tree fern	Fern with single trunk with a crown of fronds at the top
Ground fern or fern-ally	Fern with fronds arising individually or in clumps from the ground.
Epiphytic fern or fern-ally	Fern with fronds growing on the body of another plant (often a tree or tree fern)
Mistletoe	Parasitic shrub often on the branches of eucalypts or wattles
Instream plant lifeforms	
Floating grass or grass-like plant	Free floating (but not necessarily at the surface), not attached to substrate
Floating forb	Free floating (but not necessarily at the surface), not attached to substrate
Emergent grass or grass-like plant	Attached to substrate with leaves or flowering stem +/- upright at or above the waterline
Emergent forb	Attached to substrate with leaves or flowering stem +/- upright at or above the water surface
Submergent grass or grass-like plant	Attached to substrate with leaves below water surface
Submergent forb	Attached to substrate with leaves below water surface
Submergent or emergent bryophytes (mosses, liverworts or hornworts combined)	Attached to substrate with leaves below, at or above water surface
Submergent or emergent macro algae	Attached to substrate with body below, at or above water surface
Floating macro algae	Free floating, not attached to substrate

* Leaves for the purpose of this assessment are true leaves or leaf-like structures which function as leaves. The following considerations apply. Green photosynthetic branches including minute true leaves (examples occur within Casuarinaceae, Santalaceae, Polygonaceae, Cupressaceae) are treated as narrow-leaved. Phyllodes or cladodes (examples occur within Fabaceae) are assessed according to their dimensions.

Table 2-4. Table of threats for Vegetation Visions sites

Threat	Observed	Not Observed	Threat	Observed	Not Observed
Rabbit pellets			Evidence of Phytophthora		
Rabbit warrens			Evidence of acid sulphate soils impacts		
Deer pellets			Native vegetation clearing		
Deer browsing			Stock access		
Deer wallows			Recent understory fire*		
Fox scats			Recent canopy fire*		
Encroachment			Land slip or stream bank collapse		
Storm water/grey water discharge			Soil surface erosion		

2.2 Transects – Detailed Assessment

A total of 74 transects were surveyed across 29 estuaries (Table 1-1). Transects contained up to 10, 2 x 2 m sub-plots (4 m²) located at 20 m intervals, as well as a grid of nine sub-plots¹ (Figure 2-4).

The location and composition of transects (e.g. number and placement of sub-plots and grids) followed Dell (2020a), though minor alterations to the number of sub-plots and location of grids were made to a) ensure target grid EVCs were sampled, b) to avoid areas of open water or dangerous terrain, or c) where access to private property could not be achieved. Note: all transects alterations were discussed with Dr. Matt Dell to ensure that they would not negatively affect statistical analyses detailed in Dell (2020a).

The process for surveying transects is detailed below:

- At each transect site, run a tape measure out and mark a sub-plot corner at 20 m intervals up to a maximum of 200 m (10 sub-plots in total). Alternatively, use a GPS with 30 cm accuracy to locate sub-plots.
- A sub-plot is a 2 x 2 m quadrat which is divided into 16 even squares (Figure 2-5). A PVC frame was used to aid in the division of each sub-plot into 25 sampling points (for touch intersects).
- At each sub-plot location, determine the EVC according to descriptions in Victorian Saltmarsh Study[^] (2011) for EVC 9 Coastal Saltmarsh sub-communities and according to DEECA EVC benchmarks for other EVCs.
- All vascular plant taxa are recorded for each sub-plot. Identification of plants should be made to infraspecific level where possible.
- Species which are intercepted by a point in each sub-plot are recorded (25 points) (Figure 2-5). Each plant taxon which touches the point is recorded; more than one species may be recorded at each point. A point marker (rod) of 4–5 mm diameter is used.
- Within each 1 m² cell of each sub-plot, the maximum height of shrubs², forbs and graminoids is recorded using a measuring staff (nearest 1 cm). Measurements are then averaged to obtain the mean maximum height for each lifeform at 4 m². The scientific name of the tallest shrub, forb and graminoid species is recorded at 4 m². Some herbaceous species such as *Phragmites australis* may need to be straightened on the measuring staff before measuring i.e. actual length of culm to apex rather than effective canopy height.
- Soil electro-conductivity and pH are recorded near the centre of each 4 m² using an electronic field meter.
 - The following steps were undertaken for this round of monitoring:
 - Collection - dig into soil approximately one trowel length deep (20 cm) and fill sample cup 1/5 of the way with soil. One soil sample per subplot/gridplot.

¹ A small number of transects will contain two grids, or no grids.

² It may be unclear whether some species are herbaceous or woody in estuarine vegetation. It is recommended for consistency that species are classified prior to monitoring.

- Sample preparation - fill each sample cup to the top with demineralised water and shake to homogenise.
 - Calibrate soil meter (doesn't need to be done every time) according to pH/EC calibration solution at 25°C.
 - Take readings by submerging probe into sample, swirl a couple times to ensure solution is still homogenised, and note down pH/EC readings.
 - Discard samples and rinse out cups (ideally with demineralised water).
 - Note: If difficulty getting a reading dilute sample by tipping out ~1/4 of homogenised sample and fill back up to top with demineralised water. Shake/swirl to re-homogenise. Repeat until there is a reading.
 - Devices used were the Milwaukee MW802 Pro and the Hanna Instruments HI 98129 pH Meter.
- Photographs are taken of the vegetation:
 - Grid-plot – photo from the reference corner looking at the centre of grid (centre sub-plot).
 - Photos are taken at full frame with a smart phone camera (equivalent to about 26 mm in 35 mm film camera) at 1.6 m from the ground.

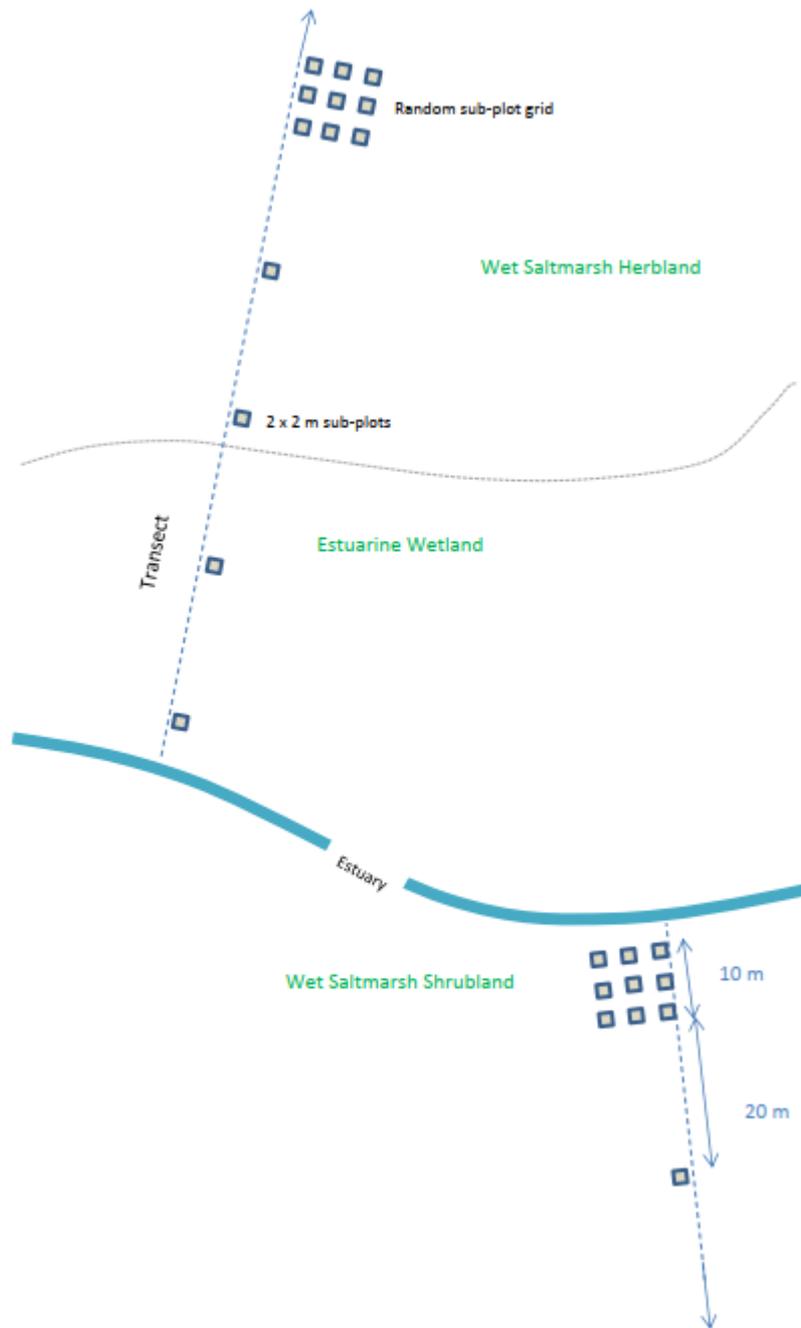


Figure 2-4. Example of sub-plot grid and transect layout for saltmarsh and related vegetation, stratified by EVC (not to scale). Source: Dell (2020a).

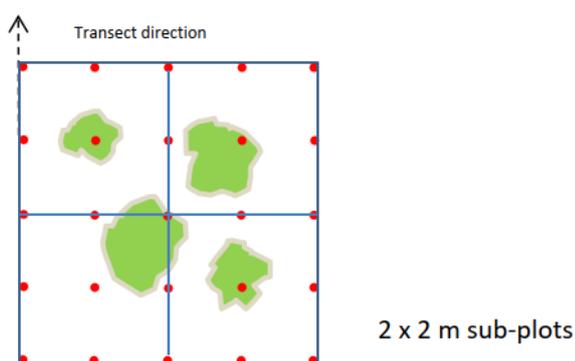


Figure 2-5. Point-based cover sample of sub-plot (red dots). Source: Dell (2020a).

2.3 Summary information

A high-level summary of vegetation values and threats is provided for each estuary, along with notes on site access, safety and risks as they relate to undertaking future monitoring events. This information is tabulated for each estuary in Section 3.

2.4 Nomenclature and taxonomy

Use of scientific and common plant names follows the Victorian Biodiversity Atlas (DEECA 2023). An asterisk (*) preceding a plant or animal name indicates taxa which are not indigenous to Victoria. A hash (#) signifies a Victorian indigenous plant species that is not indigenous within the study area (i.e. its occurrence is outside of its natural range).

2.5 Limitations

- The timing of the surveys was not ideal for detecting all flora species potentially present within the monitoring sites. Some seasonal species (e.g. geophytes such as orchids and lilies) may not have had terrestrial material present during the survey period, while other species could not be identified to specific or sub-specific level due to a lack of identifying vegetative and/or reproductive material. In the case of at least one senescent annual grass species identification could only be made to family level, though it is assumed this species was **Parapholis incurva* (Coast Barb-grass).
- A small subset of sub-plots were unable to be surveyed due to inaccessible terrain (e.g. plots in open water), lack of access to private land or because they were situated in inappropriate locations (e.g. on houses). All locations where alterations were made to the placement or composition of transects (e.g. grid placement) are detailed in Appendix B.
- Vegetation Visions scoring does not appear to accurately reflect the condition of some estuarine plant communities. Structurally and/or floristically 'simple' communities in excellent condition may receive lower scores than other communities in relatively poor condition. Notable examples include Coastal Saltmarsh, Estuarine Wetland and Estuarine Reedbed.
- In many instances submergent vegetation was unable to be accurately assessed. This was due to high turbidity within many of the lower estuaries, as well as the occurrence of high flows during some surveys. This issue was partially addressed by inferring the presence of certain species if they were recorded in nearby plots or if were known to be common in specific locations.
- No photograph is provided for Little River Transect 2. This issue was discussed with the Melbourne Water project manager, and it was deemed unnecessary to retake this photograph due to access constraints associated with accessing the Western Treatment Plant.

3. Results

3.1 Balcombe Creek

Values	The estuary supports native vegetation throughout the study area, principally EVC 953 Estuarine Scrub. Closer to the mouth of the estuary EVC 10 Estuarine Wetland and EVC 9 Coastal Saltmarsh (Wet Saltmarsh Herbland) were present, the latter constituting the Subtropical and Temperate Coastal Saltmarsh threatened ecological community (listed as vulnerable under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)). Vegetation condition was generally good.
Threats	Weed cover was between 10-50% for the majority of the site with notable weed species including <i>Polygala myrtifolia</i> (Myrtle-leaf Milkwort), <i>Atriplex prostrata</i> (Hastate Orache), <i>Aponogeton distachyos</i> (Cape Pond-lily) and <i>Cotula coronopifolia</i> (Water-buttons).
Survey access	Access from roads is good with The Esplanade crossing the downstream extent of the estuary and Nepean Hwy the upstream extent. Additional access points are located on Augusta St, Ave and Uralla Rd (among others), and the Balcombe Estuary Nature Trail follows the creekline in the upper third of the study area.
Survey safety	Soft sediments are present in the lower estuary and care must be taken when traversing these areas. Peninsula Pistol Club and firing range adjoins the northern boundary of the study area at the upstream extent.
Survey risks	Trampling damage to Wet Saltmarsh Herbland vegetation is unavoidable when assessing Transect 1, due to soft sediments.

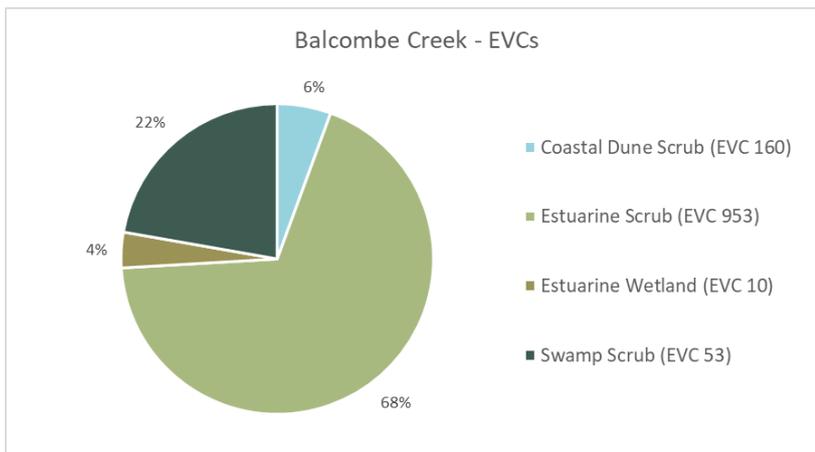


Figure 3-1. Balcombe Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

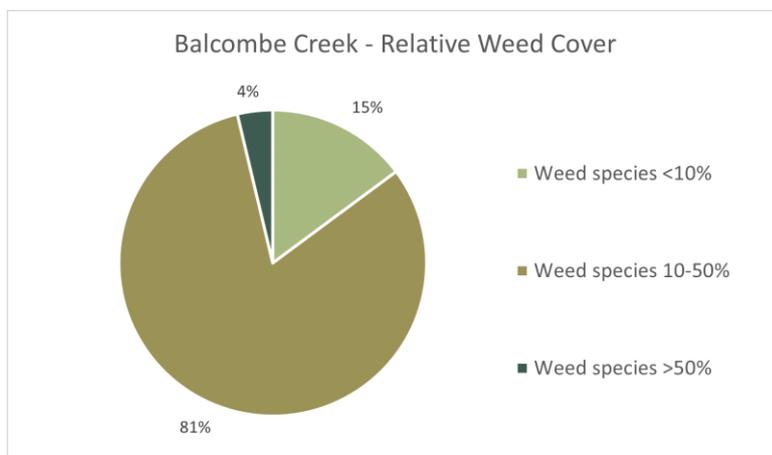


Figure 3-2. Balcombe Creek Vegetation Visions survey area: relative weed cover



Picture 3-1. Balcombe Creek: grid-plot photographs (left – Transect 1, 20m; right – Transect 2, 20m)

Balcombe Creek



LEGEND
Relative Vegetation Vision Scores
■ High (4)
■ Very High (5)

0 150 300
 Meters
 N
 A3 1:6,500
 GDA 1994 MGA Zone 55



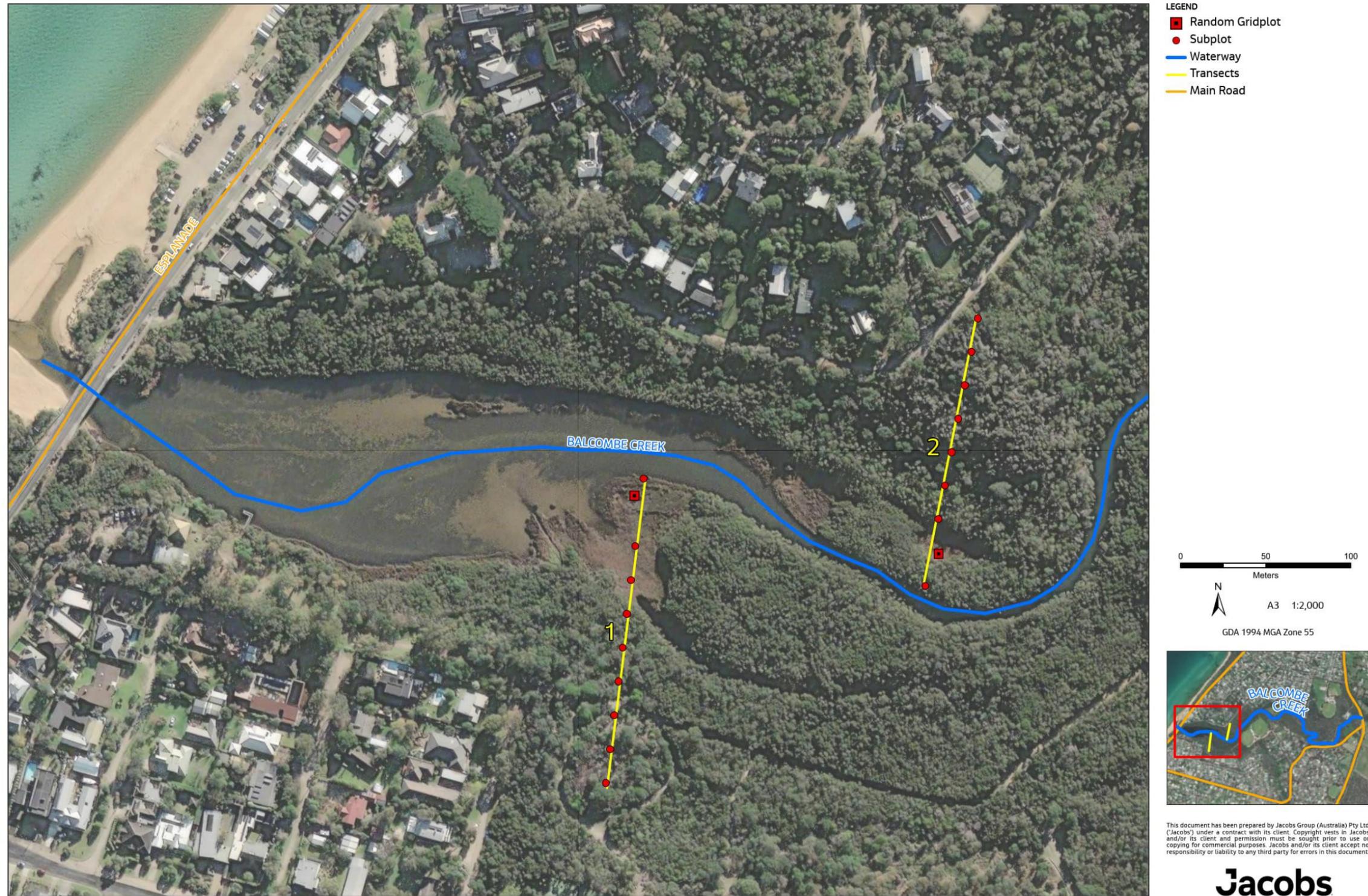
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Data Sources: Geosciences Australia (2006);
 Imagery Sources: ESRI Online Imagery Services

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Figure 3-3. Balcombe Creek: Vegetation Vision scoring



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Figure 3-4. Balcombe Creek: transect locations

3.2 Bass River

Values	The downstream half of the estuary provides an extensive area of high-quality remnant native vegetation (Reef Island and Bass River Mouth Nature Conservation Reserve). Dominant EVCs include Coastal Saltmarsh (notably Wet Saltmarsh Shrubland and Wet Saltmarsh Herbland) and Mangrove Shrubland. The vast majority of Coastal Saltmarsh forms part of the EPBC Act-listed community. Native vegetation is restricted to the riparian zone in the upper half of the estuary where grazing land abuts the waterway channel.
Threats	* <i>Sporobolus anglicus</i> (Common Cord-grass) becomes increasingly common in the upstream section of the estuary, though maintains an overall low cover. Other high-threat weed species are rare, and are generally restricted to terrestrial habitat adjoining private property.
Survey access	The southern side of the lower estuary can be accessed via Bass Landing Road. The northern side can be accessed from the north (along the coastline) from Whistler Lane though the walk is several km long and difficult at high tide. The remainder of the estuary is abutted by private farmland, and at least some landholders will not allow access through their properties. Use of kayaks are recommended for accessing this estuary. Good launching locations are present at the end of Bass landing Road, and from Bass River Streamside Reserve located upstream of Bass Hwy.
Survey safety	Safety considerations relate to dense vegetation (obstructing view of ground), occasional fences that require crossing (minor issue), rabbit diggings/burrows (tripping hazard) and soft sediments adjoining waterways (to be avoided).
Survey risks	Damage to plants of <i>Tecticornia arbuscula</i> (Shrubby Glasswort) will result where this species occurs in dense stands (generally in the Coastal Saltmarsh sub-community Wet Saltmarsh Shrubland). This species is noted to be slow growing and is very brittle, and major branches may be snapped off when moving through stands.

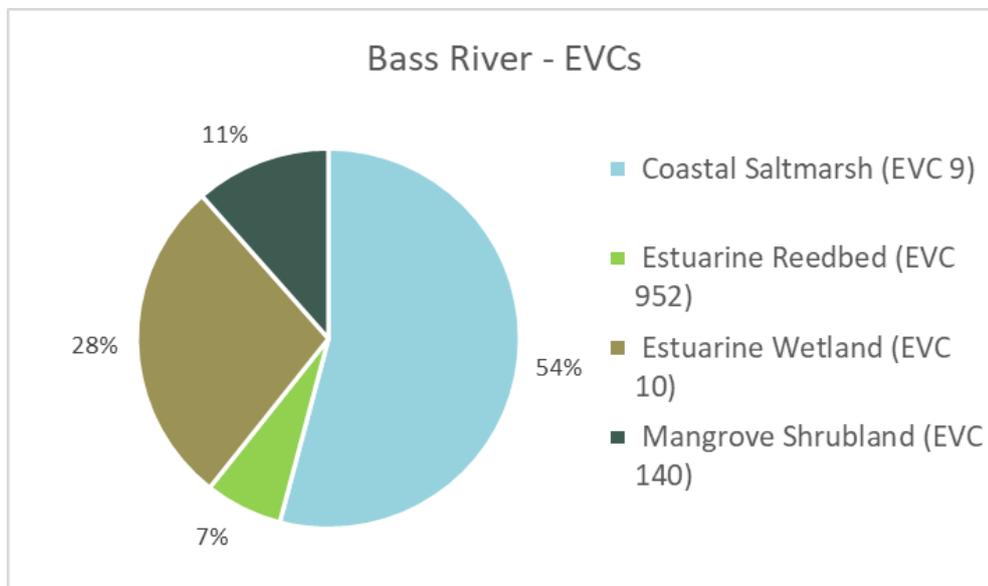


Figure 3-5. Bass River Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

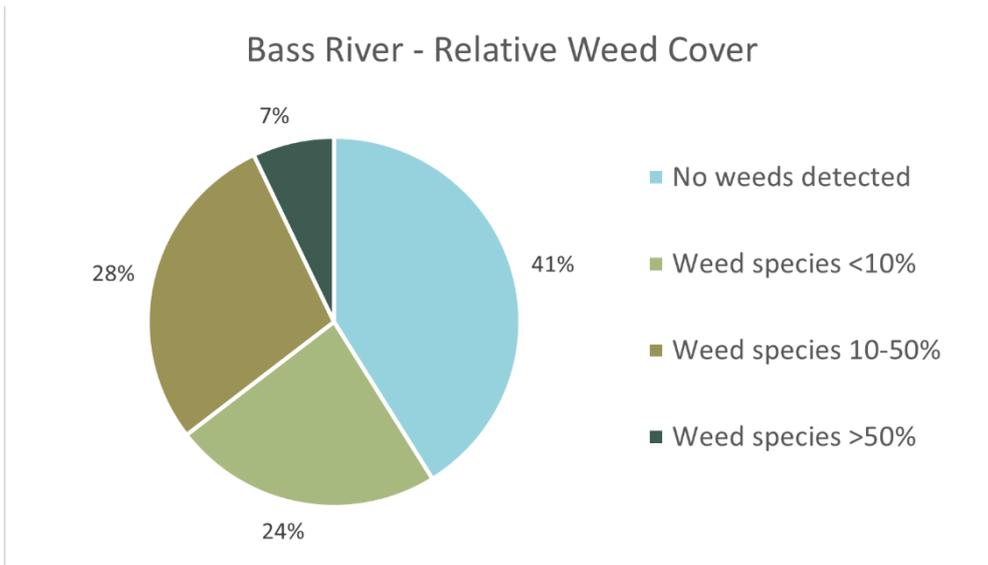


Figure 3-6. Bass River Vegetation Visions survey area: relative weed cover



Picture 3-2. Bass River: grid-plot photographs (left – Transect 1, 160m; right – Transect 1, 120m)



Picture 3-3. Bass River: grid-plot photographs (left – Transect 2; right – Transect 4)

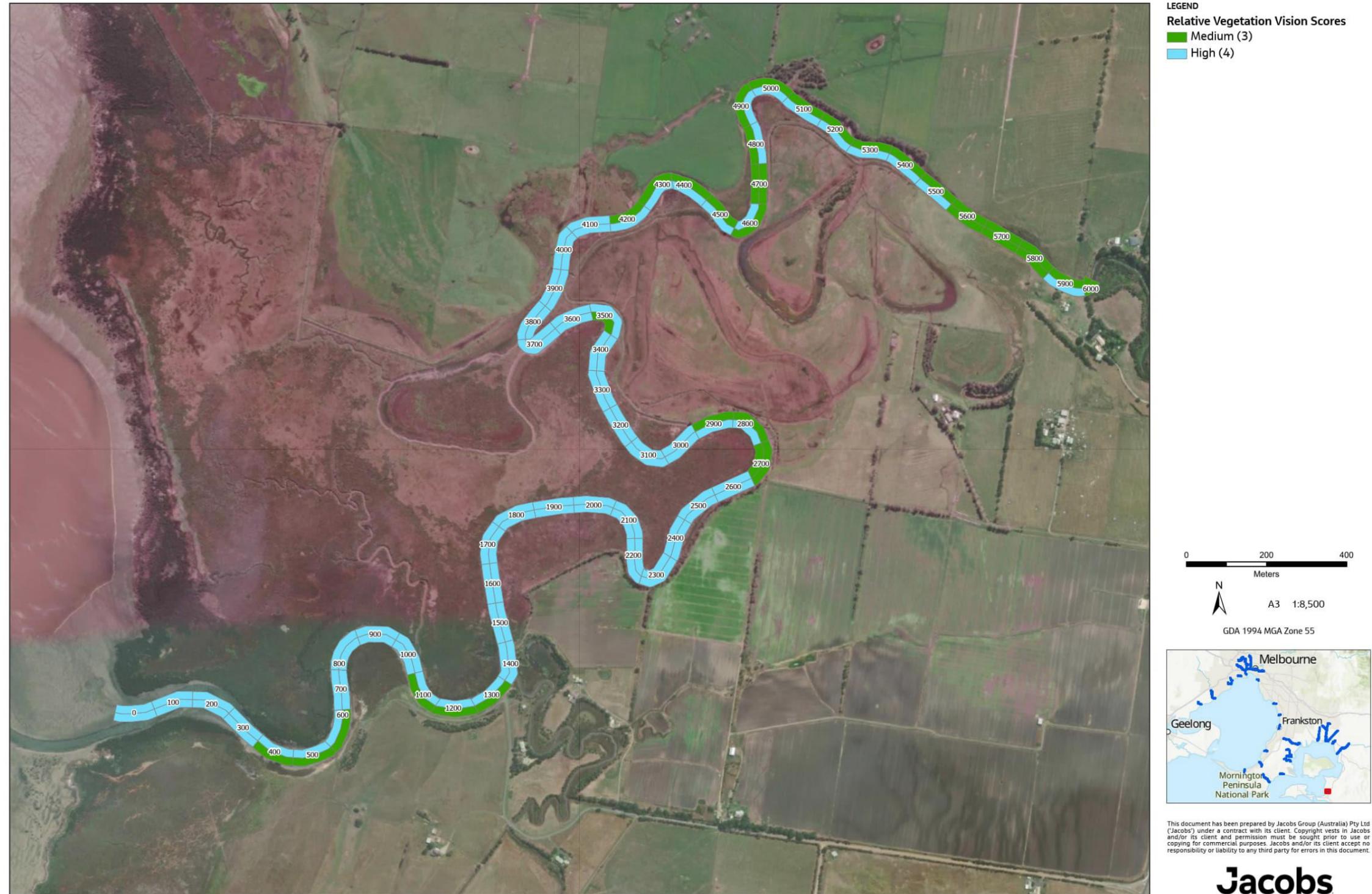


Picture 3-4. Bass River: grid-plot photographs (left – Transect 5, 40m; right – Transect 5, 180m)



Picture 3-5. Bass River Vegetation Visions survey area: Common Cord-grass (*Sporobolus anglicus*) infestation

Bass River



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Figure 3-7. Bass River: Vegetation Vision scoring



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Figure 3-8. Bass River: transect locations

3.3 Bunyip River

Values	Coastal Saltmarsh, Mangrove Shrubland and Estuarine Wetland are the dominant EVCs within the lower estuary south of South Gippsland Hwy. The vast majority of Coastal Saltmarsh forms part of the EPBC Act-listed community. Vegetation within the North Western Port Nature Conservation Reserve adjoining Westernport Bay is of generally high quality, though becomes increasingly degraded north of the reserve. Estuarine Scrub grades into Swamp Scrub between South Gippsland Hwy and Koo Wee Rup and is of moderate condition. Native vegetation north of Koo Wee Rup is highly degraded and largely reduced to a narrow fringe of emergent species loosely referable to Tall Marsh and Swamp Scrub EVCs.
Threats	All but the lower estuary is subject to significant weed invasion, with high-threat weeds of management concern (woody weeds and robust scramblers) scattered to abundant in scrub between South Gippsland Hwy and Koo Wee Rup, while north of here the riparian zone and floodway are dominated by exotic perennial grasses. Stock access and grazing paddock encroachment was evident in one location and rabbit and fox scats were recorded throughout.
Survey access	Pedestrian access is reasonable throughout the estuary. Access to the lower estuary (south of South Gippsland Hwy) is through the riparian corridor and requires crossing several wire fences. Access north of South Gippsland Hwy can be achieved at numerous locations including South Gippsland Hwy, Healesville-Koo Wee Rup Rd and Main Drain Rd.
Survey safety	The majority of the estuary north of South Gippsland Hwy can be easily navigated, with open mown areas and/or access tracks allowing easy access. South of South Gippsland Hwy dense vegetation may obstruct the view of ground, and occasional fences require crossing (minor issue). Semi-collapsed rabbit warrens present in the southwest of the estuary (vicinity of Transect 2) create a significant tripping hazard and this area should be traversed with care.
Survey risks	No risks identified.

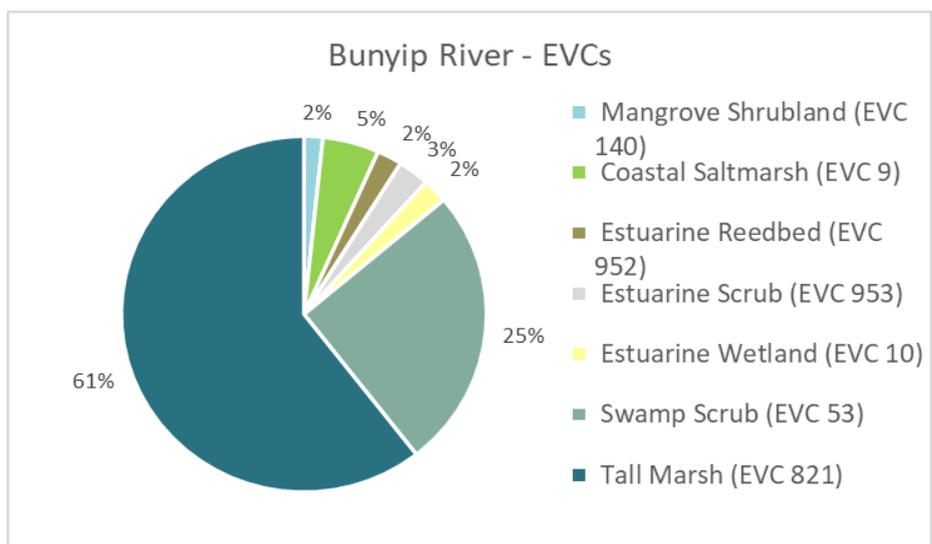


Figure 3-9. Bunyip River Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

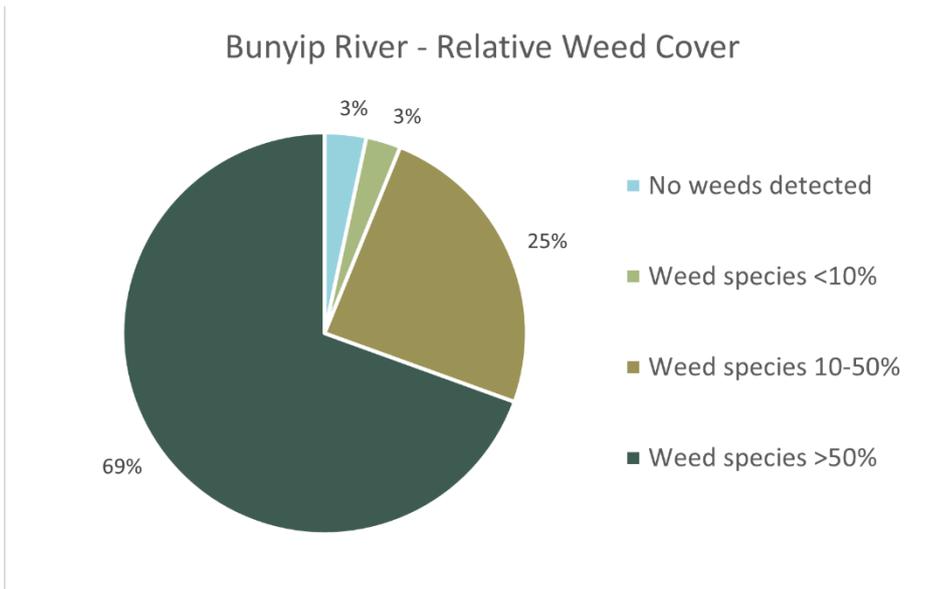
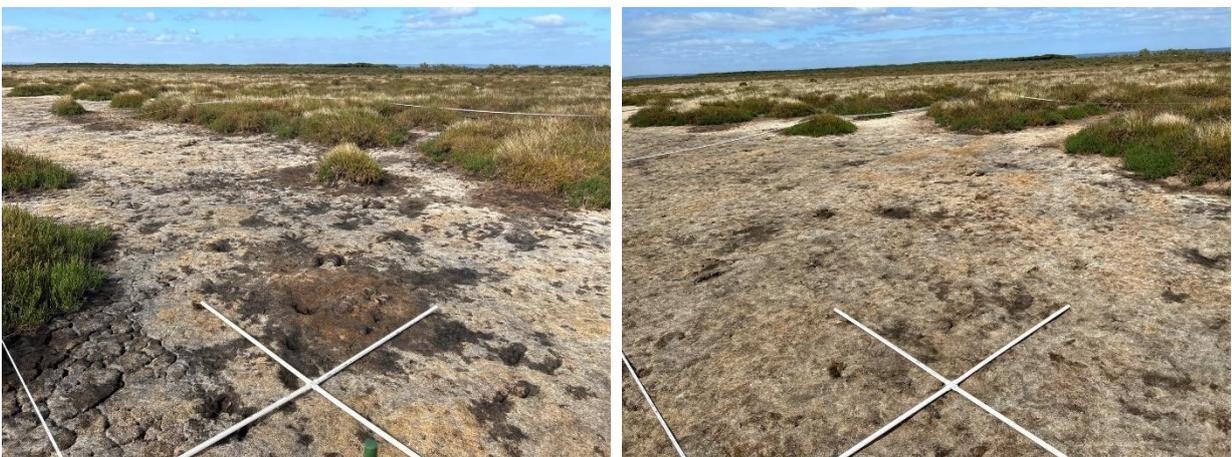


Figure 3-10. Bunyip River Vegetation Visions survey area: relative weed cover



Picture 3-6. Bunyip River: grid-plot photographs (left – Transect 1; right – Transect 2)



Picture 3-7. Bunyip River: grid-plot photographs (left – Transect 3, 80; right – Transect 2, 100m)

Bunyip River



Figure 3-11. Bunyip River: Vegetation Vision scoring (1 of 2)

Bunyip River



Figure 3-12. Bunyip River: Vegetation Vision scoring (2 of 2)



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Figure 3-13. Bunyip River: transect locations

3.4 Cardinia Creek/Deep Creek

Note: Cardinia/Deep Creek comprises four separate waterways that converge into two waterways in the lower estuary. These waterways have been labelled Cardinia Creek 1–4 (from west to east), with Cardinia Creek 4 also referred to as Deep Creek in some contexts.

Values	The downstream extent of the estuary provides an extensive area of high-quality remnant native vegetation ('The Inlets'). Dominant EVCs in this location include Coastal Saltmarsh (Wet Saltmarsh Shrubland, Wet Saltmarsh Herbland, Coastal Tussock Saltmarsh) Estuarine Wetland, Mangrove Shrubland and Estuarine Scrub. The vast majority of Coastal Saltmarsh forms part of the EPBC Act-listed community. Native vegetation quality decreases significantly upstream where waterways become channelled drains. Upstream EVCs include Estuarine Reedbed, Tall Marsh and Aquatic Herbland. The threatened Swamp Skink (<i>Lissolepis coventryi</i>) was incidentally noted in several locations in the lower estuary and a previously unrecorded population of the nationally threatened Growling Grass Frog (<i>Litoria raniformis</i>) was also recorded on several of the waterways in the vicinity of Manks Road.
Threats	High-threat weed species are largely absent from wetland and saltmarsh EVCs in the lower estuary, though increase in abundance upstream and on boundaries of wetland areas. Infrequent plants of <i>*Sporobolis anglicus</i> (Common Cord-grass) were recorded within intertidal zone on several creeks. Levees and upper banks may support dense infestations of woody weeds, notably <i>*Genista linifolia</i> (Flax-leaf Broom) in many locations. Cattle have access to several waterways in upstream locations resulting in significant damage to stream banks and beds. Evidence of deer in lower estuary. Bank collapse was noted sporadically throughout. De-silting works underway at the time of survey were noted to be threatening a hitherto unrecorded population of Growling Grass Frog.
Survey access	Pedestrian access is good for the majority of the project area with all waterways intersected by roads. Access is variously available from Manks Road, Ballarto Road, McGregor Road, Railway Road and South Gippsland Highway. Pedestrian access within the reserve is reasonable, with the majority of vegetation be navigable, however areas of Estuarine Scrub can be difficult to navigate where Blackberry is present. Accessing the lower 400 m of Deep Creek and Cardinia Creek is difficult on the boundaries of the reserve. High tides may restrict access in some locations within the lower estuary. Use of kayaks may be beneficial in some locations.
Survey safety	Safety considerations relate to dense vegetation (obstructing view of ground), occasional fences that require crossing (minor issue), rabbit diggings/burrows (tripping hazard), soft sediments adjoining waterways (to be avoided), presence of cattle and occasional dense patches of Blackberry.
Survey risks	Damage to plants of <i>Tecticornia arbuscula</i> (Shrubby Glasswort) will result where this species occurs in dense stands (generally in the Coastal Saltmarsh sub-community Wet Saltmarsh Shrubland). This species is noted to be slow growing and is very brittle, and major branches may be snapped off when moving through stands.

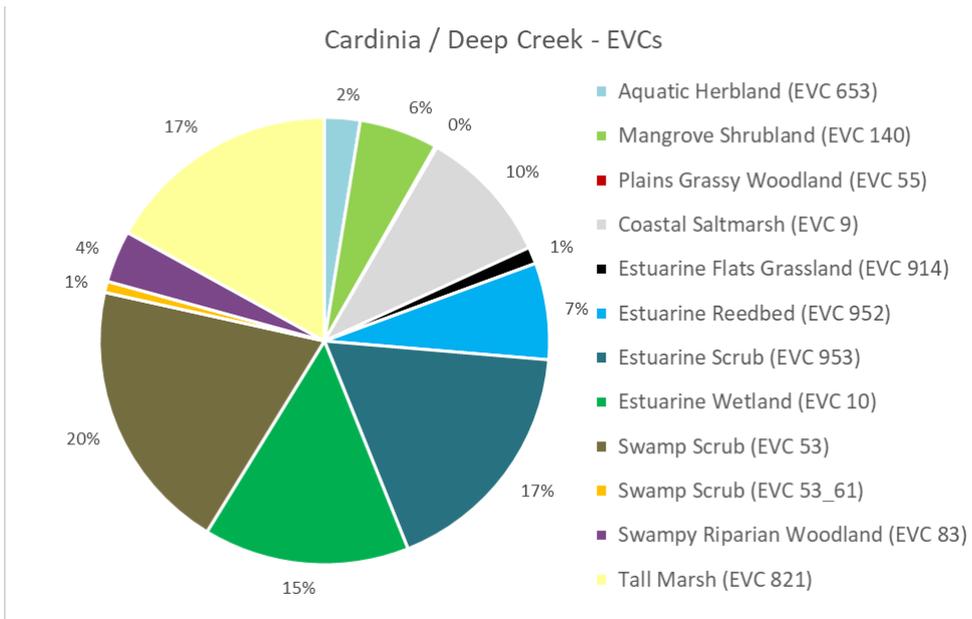


Figure 3-14. Cardinia Creek / Deep Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

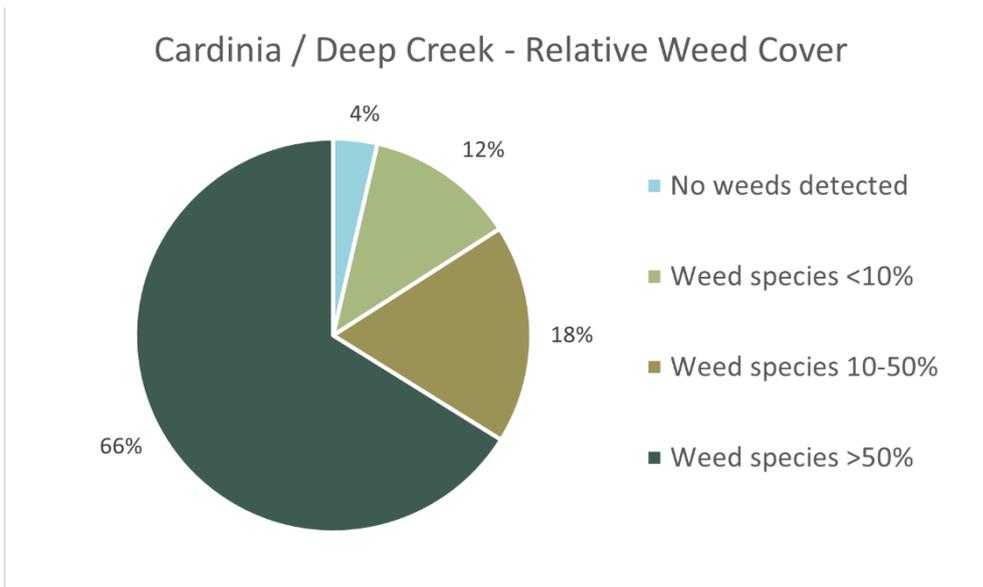
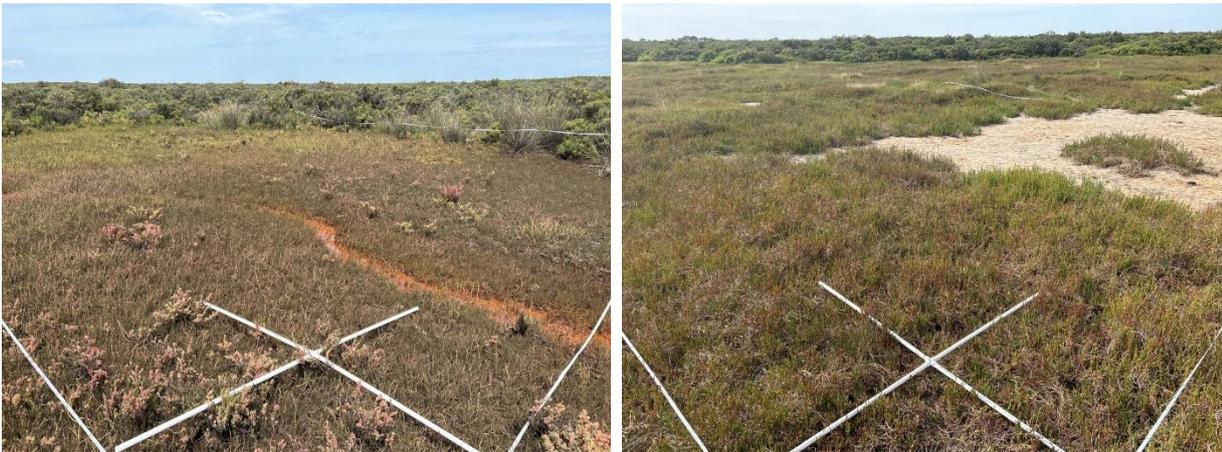


Figure 3-15. Cardinia Creek / Deep Creek Vegetation Visions survey area: relative weed cover



Picture 3-8. Cardinia: grid-plot photographs (left – Transect 1; right – Transect 2)



Picture 3-9. Cardinia Creek: grid-plot photographs (left – Transect 3, 20m; right – Transect 3, 40m)



Picture 3-10. Cardinia Creek: grid-plot photographs (left – Transect 4, 40m; right – Transect 4, 100m)



Picture 3-11. Cardinia Creek: grid-plot photographs (left – Transect 5; right – Transect 6)



Picture 3-12. Deep Creek: grid-plot photographs (left – Transect 1; right – Transect 2)



Picture 3-13. Deep Creek: grid-plot photographs (left – Transect 3; right – Transect 4)



Picture 3-14. Deep Creek: grid-plot photographs (left - Transect 5; right – Transect 6, 26m)



Picture 3-15. Deep Creek: grid-plot photograph (Transect 6, 180m)



Picture 3-16. Cardinia / Deep Creek Vegetation Vision survey area: EPBC Act and FFG Act listed Growling Grass Frog (*Litoria raniformis*) found within plot 5300 on the left side of Cardinia Creek 1

Cardinia Creek



Figure 3-16. Cardinia / Deep Creek: Vegetation Vision scoring (1 of 3)

Cardinia Creek



Figure 3-17. Cardinia / Deep Creek: Vegetation Vision scoring (2 of 3)



Figure 3-18. Cardinia / Deep Creek: Vegetation Vision scoring (3 of 3)

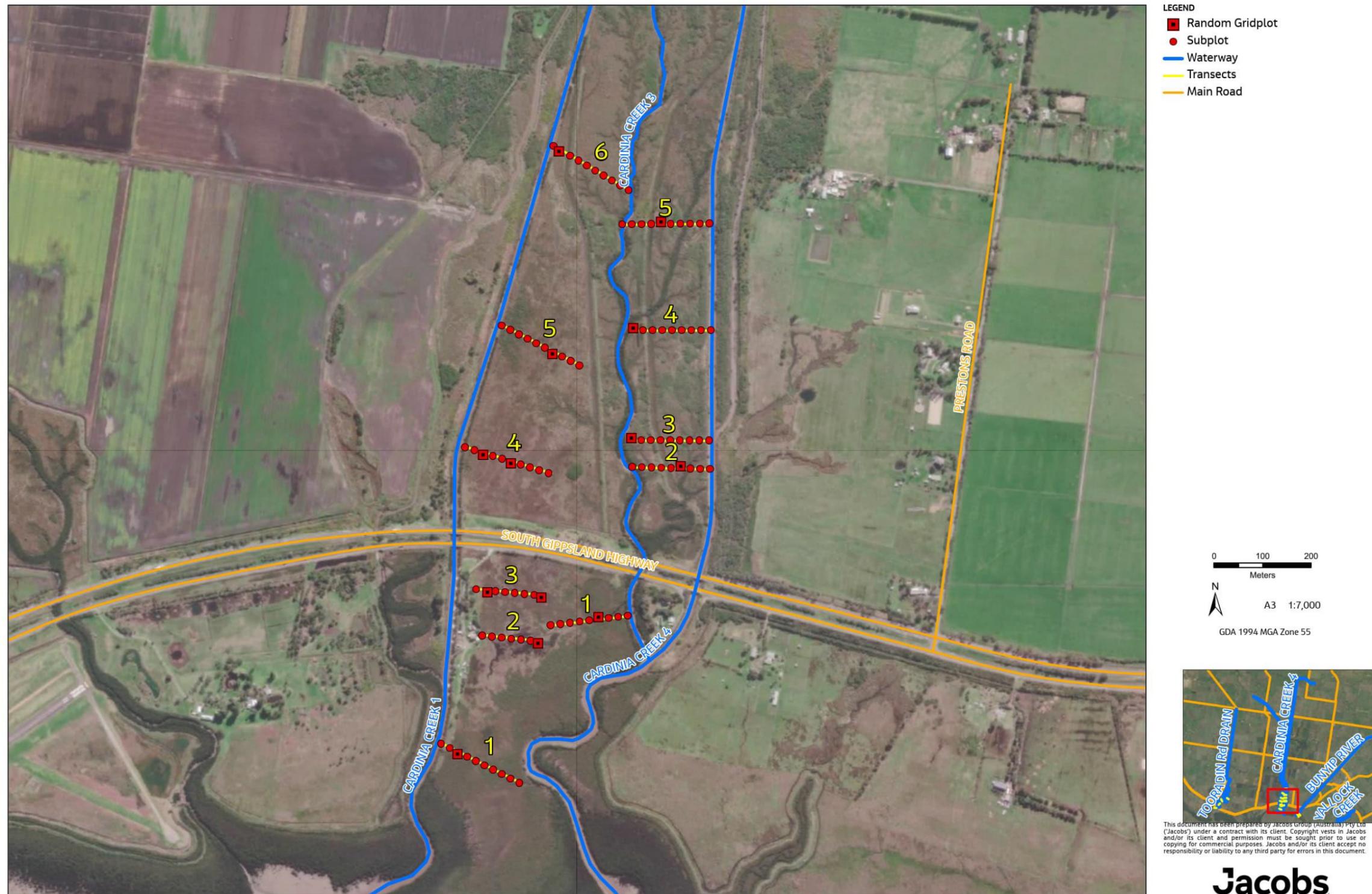


Figure 3-19. Cardinia/Deep Creek: transect locations

3.5 Chinamans Creek

Values	The lower extent of the estuary is dominated by high-density woodland vegetation representative of Coast Banksia Woodland. Moving further upstream, vegetation becomes shrubby and largely characteristic of Swamp Scrub EVC, with additional scatterings of non-woody vegetation representative of Tall Marsh. The creek itself is intersected by paved roads which impacts vegetative continuity in some sections. No saltmarsh vegetation was observed.
Threats	The majority of the estuary supports 10-50% weed cover (relative to native species) and a large proportion of this weed cover is due to high-threat weed species of management concern. The majority of the estuary is also subject to encroachment from adjoining paved roads and residential dwellings with man-made piers.
Survey access	The lower portion of the estuary is accessible from Point Nepean Road and associated Bay Trail adjacent to the Capel Sound Foreshore campground facility. Accessing the upstream portion can be done through Village Glen Drive. Walking within the creek corridor on the bank may be required.
Survey safety	As aforementioned, the majority of the estuary can be easily navigated, with footpaths and connecting bridges allowing easy access. Safety considerations relate to walking along the main road and along the creek bank when assessing upstream.
Survey risks	No risks identified.

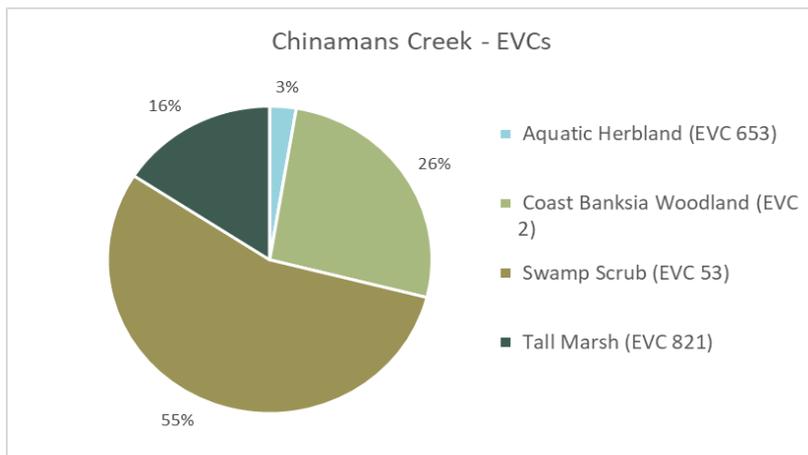


Figure 3-20. Chinamans Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

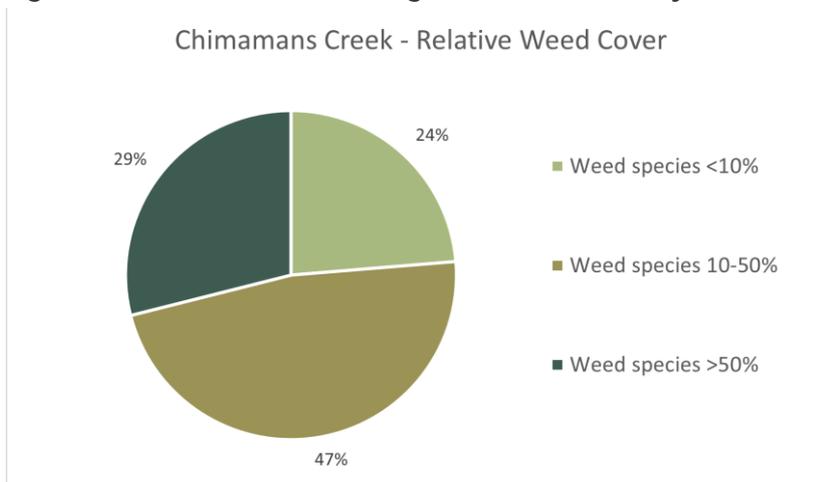


Figure 3-21. Chinamans Creek Vegetation Visions survey area: relative weed cover

Chinamans Creek

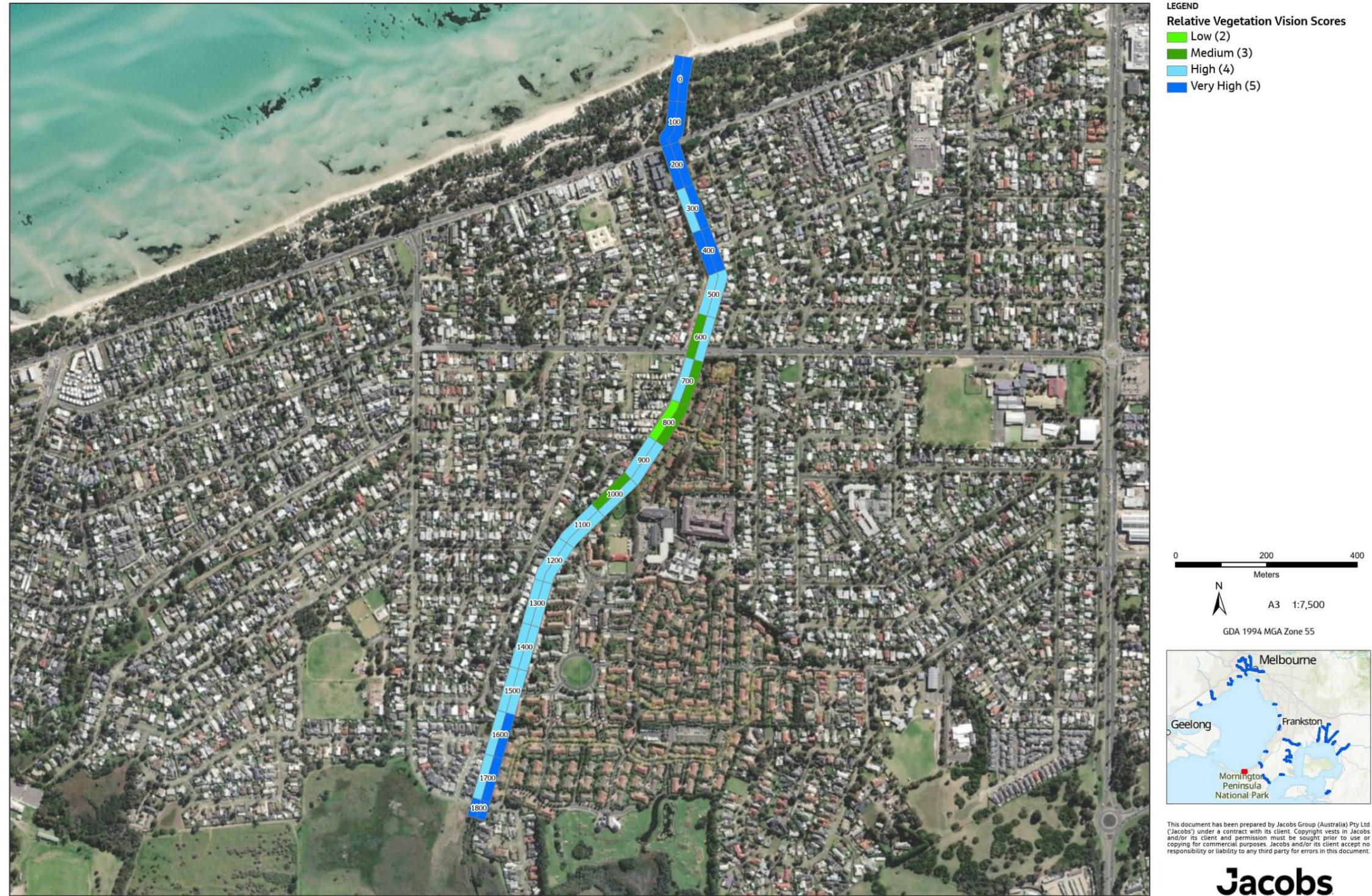


Figure 3-22. Chinamans Creek: Vegetation Vision scoring

3.6 Elwood Canal

Values	Remnant native vegetation is somewhat limited due to the highly modified nature of the site. The majority of the canal is concrete to accommodate recreational activities (e.g., cycling, walking) with occasional pockets of planted vegetation. With regards to EVCs, the native vegetation present is predominately planted as revegetation and representative of Grassy Woodland, Damp Sands Herb-rich Woodland, Coast Banksia Woodland and Coastal Dune Scrub.
Threats	The majority of the estuary supports 10-50% weed cover (relative to native species) and a large proportion of this weed cover is due to high-threat weed species of management concern. The majority of the estuary is also subject to encroachment from adjoining paved roads and residential dwellings. The canal is also prone to stormwater flooding due to its low-lying position.
Survey access	The estuary is accessible from Marine Parade towards the bay and upstream from Glen Huntly Road. Numerous foot bridges provide crossings to access either side when needed.
Survey safety	As aforementioned, the majority of the estuary can be easily navigated, with footpaths and connecting bridges allowing easy access. Safety considerations relate to walking along the canal as it does not have any barriers so caution when walking is required.
Survey risks	No risks identified.

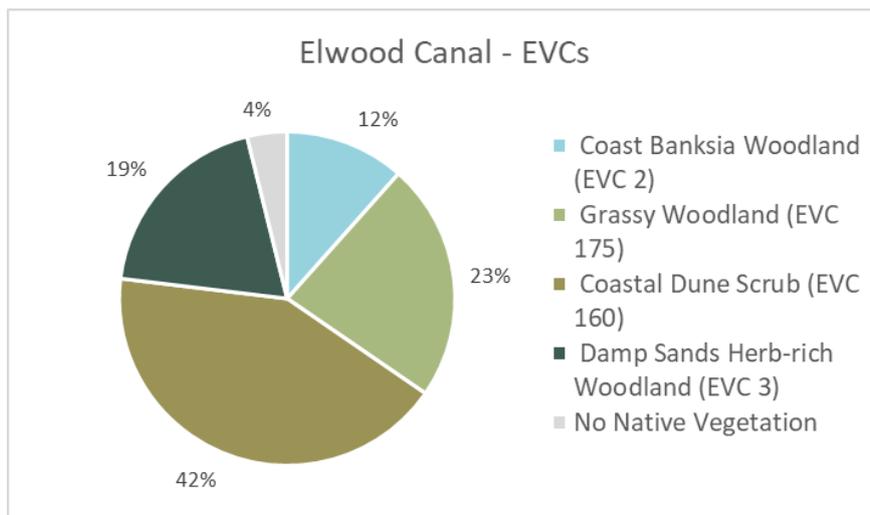


Figure 3-23. Elwood Canal Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

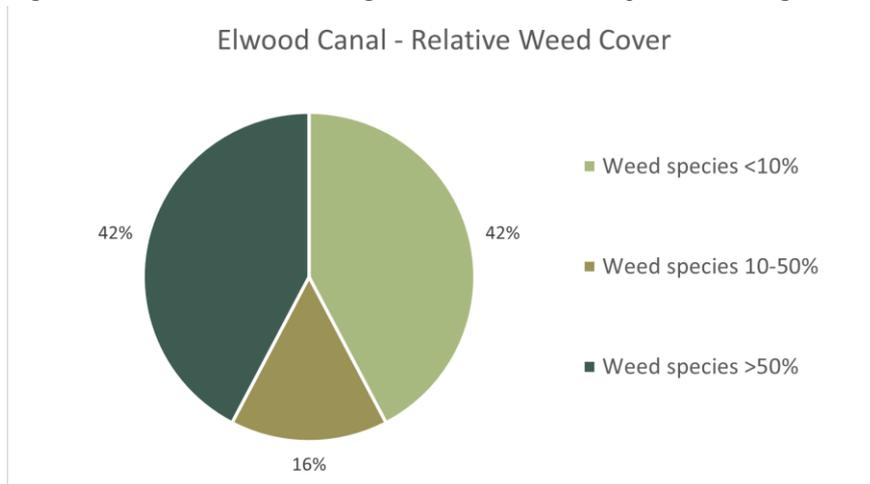


Figure 3-24. Elwood Canal Vegetation Visions survey area: relative weed cover

Elwood Canal



Figure 3-25. Elwood Canal: Vegetation Visions scoring

3.7 Kananook Creek

Values	Remnant vegetation was limited towards the estuary mouth with stands of planted indigenous vegetation from 0-800m being present and forming Coastal Banksia Woodland and Coastal Scrub. The remainder of the waterway was dominated by remnant Coastal Banksia Woodland and Swamp Scrub on the eastern bank (western bank between 1400-2000m), with small pockets of Swamp Scrub on the western bank (eastern bank between 1400-2000m), due to the encroachment of residential properties.
Threats	Kananook Creek generally contained a high relative cover (>50%) of weeds represented by garden escapees due to the encroachment of residential properties, lawns dominated by exotic grasses in landscaped areas, and environmental woody weeds within remnant vegetation.
Survey access	Walking tracks occur on at least one side of the waterway for the extent of the survey area. Access points include Nepean Hwy which crosses Kananook Creek, and the boat launching ramps carpark at the mouth of the estuary off Nepean Hwy. Areas without a walking track, backing on to residential properties, could be viewed from the opposite side.
Survey safety	Safety considerations include dense vegetation at the upper end of the study area.
Survey risks	No risks identified.

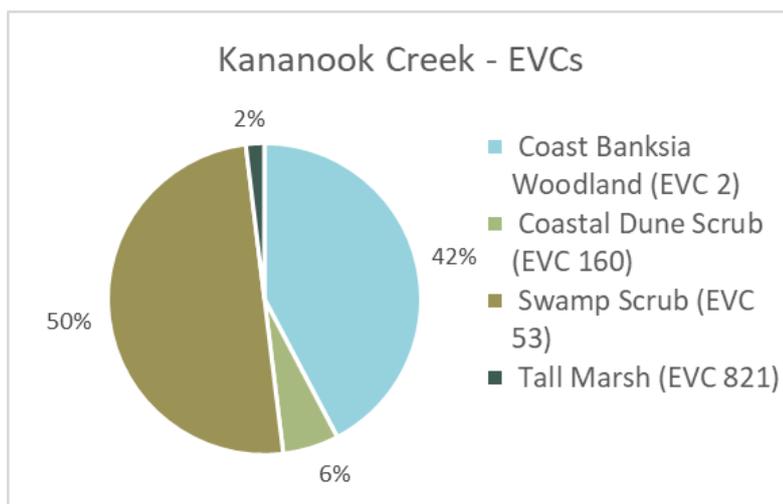


Figure 3-26. Kananook Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

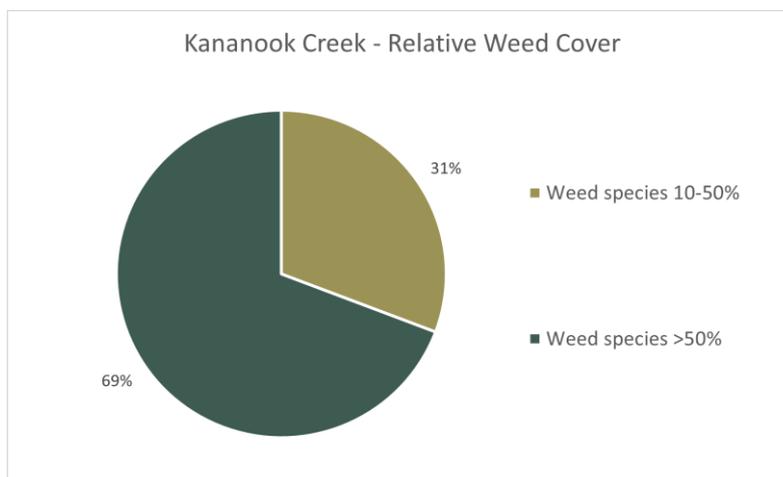


Figure 3-27. Kananook Creek Vegetation Visions survey area: relative weed cover

Kananook Creek

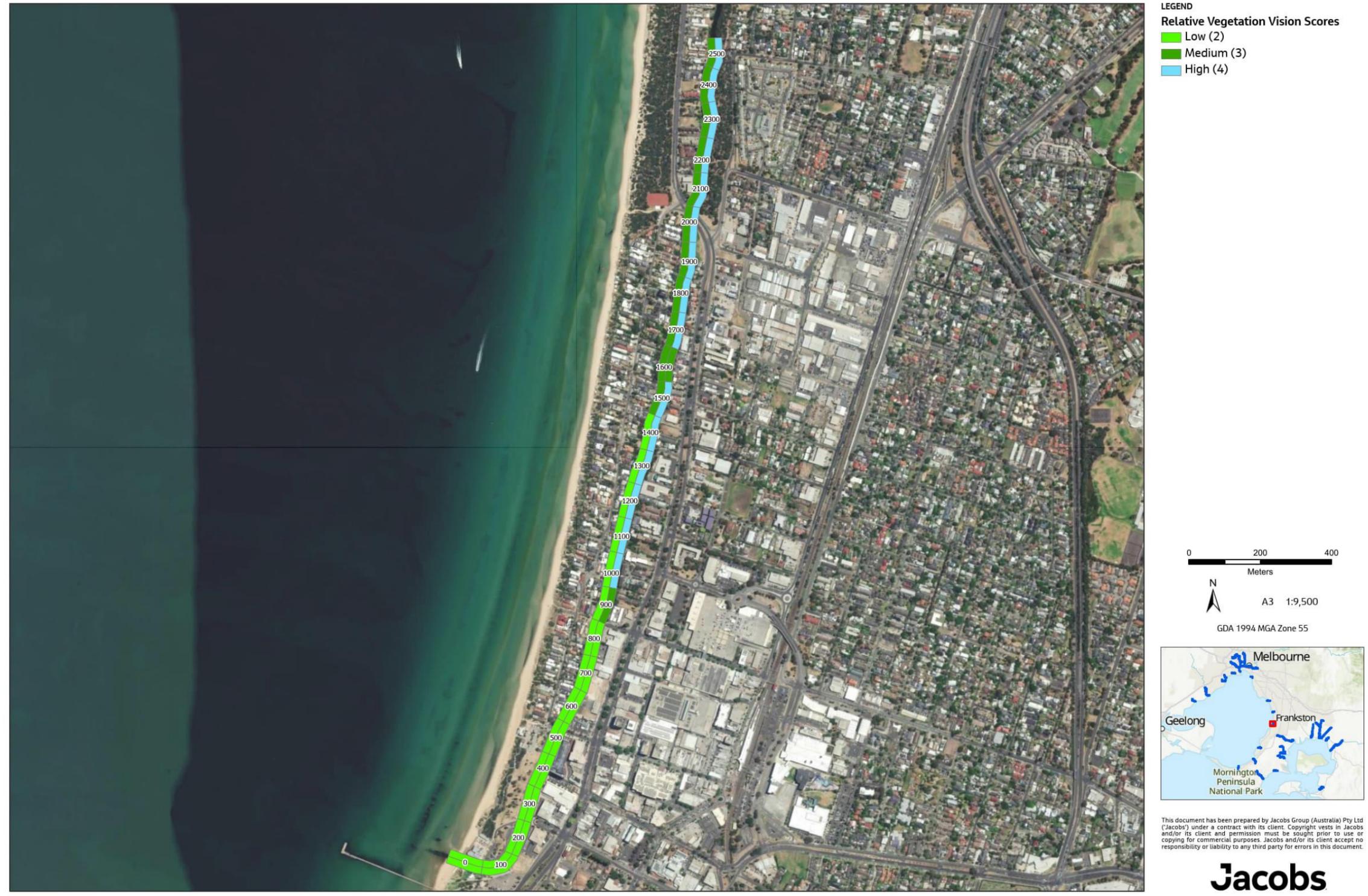


Figure 3-28. Kananook Creek: Vegetation Visions scoring

3.8 Kings Creek

Values	The lower end of this estuary falls within the Hastings Foreshore Reserve and was dominated by high quality remnant vegetation. This section of the Kings Creek was generally lined with Mangrove Shrubland which also extended perpendicular to the creek across large areas along the foreshore. Further inland, areas were dominated by Coastal Saltmarsh represented mainly by Wet Saltmarsh Shrubland with Wet Saltmarsh Herbland and Coastal Tussock Saltmarsh also present. Saltmarsh areas usually graded into Estuarine Wetland and Estuarine Scrub on boundaries further away from the tidal influence of the estuary. Beyond the Hastings Foreshore Reserve the waterway was dominated by Swamp Scrub which extended until grading into Swampy Riparian Woodland at the upper end of the study area, within Kings Creek Bushland Reserve.
Threats	Lower reach areas were generally devoid of exotic species. In areas further upstream the relative cover of weeds varied but was generally high (>50%) in areas where streamside vegetation was narrow due to surrounding residential and industrial development. Swamp Scrub vegetation was generally invaded by Blackberry (<i>*Rubus fruticosus</i> spp. agg.) with other woody weeds also present, especially in Kings Creek Bushland Reserve where large infestations of New Zealand Cabbage Tree (<i>*Cordyline australis</i>) were observed.
Survey access	Access was good throughout the Kings Creek study area with walking paths leading to vegetation within Hastings Foreshore Reserve and Kings Creek Bushland Reserve. Access to the transects on the western side of the waterway was via Thornhill Road. A large section of the southern side of the waterway, directly downstream of Kings Creek Bushland Reserve, was accessible by a fuel break occurring behind residential properties parallel to the creek. This fuel break had multiple road access points. Other access points include Marine Parade and Frankston-Flinders Road.
Survey safety	Safety considerations include dense vegetation (impenetrable in some places), unstable ground due to waterlogging (especially during high tide in saltmarsh vegetation), and tripping hazards including areas where Blackberry was prominent. It should also be noted that the study area is intersected by a railway line where there is little or no fencing adjacent to dense vegetation.
Survey risks	Damage to plants of <i>Tecticornia arbuscula</i> (Shrubby Glasswort) will result where this species occurs in dense stands (generally in the Coastal Saltmarsh sub-community Wet Saltmarsh Shrubland). This species is noted to be slow growing and is very brittle, and major branches may be snapped off when moving through stands.

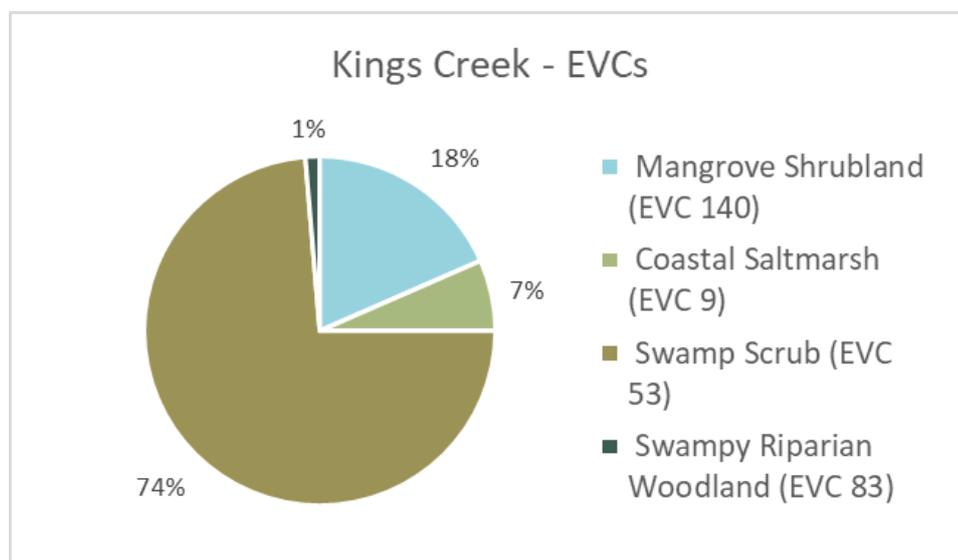


Figure 3-29. Kings Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

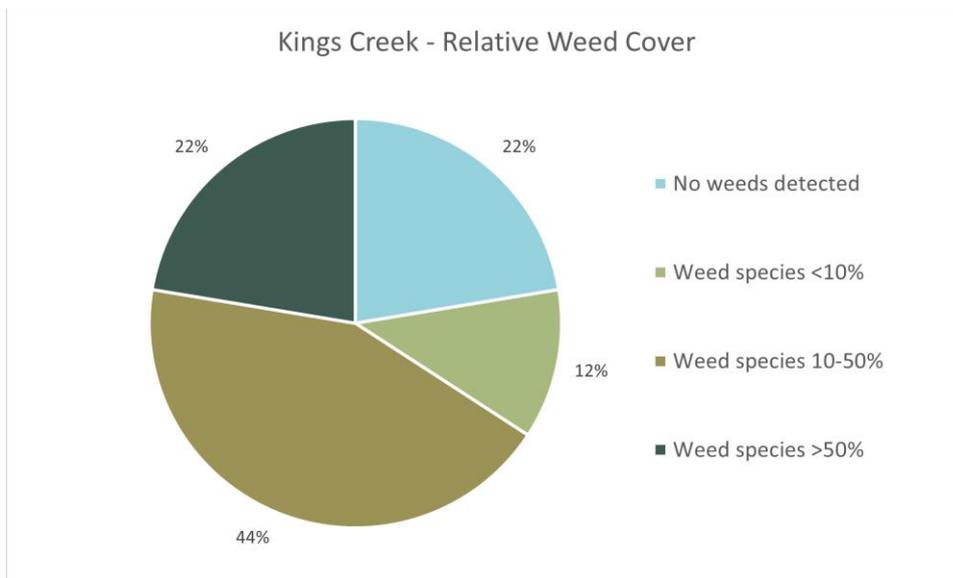


Figure 3-30. Kings Creek Vegetation Visions survey area: relative weed cover

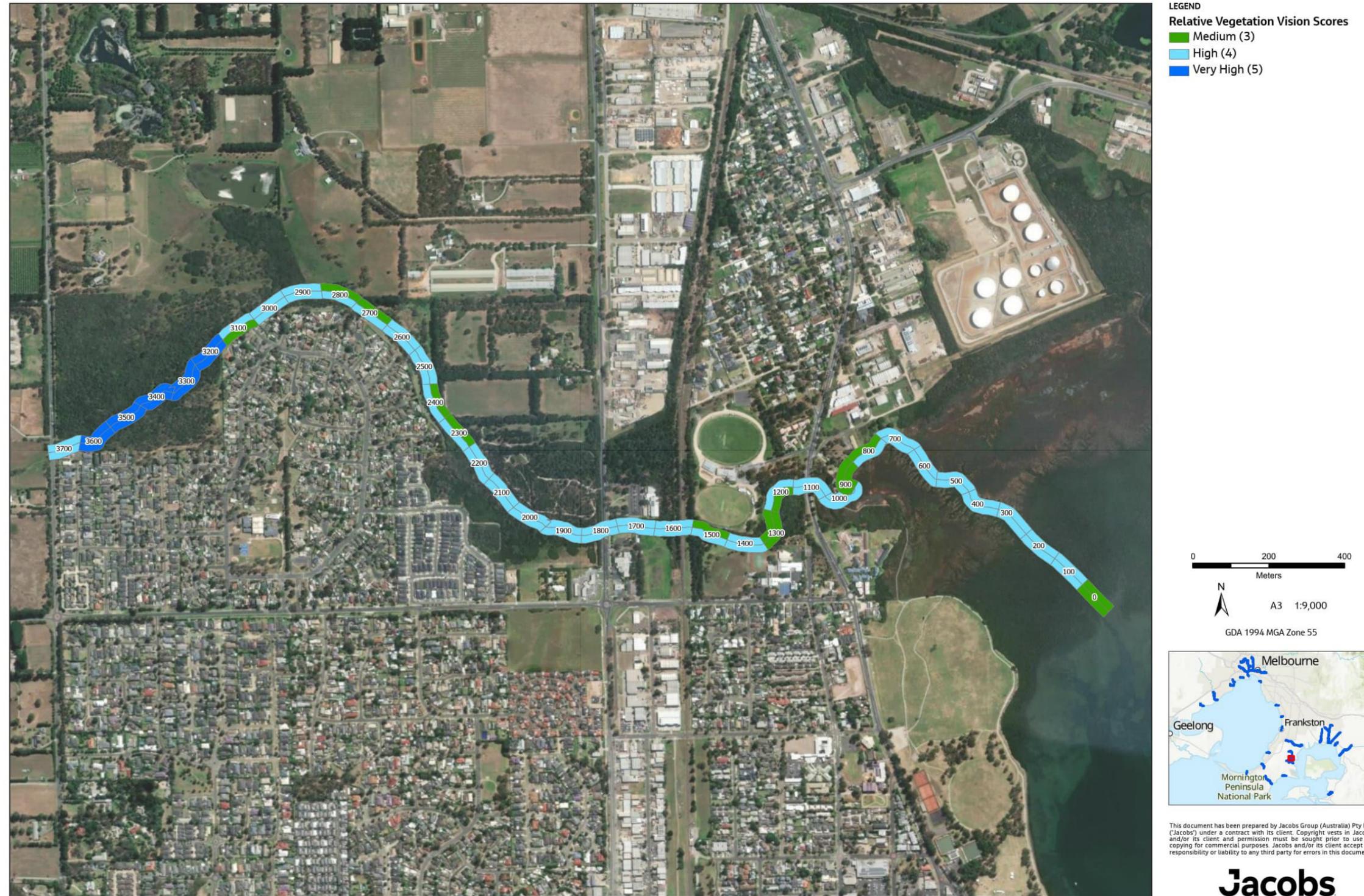


Picture 3-17. Kings Creek: grid-plot photographs (left – Transect 2, 85m; right – Transect 1, 120m)



Picture 3-18. Kings Creek Vegetation Vision survey area: Dense infestation of New Zealand Cabbage Tree (*Cordalyne australis*) found at plot 3200 on the right side

Kings Creek



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Figure 3-31. Kings Creek: Vegetation Visions scoring

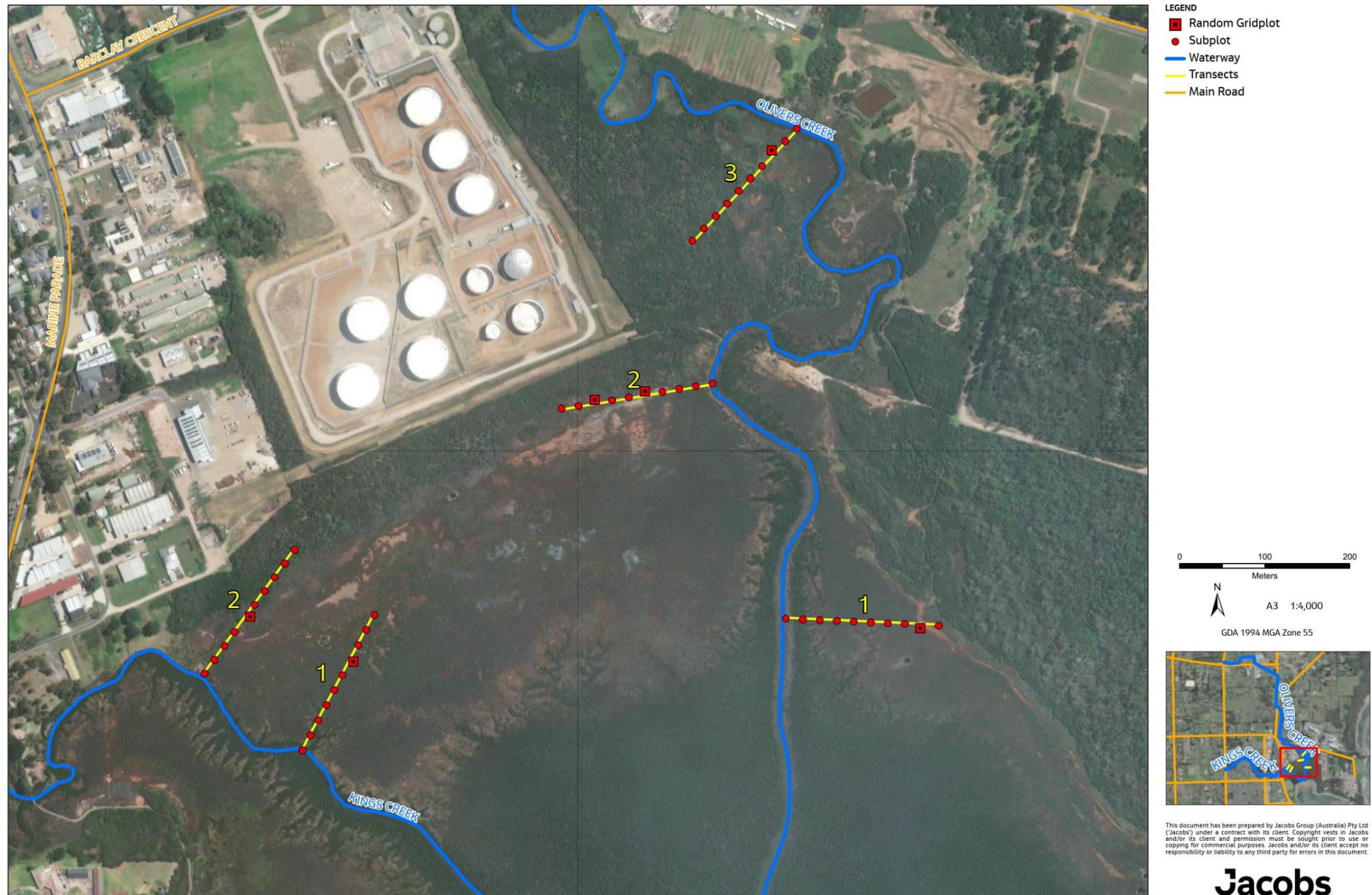


Figure 3-32. Kings Creek: transect locations

3.9 Kororoit Creek

Values	The lower reaches of Kororoit Creek contain significant areas of estuarine EVCs including Wet Saltmarsh Shrubland, Wet Saltmarsh Herbland, Coastal Hypersaline Saltmarsh and Berm Grassy Shrubland. The area between Altona Road and Miller Road contains Estuarine Wetland, Coastal Dry Saltmarsh and Brackish Lignum Swamp. Large areas of revegetation occupy Altona Coastal Park and some shrubland remnants indicate that Coastal Alkaline Scrub may have occupied older substrates. Most patches of saltmarsh EVCs represent the EPBC Act listed Subtropical and Temperate Coastal Saltmarsh community.
Threats	Parts of the study area were cleared some time ago and are now occupied for most part by exotic grasses e.g. <i>Cenchrus clandestinus</i> (Kikuyu) and <i>Thinopyrum junceiforme</i> (Sea Wheat-grass) and other introduced herbs. Rabbits were occasionally noted in Altona Coastal Park. Most of the southern side of Kororoit Creek has a large buffer of vegetation between estuarine vegetation and public access, residential and industrial land. These areas include some high threat weeds e.g. <i>Nassella</i> species. The north side has a relatively narrow buffer (10–20 m) of vegetation between industrial land in the lower reaches, and therefore has limited capacity for effective protection and expansion of estuarine vegetation.
Survey access	All parts of the study area are accessible. Some subplots are not accessible in Estuarine Reedbed due to deep water. Small tributaries in the lower sections require crossing at low tide or with gumboots. The water is quite shallow however the substrate is muddy on the edges. Access to the north side of upper sections is best from gate access at Miller Road.
Survey safety	Fieldwork planning needs to factor in crossing shallow tributaries. Traversing the study area is otherwise relatively easy. Moving equipment through Estuarine Wetland is somewhat slow and requires careful footing. There is an uncontrolled rail crossing for pedestrians on Altona Road. Snakes are common in this area.
Survey risks	No risks identified.

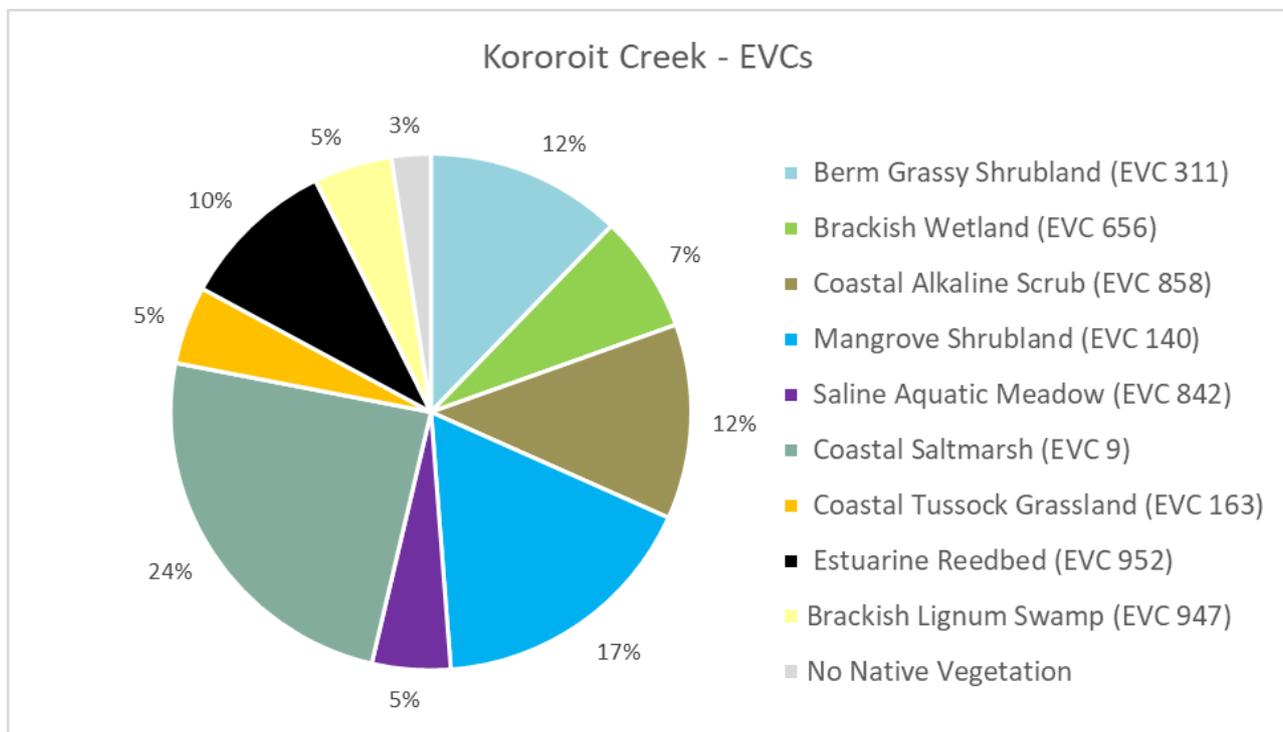


Figure 3-33. Kororoit Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

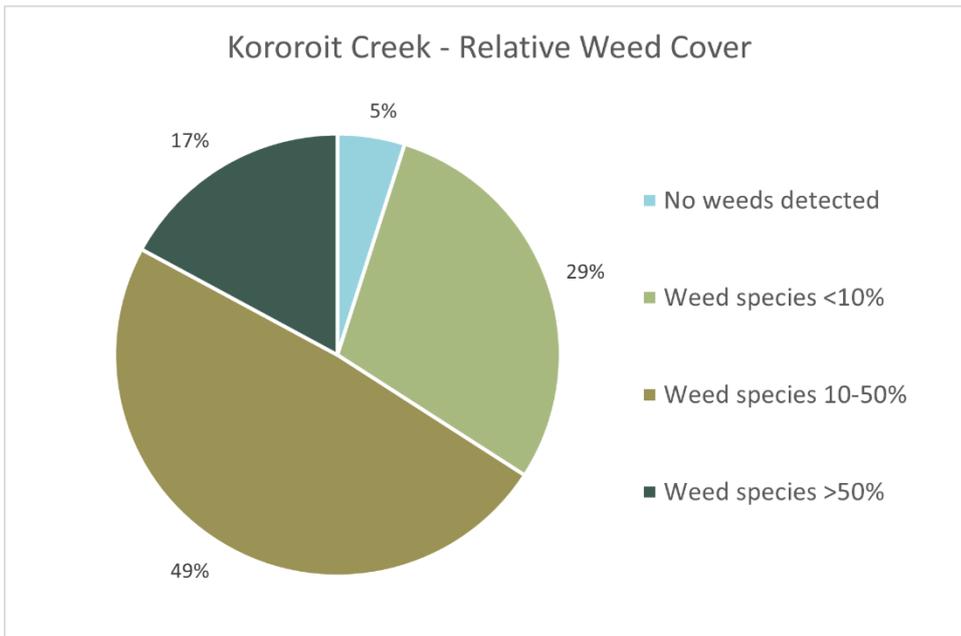


Figure 3-34. Kororoit Creek Vegetation Visions survey area: relative weed cover



Picture 3-19. Kororoit Creek: grid-plot photographs (left – Transect 1; right – Transect 2)



Picture 3-20. Kororoit Creek: grid-plot photographs (left – Transect 3; right – Transect 4)



Picture 3-21. Kororoit Creek: grid-plot photographs (left – Transect 5; right – Transect 6)



Picture 3-22. Kororoit Creek: grid-plot photographs (left – Transect 7; right – Transect 8)

Kororoit Creek and Paisley Drain



Figure 3-35. Kororoit Creek: Vegetation Visions scoring



Figure 3-36. Kororoit Creek: transect locations

3.10 Lang Lang River

Values	Native vegetation is predominantly present as revegetation with scattered occurrences of remnant, or at least naturally established native species. While the majority of the waterway contains some degree of native species cover, it is generally highly compromised by weed invasion. With regards to EVCs the majority of native vegetation present was referable to Swampy Riparian Woodland, though Coastal Saltmarsh, Tall Marsh and Swamp scrub were also recorded.
Threats	The majority of the estuary supports > 50% weed cover (relative to native species), and a significant proportion of this weed cover is due to high-threat weed species of management concern. Sections of the river are virtually impassable to access due to dense infestations of woody weed species including <i>*Rubus fruticosus</i> spp. agg. (Blackberry) and <i>*Crataegus monogyna</i> (Hawthorn). Approximately one-third of the estuary is subject to encroachment from adjoining farmland/private property. Areas of bank collapse/landslip were noted sporadically throughout the estuary, some of which were substantial in size.
Survey access	Access is limited throughout much of the estuary, and private property access was required for this project (at the lower and upper extents of the project area) to minimise backtracking. Additionally, due to impenetrable weed thickets in a number of locations it was necessary to move into adjoining paddock/private land to pass these locations.
Survey safety	Safety considerations relate to negotiating dense and/or prickly vegetation, fences, cattle-pugged ground and the presence of cattle within or immediately adjoining the riparian corridor. Additionally, access/egress points need to be determined prior to survey given the potentially large distances between suitable locations.
Survey risks	No risks identified.

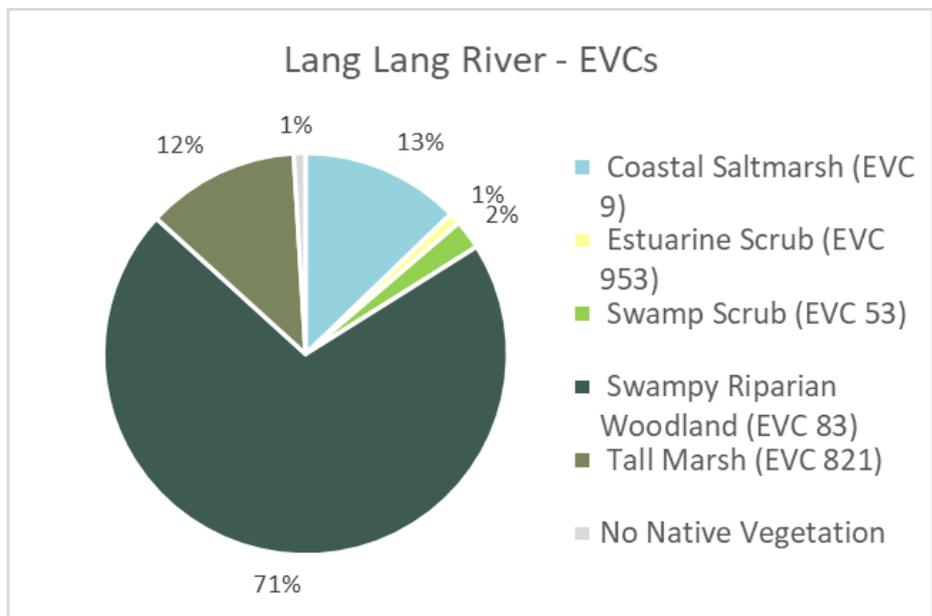


Figure 3-37. Lang Lang River Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

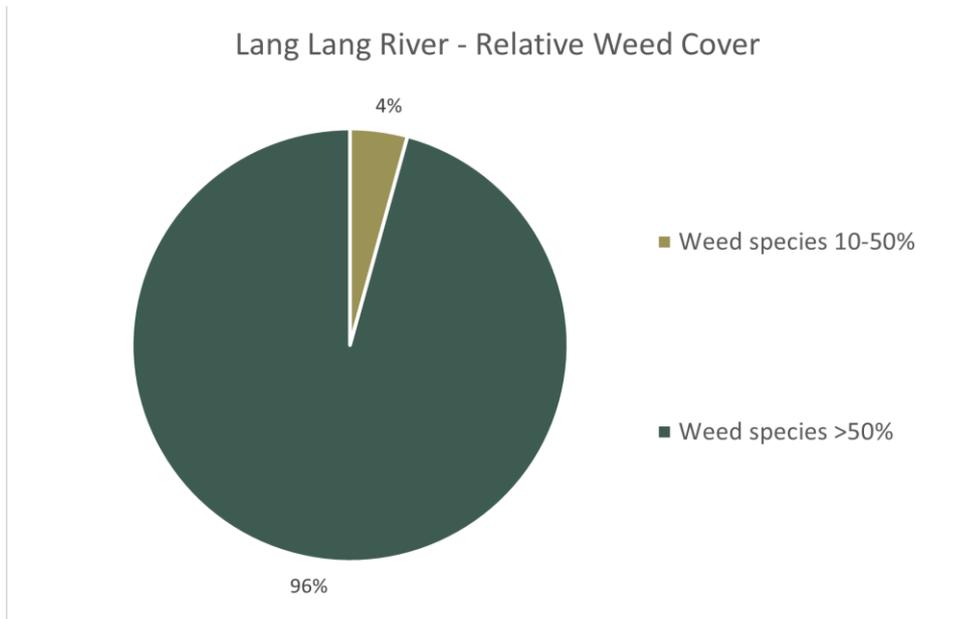


Figure 3-38. Lang Lang River Vegetation Visions survey area: relative weed cover

Lang Lang River



Figure 3-39. Lang Lang River: Vegetation Visions scoring (1 of 2)

Lang Lang River



Figure 3-40. Lang Lang River: Vegetation Visions scoring (2 of 2)

3.11 Laverton Creek

Values	The upper reaches of Laverton Creek contain most of the saltmarsh and related vegetation values. This area has significant large patches of Estuarine Wetland, Coastal Tussock Saltmarsh, Wet Saltmarsh Herbland and Estuarine Reedbed which are largely contiguous. Lower reaches from the Altona Treatment Plant south pass through more elevated surrounding land that may have been historically occupied by Coastal Alkaline Scrub, Plains Grassy Woodland and other woodlands and shrublands. Natural values in the riparian zone of lower reaches are mostly confined to within 10 m of the high-water mark. Above this zone a mix of revegetation, planted native trees (indigenous and other) and herbaceous weeds occupy the banks. At the lowest reaches, there are large patches of intact coastal saltmarsh and other coastal EVCs which form part of the more extensive Altona Foreshore Reserve. Most patches of saltmarsh EVCs represent the EPBC Act listed Subtropical and Temperate Coastal Saltmarsh community.
Threats	There are occasional woody weeds along the more elevated banks of Laverton Creek, including <i>*Chrysanthemoides monilifera</i> (African Boneseed) and <i>*Lycium ferocissimum</i> (African Box-thorn). <i>*Nassella leucotricha</i> (Texas Needle-grass) is scattered through elevated banks in the lower sections. Some saltmarsh vegetation near the Altona Treatment Plant is slashed alongside the shared trail, which restricts its development.
Survey access	Access to the north side of upper reaches can be made on foot via Merton Street or Bell Avenue. Access on the south side is good via a concrete shared trail. A number of informal pedestrian trails run through saltmarsh and related vegetation in the north. Both sides of the lower reaches are easily accessible via shared paths.
Survey safety	Care should be taken on shared trails to watch for bike traffic. Walking to surveys areas is generally low risk but requires some access through tall grassy vegetation. Care should take here to watch footing and for snakes which were observed while undertaking assessments.
Survey risks	No risks identified.

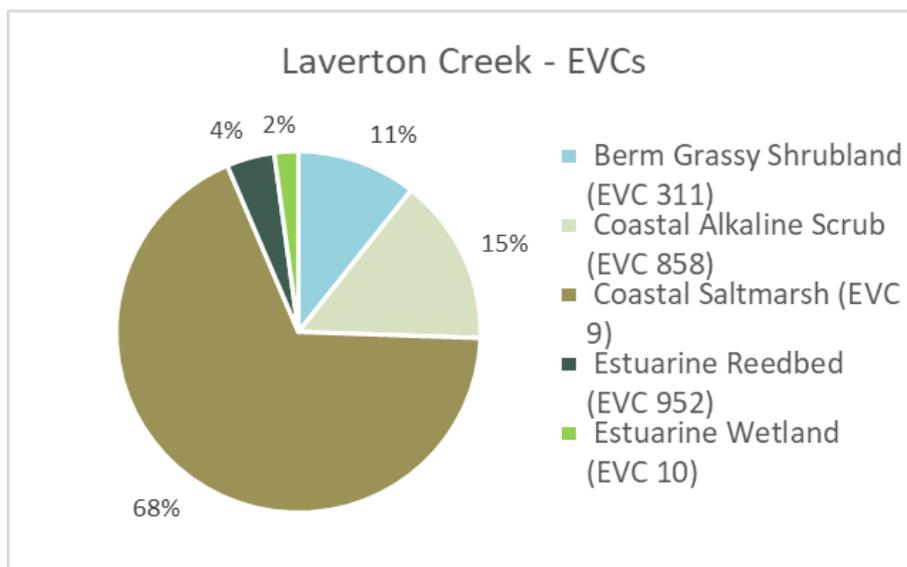


Figure 3-41. Laverton Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

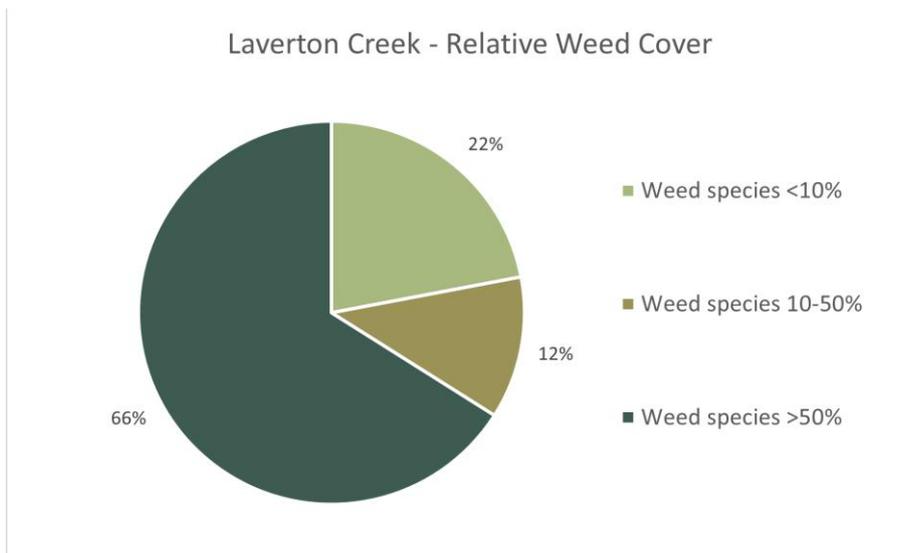


Figure 3-42. Lang Lang River Vegetation Visions survey area: relative weed cover



Picture 3-23. Laverton Creek: grid-plot photographs (left – Transect 1; right – Transect 2)



Picture 3-24. Laverton Creek: grid-plot photographs (left – Transect 3; right – Transect 4)



Picture 3-25. Laverton Creek: grid-plot photographs (Transect 5)

Laverton Creek



Figure 3-43. Laverton Creek: Vegetation Visions scoring



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Figure 3-44. Laverton Creek: transect locations

3.12 Little River

Values	Values along the Little River study area include patches of Wet Saltmarsh Shrubland, Wet Saltmarsh Herbland and Coastal Saline Grassland. The most intact area of coastal saltmarsh is at the entrance with native vegetation becoming patchier upstream. The upper section of the study area grades into Brackish Lignum Swamp and Creekline Grassy Woodland. Historical disturbance has modified many parts of the riparian zone within the study area, however native vegetation persists and is scattered throughout. The FFG Act listed species <i>Atriplex paludosa</i> (Marsh Saltbush) was recorded. Some patches of saltmarsh EVCs represent the EPBC Act listed Subtropical and Temperate Coastal Saltmarsh community.
Threats	Threats within the Little River study area are mostly concerning herbaceous weeds and rabbits. The weeds <i>Atriplex prostrata</i> (Orache), <i>Cynodon dactylon</i> (Couch) and <i>Aizoon pubescens</i> (Galenia) are common in some areas. The riparian zone is bounded by water treatment ponds and wetlands, limiting the available area for the spread of terrestrial riparian vegetation.
Survey access	Access to the Little River study area is via the Western Treatment Plant which requires at least two weeks of planning for access, including completion of a safety induction. Once access is approved, most of the assessment areas can be accessed by car.
Survey safety	There are abundant water bodies within the study area. Care should be taken navigating around water and planning should consider water quality issues. Snakes were observed within survey areas. Part of the transect lines include uneven ground obscured by vegetation, which presents a tripping hazard. Care should be taken on vehicle tracks as they are shared with bird watchers and management vehicles.
Survey risks	No risks identified.

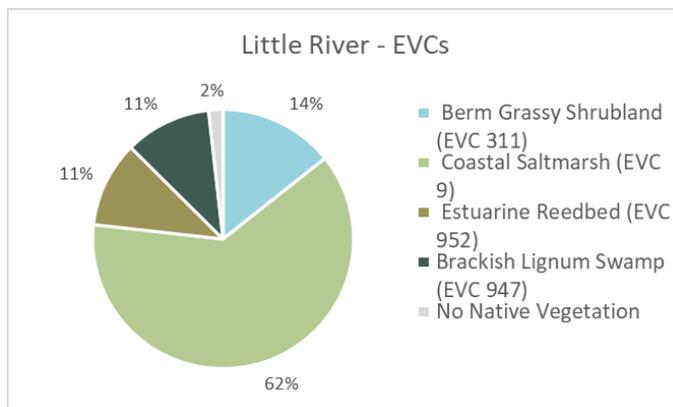


Figure 3-45. Little River Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

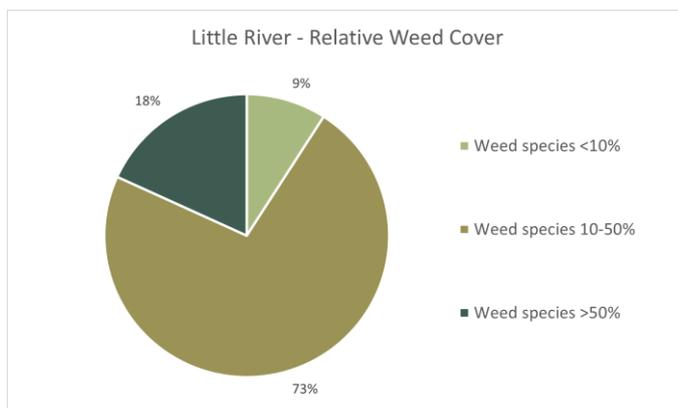


Figure 3-46. Little River Vegetation Visions survey area: relative weed cover



Picture 3-26. Little River: grid-plot photographs (left – Transect 1; right – Transect 3)



Picture 3-27. Little River: grid-plot photographs (Transect 4)

Little River



Figure 3-47. Little River: Vegetation Visions scoring



Figure 3-48. Little River: transect locations

3.13 Maribyrnong River

Values	The Maribyrnong River has significant areas of Riparian Woodland, Plains Grassy Woodland and Escarpment Shrubland in the upper reaches of the study area. Escarpment areas in the vicinity of Lily Reserve contain a suite of biodiversity values. Similar to the Yarra River, treeless vegetation types in lower reaches are not extensively formed due to modification of riparian area for urban parklands, paths etc. Areas around Coode Island have very limited riparian vegetation.
Threats	Rubbish accumulation in vegetation (notably <i>Duma florulenta</i> (Tangled Lignum)) on the banks of the Maribyrnong River was conspicuous due to recent flooding. Soil erosion on the escarpment of the upper reaches is also conspicuous and there is minor to moderate bank slip in some sections. Herbaceous and woody weeds are common in patches of woodland and escarpment EVCs. Rabbits and warrens were observed also in these areas. The absence of riparian vegetation in the lower reaches presents a potential water quality issues. Urban and industrial land use in these areas is intensive.
Survey access	Most of the Maribyrnong River is accessible by bike path or walking trail. Some sections required walking on grassy areas. A section of steep escarpment near Lily Reserve is only partially accessible and lower reaches around Coode Island are not open to the public. Most of the riparian zone in the industrial zone of Coode Island and nearby are void of vegetation which requires assessment.
Survey safety	Bike and pedestrian traffic is common along the banks of the study area. Care should be taken by wearing high visibility clothing and watching for others. Steep sections of the bank should be avoided on foot. Some access requires road crossing. Upper reaches required foot access over areas with rabbit warren and eroded escarpments. Snakes are common in the upper sections of the study area.
Survey risks	No risks identified.

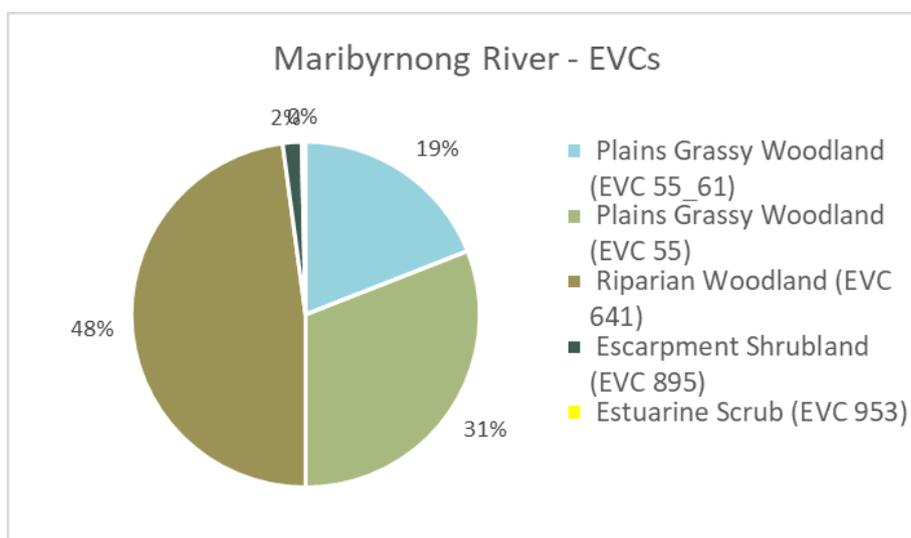


Figure 3-49. Maribyrnong River Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

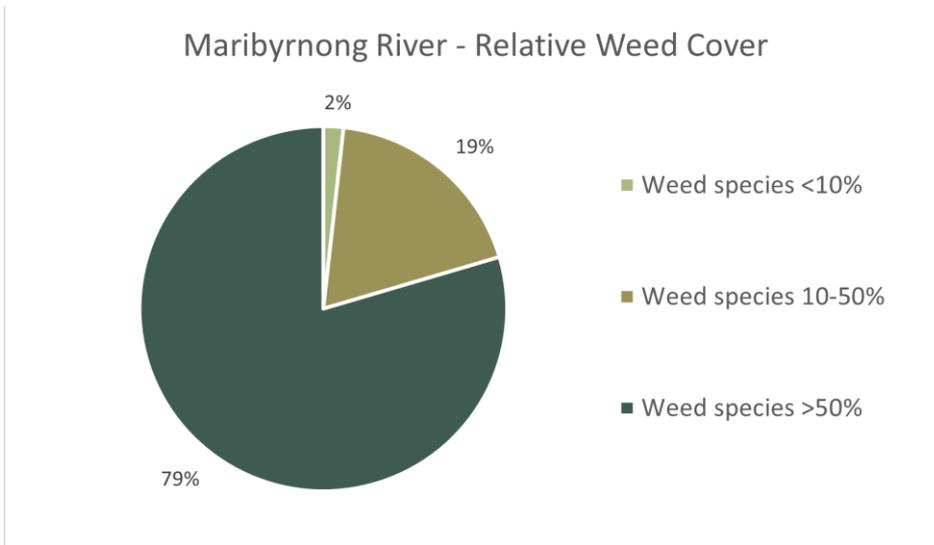


Figure 3-50. Maribyrnong River Vegetation Visions survey area: relative weed cover

Maribyrnong River

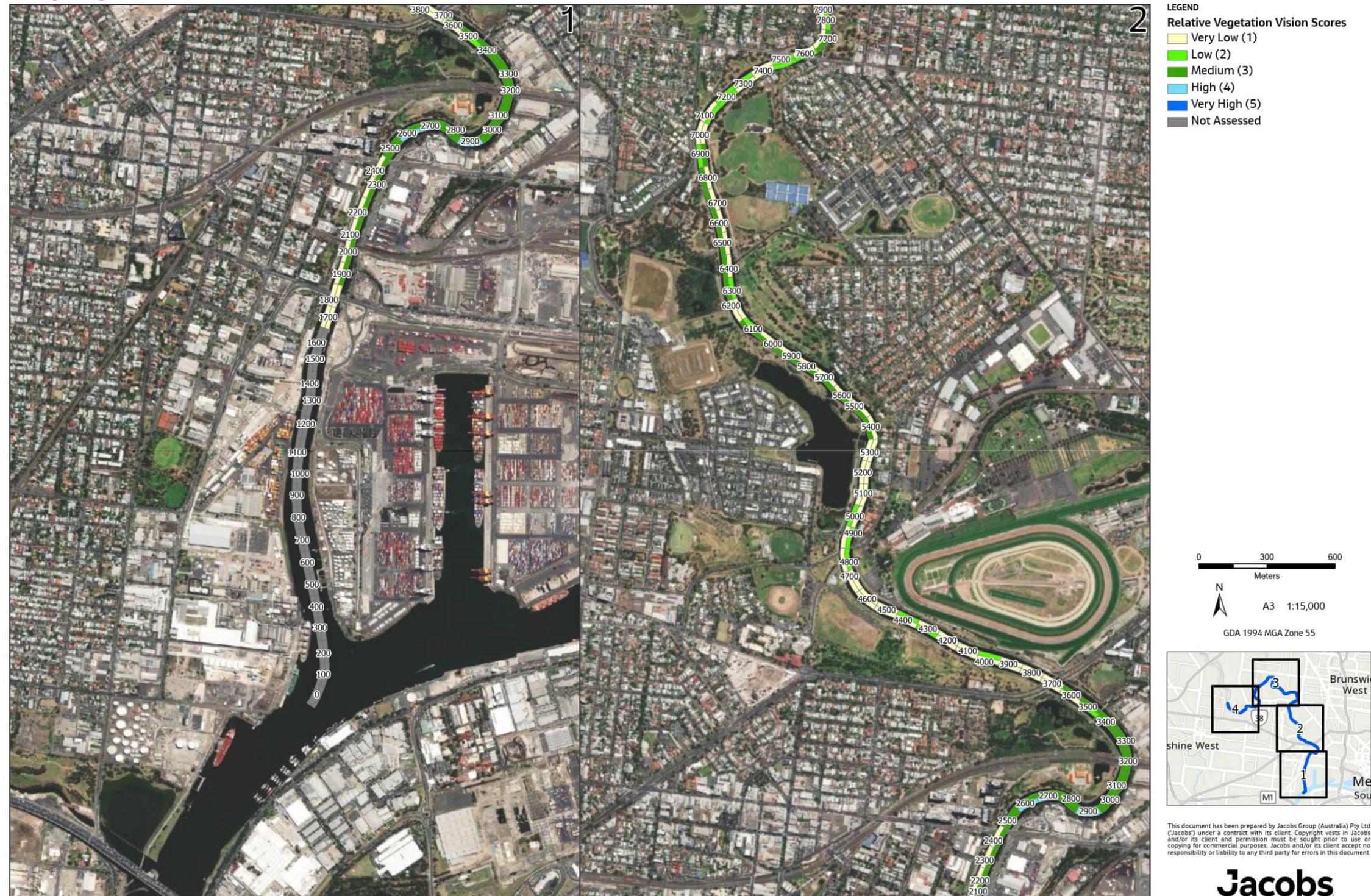
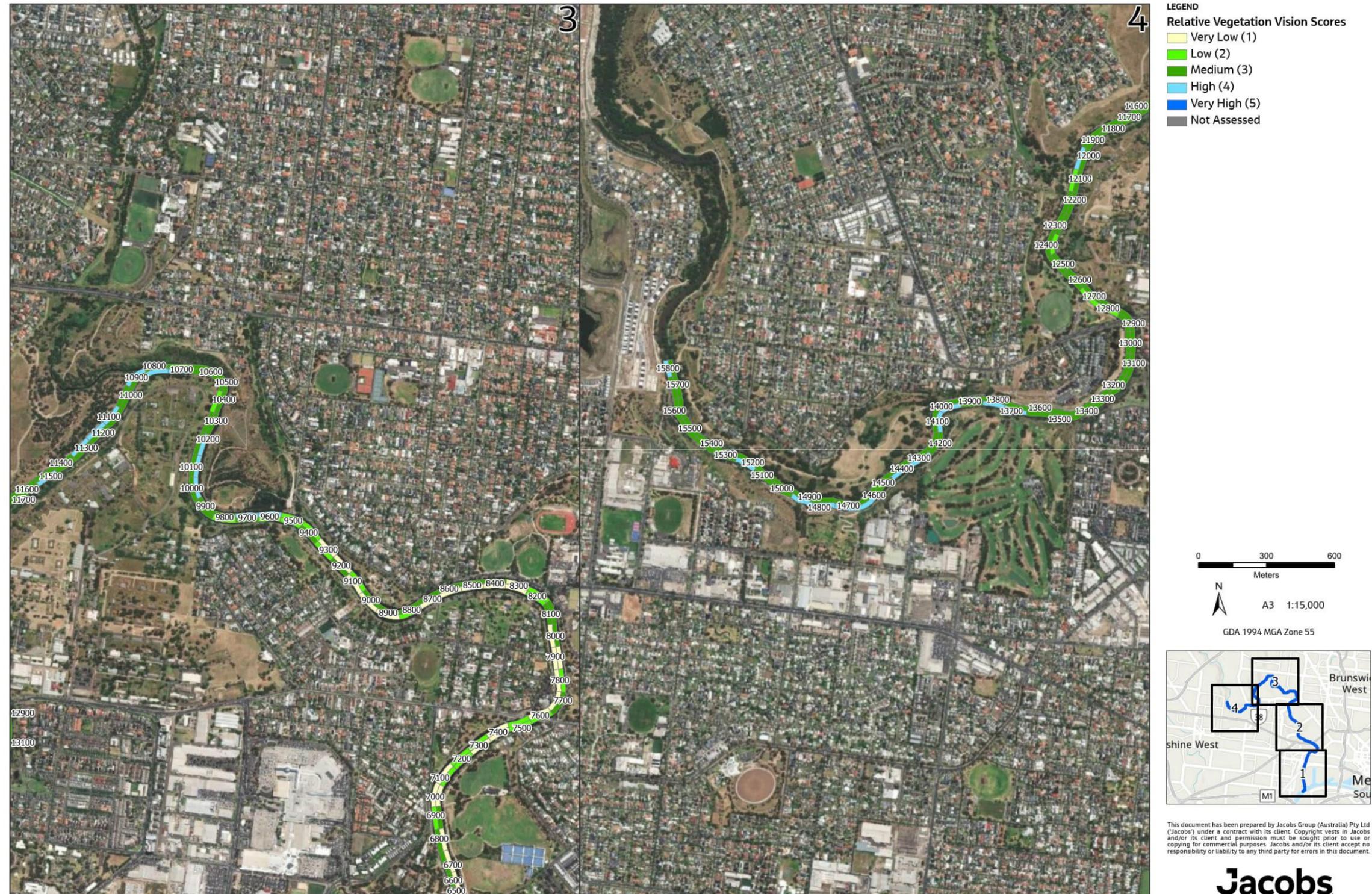


Figure 3-51. Maribyrnong River: Vegetation Visions scoring (1 of 2)

Maribyrnong River



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Figure 3-52. Maribyrnong River: Vegetation Visions scoring (2 of 2)

3.14 Merricks Creek

Values	Majority of the downstream extent of the estuary to the east of Balnarring Road supports high-quality remnant vegetation. Dominant EVCs include Estuarine Wetland, Coastal Saltmarsh (predominately Wet Saltmarsh Herbland) and Coastal Dune Scrub. Further upstream, native vegetation remains highly connected but is generally of lower quality and infested by weeds. Native vegetation quality then decreases again towards the mouth of the estuary where it abuts private property.
Threats	The majority of the estuary supports 10-50% weed cover (relative to native species), and a significant proportion of this weed cover is due to high-threat weed species of management concern. A section of the creek at the mouth of the estuary is difficult to access due to dense infestations of woody weed species including <i>*Polygala myrtifolia</i> (Myrtle-leaf Milkwort). Access further upstream is also made difficult by the presence of <i>*Rubus fruticosus</i> spp. agg. (Blackberry) and <i>*Pittosporum undulatum</i> (Sweet Pittosporum).
Survey access	The upstream portion of the estuary can be accessed via Bayview Road and Balnarring Beach Road. Access on the right side (moving downstream) from Bayview Road to Balnarring Road can be navigated by a walking track adjacent to the Balnarring Beach Foreshore Reserve. Access on the left side in this section of creek is difficult to navigate, with no clear pathway, steep terrain and dense vegetation. From Balnarring Road onwards moving downstream, the creek can be accessed on foot, again requiring walking through dense vegetation, narrow creek banks and steep slopes. The use of footbridges is recommended, particularly on the left side where the creek splits approximately a third of the way down. Towards the mouth of the estuary, access is possible from the Promenade, however walking from here can be difficult due to the presence of fences, retaining walls and narrow sand banks.
Survey safety	Safety considerations relate to negotiating dense and/or prickly vegetation and steep slopes. Additionally, access/egress points need to be determined prior to survey given the potentially large distances between suitable locations.
Survey risks	No risks identified.

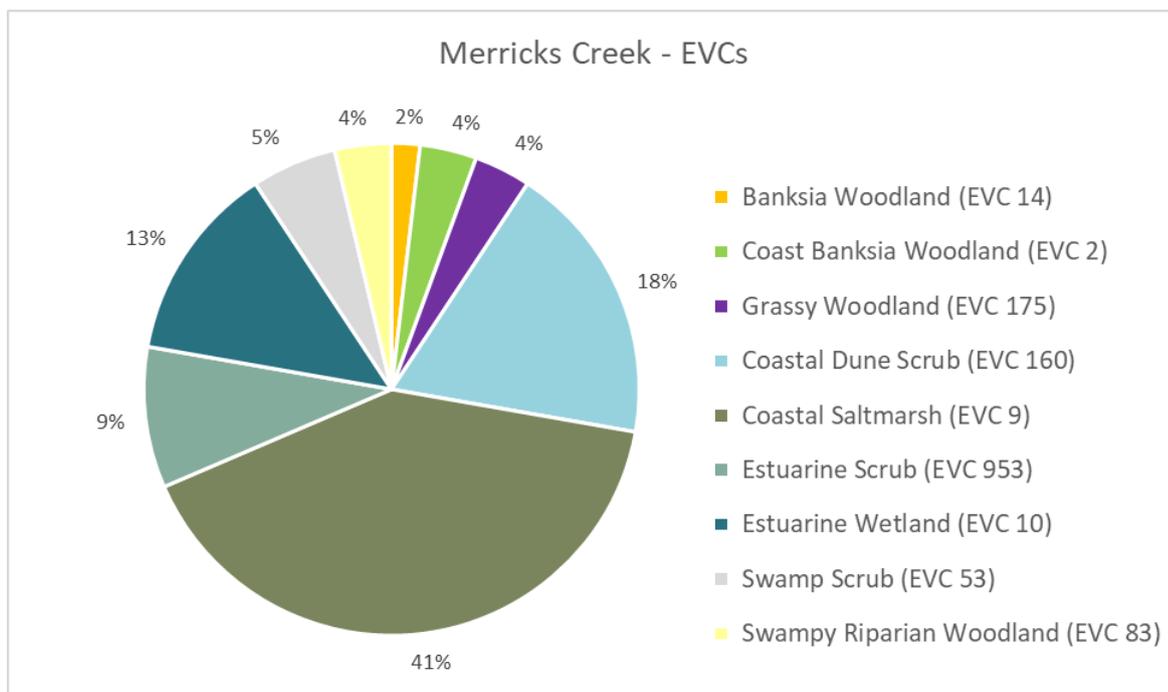


Figure 3-53. Merricks Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

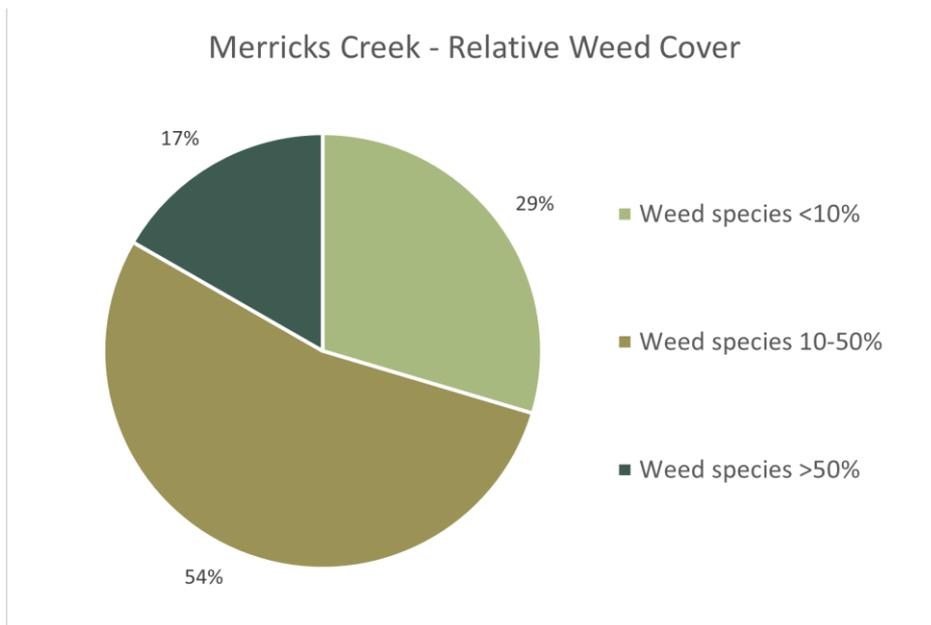
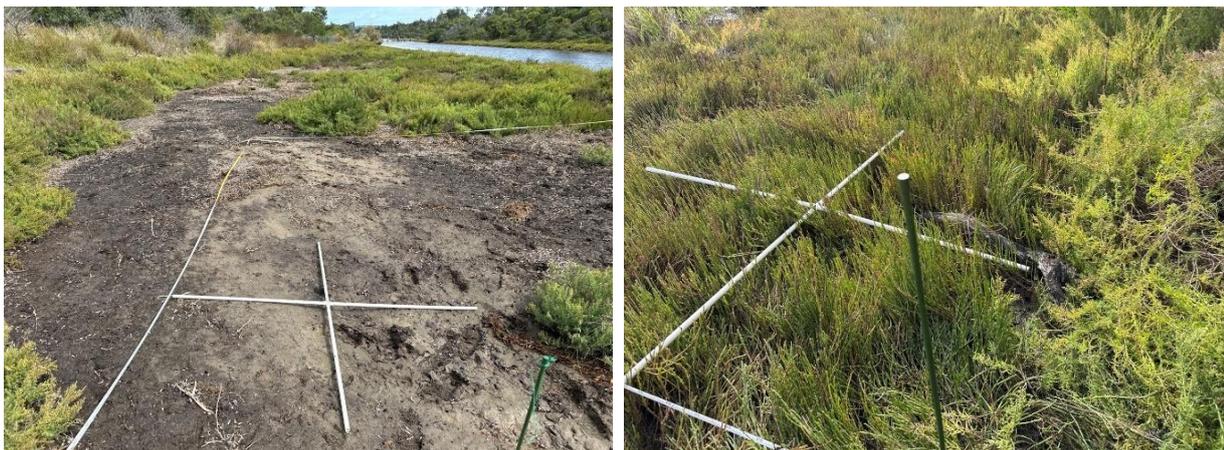


Figure 3-54. Merricks Creek Vegetation Visions survey area: relative weed cover



Picture 3-28. Merricks Creek: grid-plot photographs (left – Transect 1, 20m; right – Transect 2, 40m)

Merricks Creek



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Figure 3-55. Merricks Creek: Vegetation Visions scoring



Figure 3-56. Merricks Creek: transect locations

3.15 Moonee Ponds Creek

Values	Native vegetation values along Moonee Ponds Creek are limited. They are mostly accounted for by woodland in the upper sections as well as older revegetation and narrow strips of Wet Saltmarsh Herbland, Estuarine Wetland or Estuarine Reedbed / Tall Marsh elsewhere. Treed EVC include Floodplain Riparian Woodland, Riparian Woodland and Plains Grassy Woodland, in low to moderate condition. Remnant River Red-gums are scattered in the lower reaches. The upper reaches comprise Riparian Woodland in a moderately steep valley with a mix of mature eucalypts and very low to moderate quality understorey. Further downstream, extensive sections have been converted to concrete drains where a small number of native rushes, sedges and other herbaceous species occupy small patches. Some sections of the creek in the lower reaches (e.g. between North Melbourne and Parkville) contain larger patches of Tall Marsh and Sedge Wetland, however they do not form the dominant vegetation type.
Threats	The upper sections of Riparian Woodland are extremely weedy. These sections occupy all areas upstream of the first constructed concrete drain and contain a mix of introduced herbs, well-established garden escapes and naturalised woody species. Introduced trees and shrubs are advanced to the stage where they form a closed lower canopy under eucalypts and preclude the growth of native ground flora in many areas. Eucalypt dieback is evident at some locations. In lower reaches where concrete drains are installed, riparian vegetation is negligible. Rabbits were observed in the upper sections. The main threats south of Parkville are encroachment by infrastructure, litter and herbaceous weed such as <i>*Ranunculus repens</i> (Creeping Buttercup).
Survey access	There is restricted pedestrian access along the larger concrete drains e.g. around Essendon. The smaller concrete drain section upstream of here is accessible in part. The valley in the upper reaches (south of Moreland Road) is steep on tighter bends and the vegetation is too dense in places for easy foot access. An informal pedestrian trail runs along the back of houses in part of this section. The majority of the remaining sections are accessible by bike track (Moonee Ponds Creek Trail which starts at Donald Avenue in the north).
Survey safety	Care is required when walking through vegetation north of Donald Avenue. The ground is steep and there are a few rabbit warrens and shallow eroded gullies that may be obscured by vegetation. Access to the larger concrete drain in the mid reaches is sign posted to prevent access for safety reasons, however vegetation quality here is hardly worthy of requiring access. The Moonee Ponds Creek Trail is frequently used by bike riders, some of which are commuting at high speed. Two assessors should be used to ensure traffic on the bike trail is monitored during access. A few locations within the study area require road crossings.
Survey risks	No risks identified.

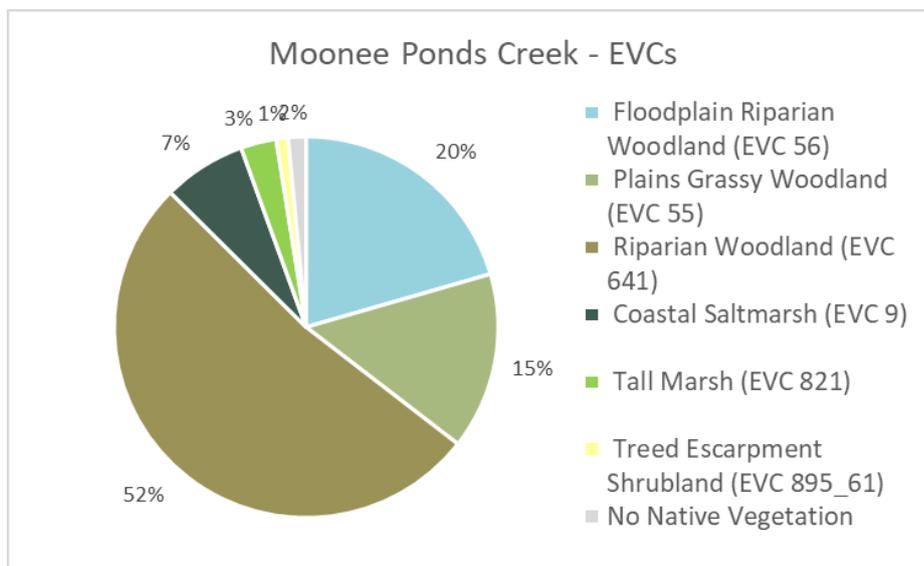


Figure 3-57. Moonee Ponds Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

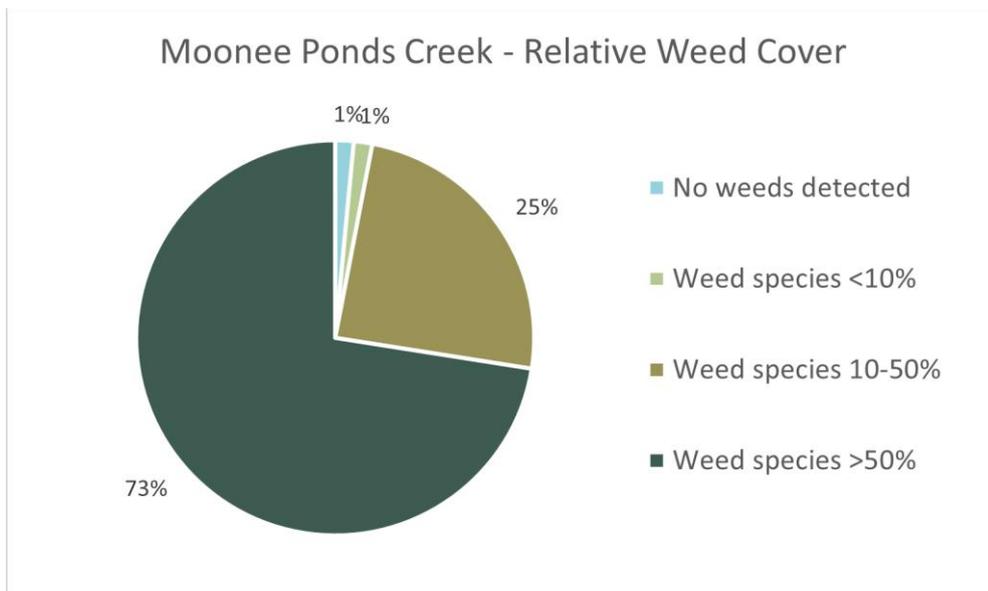


Figure 3-58. Moonee Ponds Creek Vegetation Visions survey area: relative weed cover

Moonee Ponds Creek

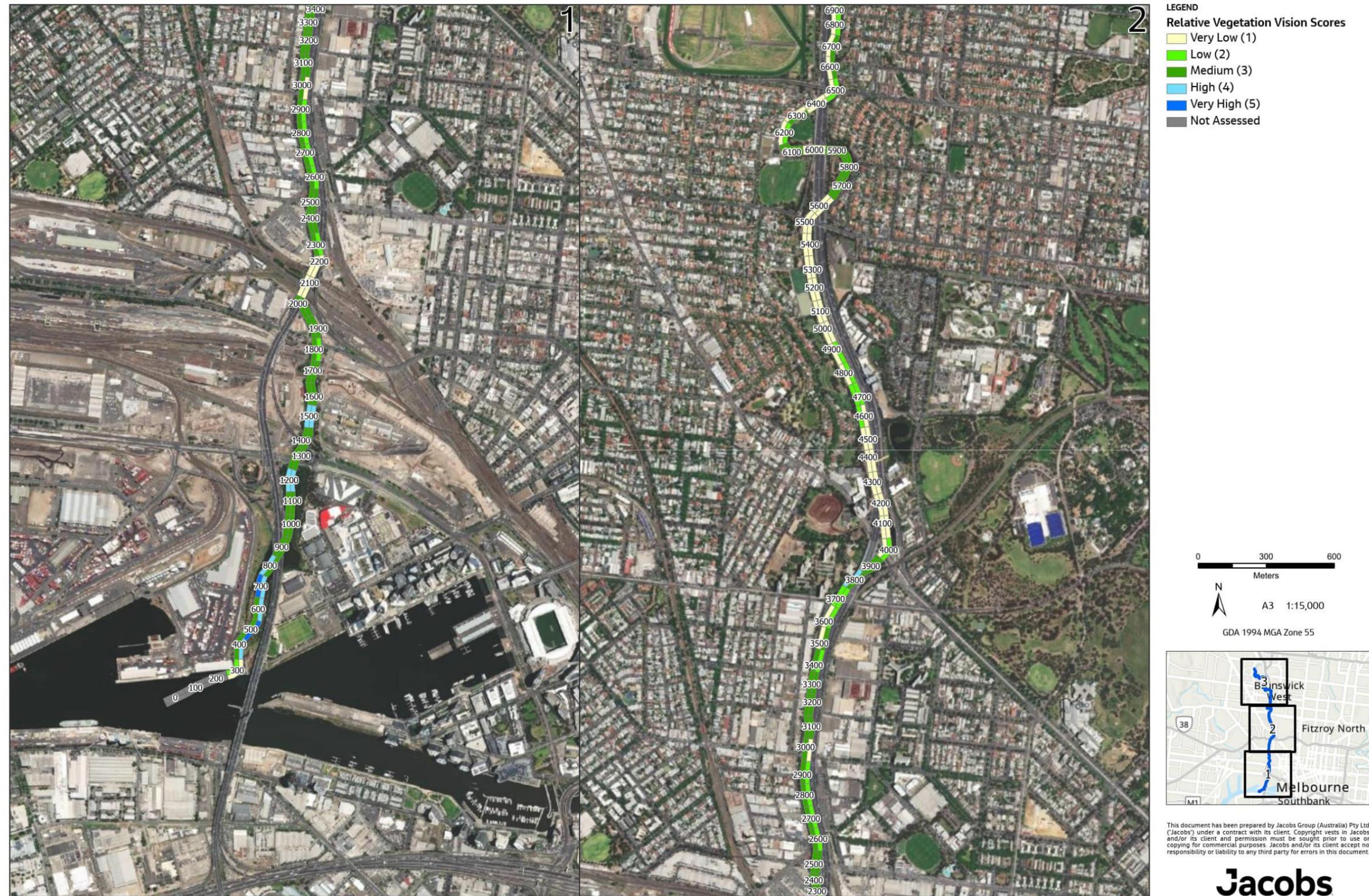


Figure 3-59. Moonee Ponds Creek: Vegetation Visions scoring (1 of 2)

Moonee Ponds Creek

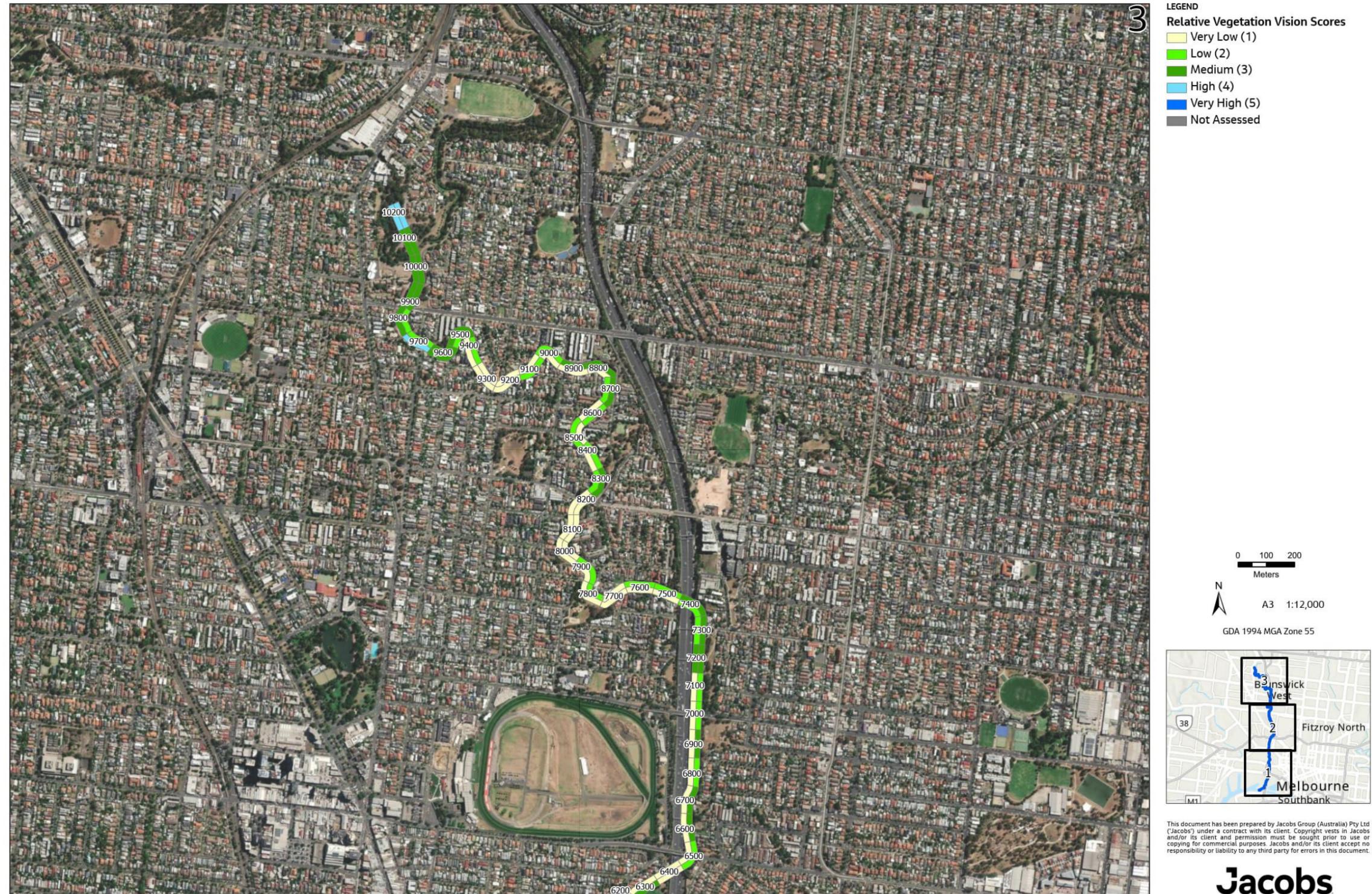


Figure 3-60. Moonee Ponds Creek: Vegetation Visions scoring (2 of 2)

3.16 Mordialloc Creek

Values	The bank towards the mouth of the estuary has been developed to accommodate cycling, fishing and boating activities and as such, native vegetation is limited. However, native vegetation increases in cover further upstream where it is representative of Coast Banksia Woodland, Swamp Scrub, Riparian Woodland, Damp Sands Herb-rich Woodland, Swampy Riparian Woodland and Tall Marsh EVCs.
Threats	The majority of the estuary supports >50% weed cover (relative to native species) and a large proportion of this weed cover is due to high-threat weed species of management concern. The majority of the estuary is also subject to encroachment from adjoining boat ramps, roads and private property.
Survey access	The estuary is accessible from Wells Road to the east of Boundary Road. Walking tracks and foot bridges enable access to either side. The left side (moving downstream) becomes inaccessible on foot past Nepean Highway. Use of the bridge before the rail corridor provides access to the right side where a walking track takes you down to the pier/mouth of the estuary. The left side can effectively be observed from here.
Survey safety	As aforementioned, the majority of the estuary can be easily navigated with footpaths and connecting bridges allowing easy access. Safety considerations relate to following the footpath once you get to the rail corridor/bridge as it is a little obscure.
Survey risks	No risks identified.

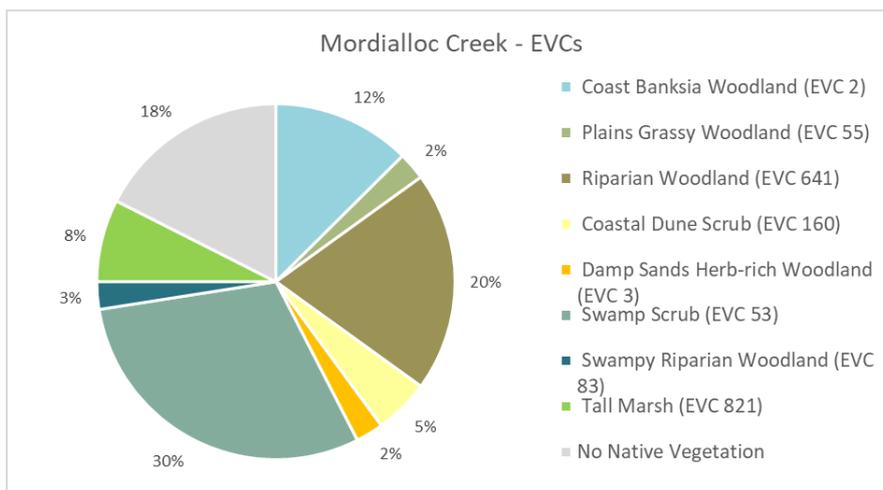


Figure 3-61. Mordialloc Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

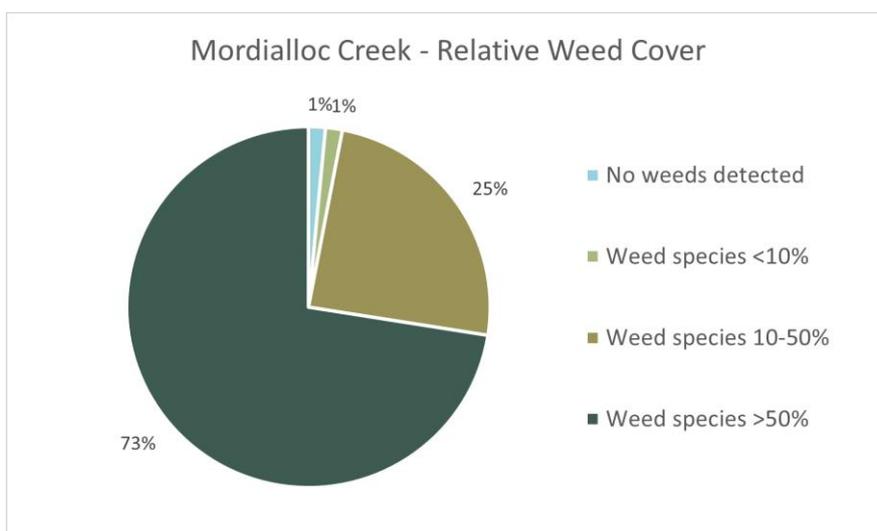


Figure 3-62. Mordialloc Creek Vegetation Visions survey area: relative weed cover

Mordialloc Creek



Figure 3-63. Mordialloc Creek: Vegetation Visions scoring

3.17 Olivers Creek

Values	Similar to Kings Creek, this estuary falls within the Hastings Foreshore Reserve and was dominated by high quality remnant vegetation. This section of the Olivers Creek was generally lined with Mangrove Shrubland which also extended perpendicular to the creek across large areas along the foreshore and was contiguous with Mangrove Shrubland of Kings Creek. Further inland, areas were dominated by Coastal Saltmarsh represented mainly by Wet Saltmarsh Shrubland, Wet Saltmarsh Herbland and Coastal Tussock Saltmarsh which occasionally formed the dominant vegetation directly along the waterway. The FFG listed Marsh Saltbush (<i>Atriplex paludosa</i>) and Salt Lawrenia (<i>Lawrenzia spicata</i>) were abundant in some sections. Estuarine Wetland was commonly encountered in low lying areas between saltmarsh and large areas of Estuarine Scrub. As the waterway headed further away from the foreshore, the Mangrove Shrubland and Coastal Saltmarsh graded into Swamp Scrub. The waterway then graded into Tall Marsh until transitioning into an underground pipeline between 4100-6200m and again between 6600-7100m, being separated only by a short aqueduct dominated by Tall Marsh. The upper end of the study was dominated by Swampy Riparian Woodland comprised of occasional remnant trees and instream vegetation with recent plantings further away from the banks.
Threats	Lower reach areas were generally devoid of exotic species. In areas further upstream the relative cover of weeds varied but was generally high (>50%) in areas where streamside vegetation was narrow due to surrounding residential and industrial development. Large infestations of Boneseed (<i>*Chrysanthemoides monilifera</i>) were observed within nearby areas of Estuarine Scrub. Livestock access was evident along sections of the waterway in areas adjacent to paddocks where no fencing was present.
Survey access	Areas within Hastings Foreshore Reserve along the eastern side of Olivers Creek were accessed by walking to the end of Jeremiahs Road, which has been closed to vehicle traffic due to illegal dumping of rubbish and antisocial behaviour as indicated by signage from Mornington Peninsular Shire. Access to the western side of the waterway was via Thornhill Road. Directly upstream of Hastings Foreshore Reserve, the waterway was accessed via private property owned by Bluescope Steel. The remainder of the waterway was accessed by intersecting roads including Railway Road, George Avenue, Peach Grove, and Jones Road.
Survey safety	Safety considerations include dense vegetation (especially within Estuarine Scrub), unstable ground due to waterlogging (especially during high tide in saltmarsh vegetation), and tripping hazards including areas where livestock pugging had occurred. Electric fencing was also present when entering Bluescope Steel property, therefore, prior arrangements should be made before accessing these areas.
Survey risks	Damage to plants of <i>Tecticornia arbuscula</i> (Shrubby Glasswort) will result where this species occurs in dense stands (generally in the Coastal Saltmarsh sub-community Wet Saltmarsh Shrubland). This species is noted to be slow growing and is very brittle, and major branches may be snapped off when moving through stands.

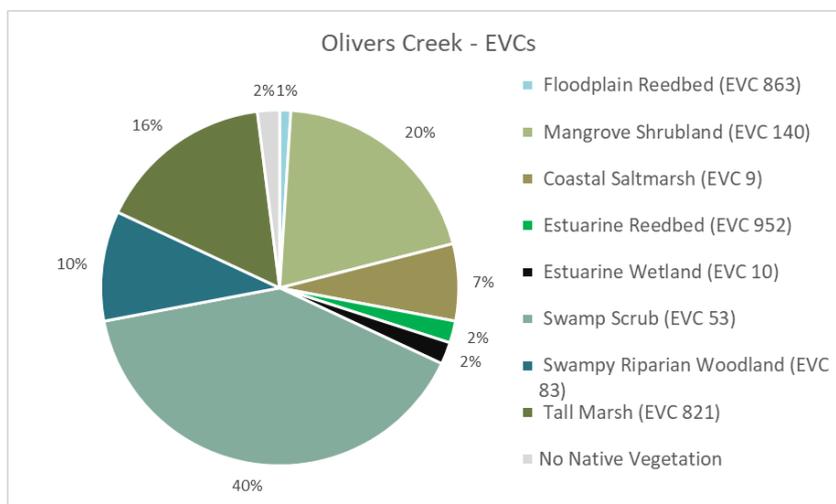


Figure 3-64. Olivers Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

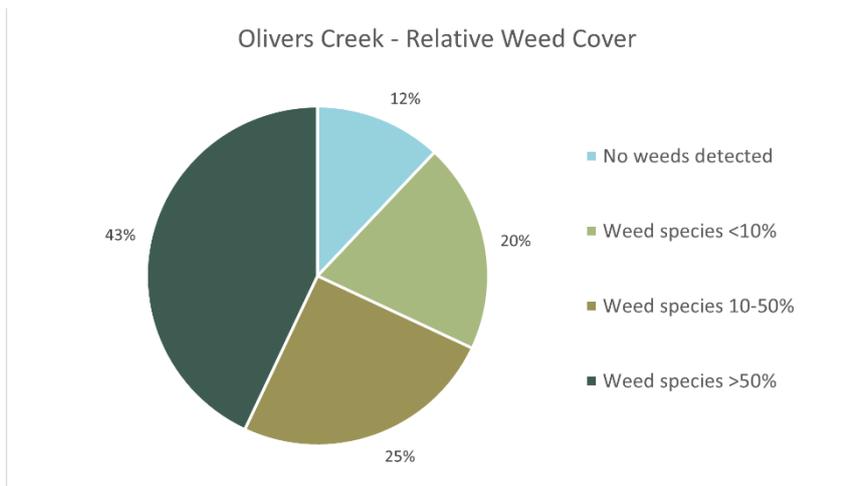


Figure 3-65. Olivers Creek Vegetation Visions survey area: relative weed cover



Picture 3-29. Olivers Creek: grid-plot photographs (left – Transect 1; right – Transect 2, 80m)



Picture 3-30. Olivers Creek: grid-plot photographs (left – Transect 2, 140m; right – Transect 3)

Olivers Creek



Figure 3-66. Olivers Creek: Vegetation Visions scoring

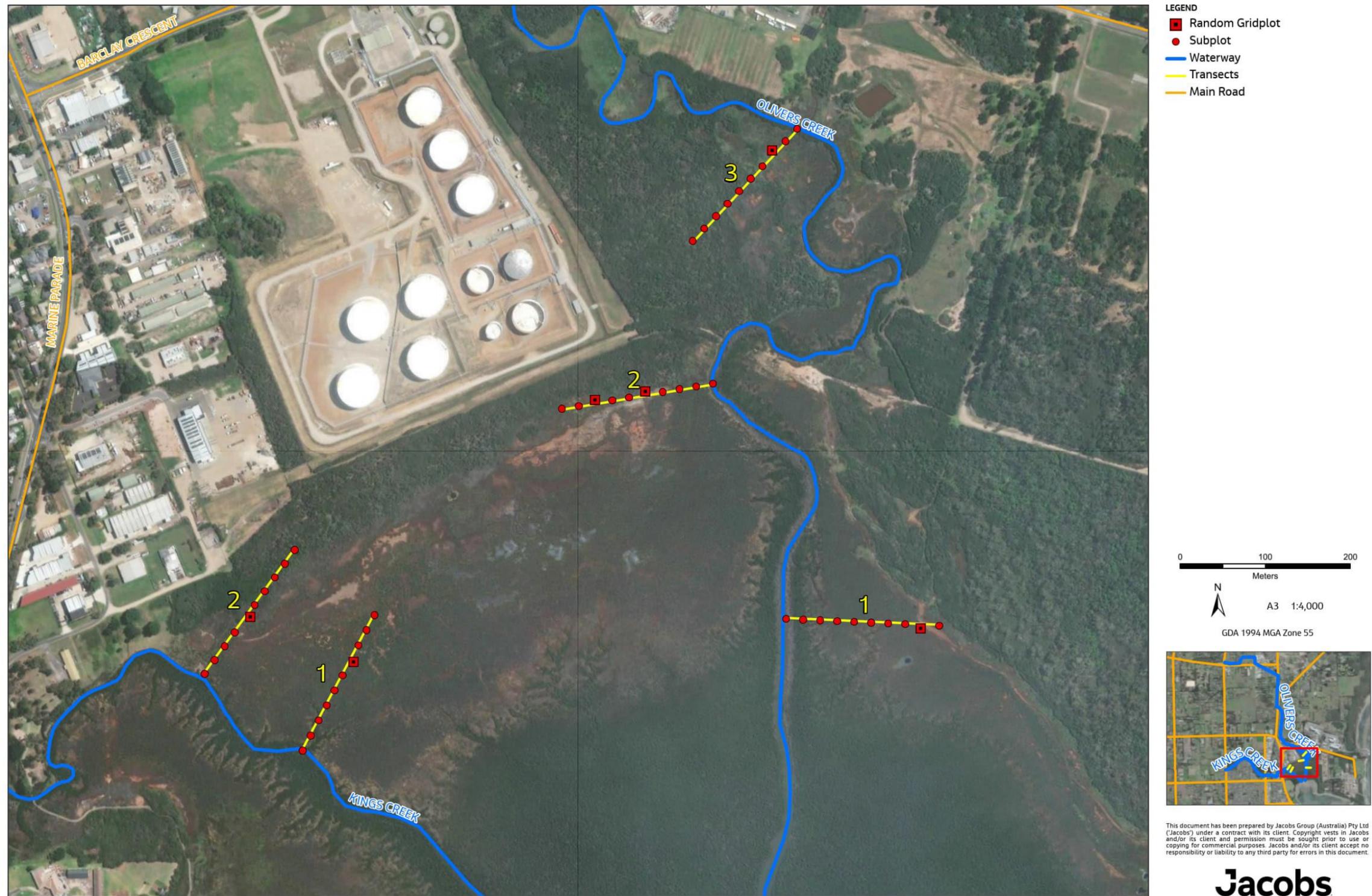


Figure 3-67. Olivers Creek: transect locations

3.18 Paisley Drain

Values	Paisley Drain is a short (300m) section of estuary which starts at Kororoit Creek Road and enters Port Phillip Bay next to the entrance of Kororoit Creek. It contains a mosaic of Wet Saltmarsh Herbland and Coastal Dry Saltmarsh in moderate to good condition, with Berm Grassy Shrubland and other saltmarsh communities as minor components.
Threats	Threats include impacts from several weed species as well as impacts from surrounding industrial and residential land. The drain runs through an industrial zone to the immediate northwest and there are potential water quality issues associated.
Survey access	Sections which require Vegetation Visions assessment area readily accessible from Maddox Road and a network of nearby trails.
Survey safety	Safety issues are minimal. There is an informal walking trail along the west side of Paisley Drain which can be safely accessed. Snakes occur in the area however access is relatively open and the risk is low.
Survey risks	No risks identified.

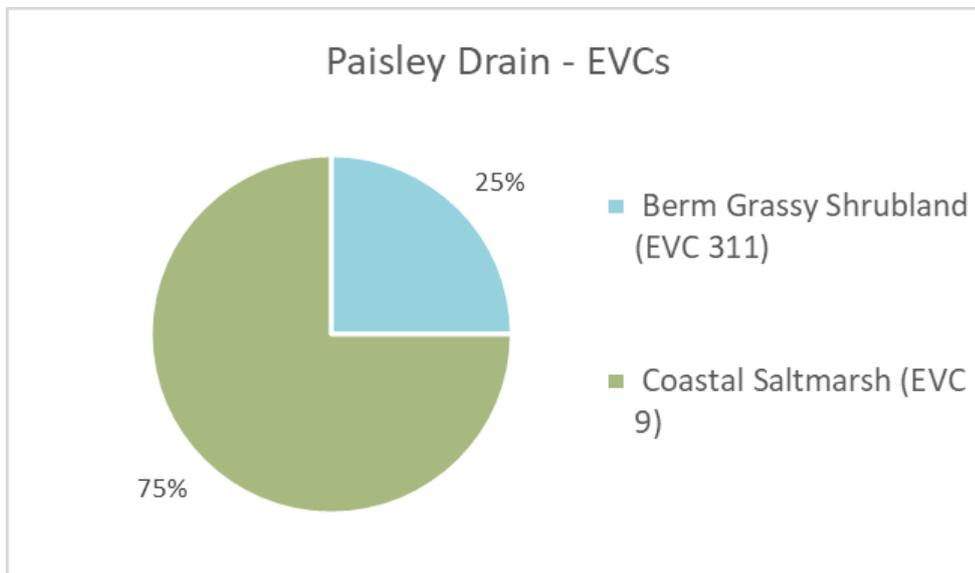


Figure 3-68. Paisley Drain Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

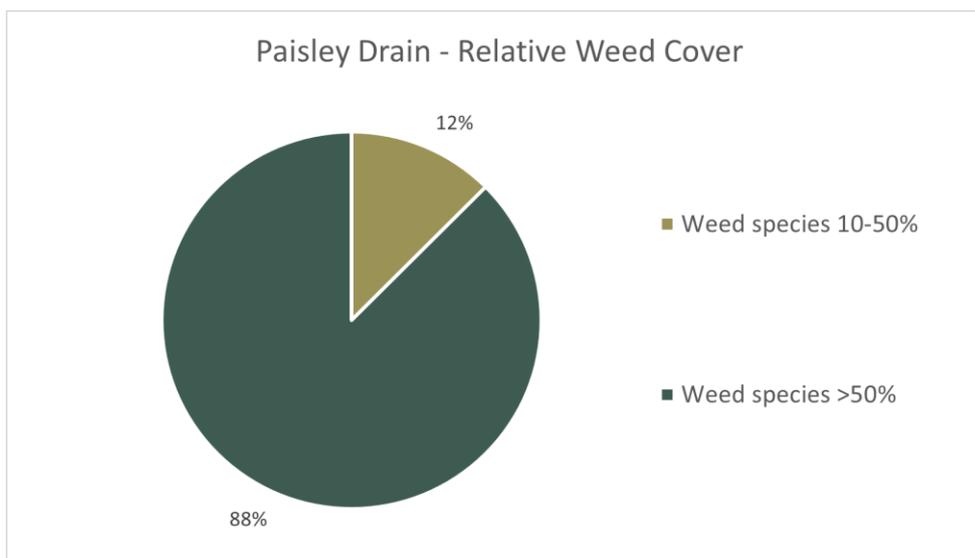


Figure 3-69. Paisley Drain Vegetation Visions survey area: relative weed cover

Kororoit Creek and Paisley Drain



Figure 3-70. Paisley Drain: Vegetation Visions scoring

3.19 Patterson River

Values	Native vegetation is somewhat limited due to the highly modified nature of the site. The majority of the bank – including the mouth of the estuary - has been developed to accommodate cycling, fishing and boating activities. With regards to EVCs, the native vegetation present is representative of Coastal Banksia Woodland, Coastal Dune Scrub, Tall Marsh and Swamp Scrub. Coastal Saltmarsh (Wet Saltmarsh Herbland) vegetation was found to be present, however it was confined to a small drain halfway up the estuary. Other native vegetation present was deemed planted for amenity purposes.
Threats	The majority of the estuary supports 10-50% weed cover (relative to native species) and a large proportion of this weed cover is due to high-threat weed species of management concern. The majority of the estuary is also subject to encroachment from adjoining paved carparks and residential dwellings.
Survey access	The left side (moving downstream) of the estuary can be accessed via Patterson River Carpark to the west of Nepean Highway. Footpaths all the way upstream of the estuary allow for easy access until the Patterson River Ramp car park where the extent of the assessment area terminates. The right side (moving downstream) of the estuary can be accessed by footpath to the west of Nepean Highway.
Survey safety	As aforementioned, the majority of the estuary can be easily navigated, with footpaths and connecting bridges allowing easy access. Safety considerations relate to walking through car parks and over boat ramps to follow set footpaths.
Survey risks	No risks identified.

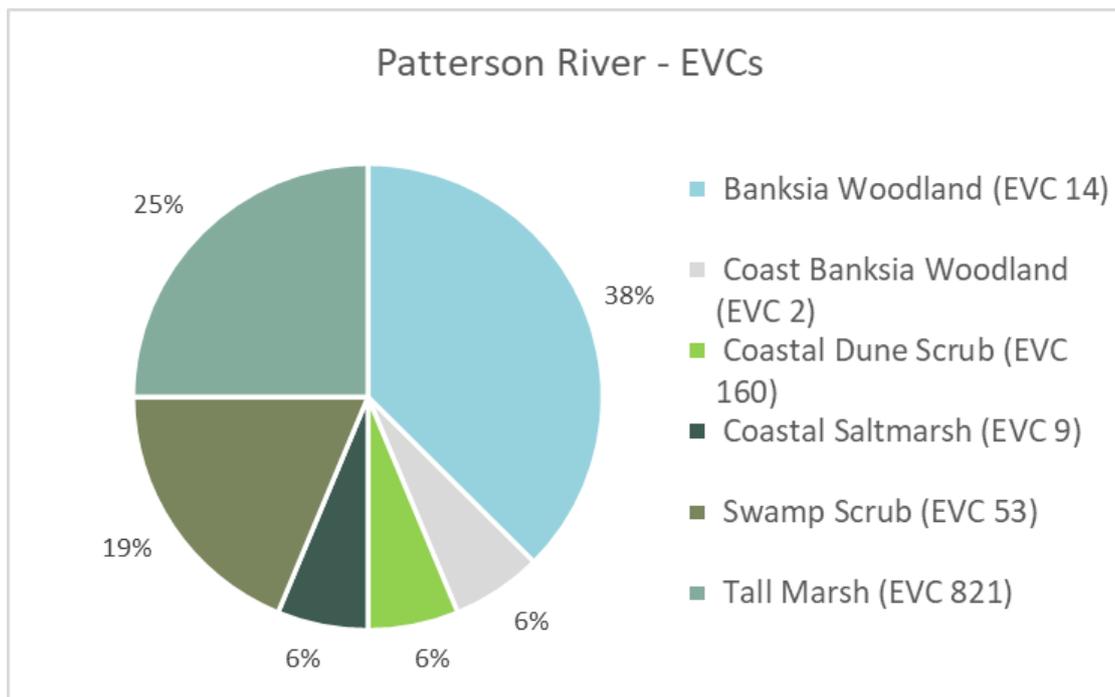


Figure 3-71. Patterson River Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

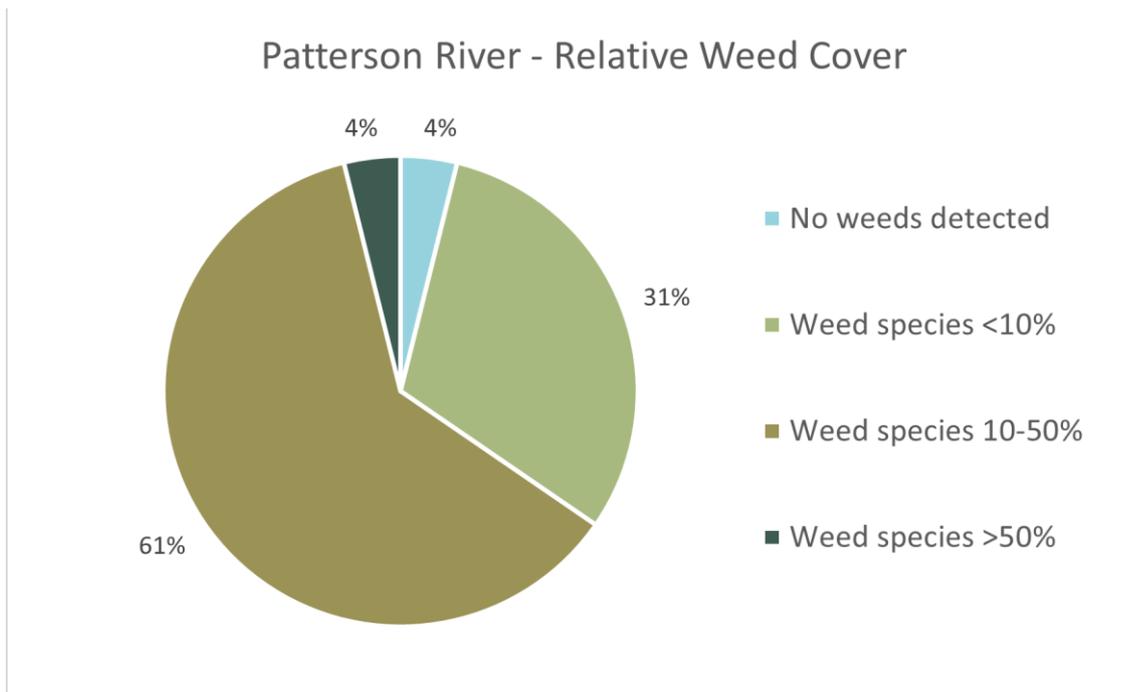


Figure 3-72. Patterson River Vegetation Visions survey area: relative weed cover

Patterson River



Figure 3-73. Patterson River: Vegetation Visions scoring

3.20 Sheepwash Creek

Values	Swamp Scrub is the dominant EVC throughout the majority of the site, with Swampy Woodland and Creekline Grassy Woodland common in some localities. Minor occurrences of Estuarine Wetland, Aquatic Herbland, Tall Marsh and Damp Heathy Woodland are also present. The condition of native vegetation varies from poor to good, with the highest scoring vegetation associated with upstream sections of the study area.
Threats	Weed cover varies throughout the estuary, through the majority supports 10–50% relative weed cover. The most severe weed infestations occur in the mid-section of the reach between Collins Road and Boundary Road, where Blackrerry forms dense thickets. This section of the reach also supports substantial erosion, with channel incision and bank collapse.
Survey access	The site has good access from roads, notably Marine Dve and Dromana Pde at the lower end of the estuary, Country Club Dve and Collins Rd in the middle section and Boundary Rd at the upstream extent.
Survey safety	Due to erosion, bank collapse and weed infestation, the mid-section of the reach (between Collins Road and Boundary Road) can be treacherous to traverse, presenting many trip and fall hazards.
Survey risks	No risks identified.

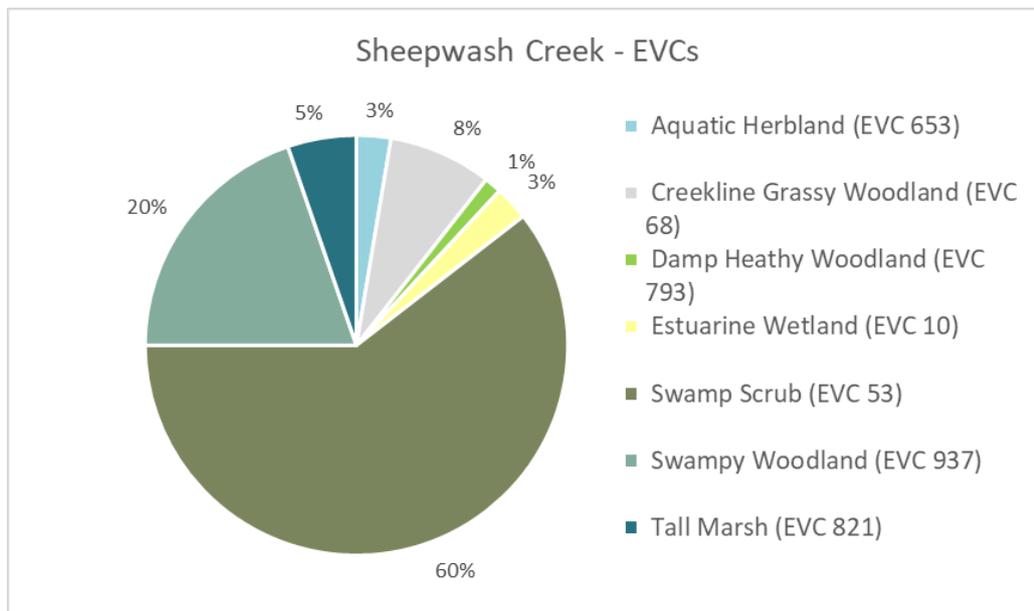


Figure 3-74. Sheepwash Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

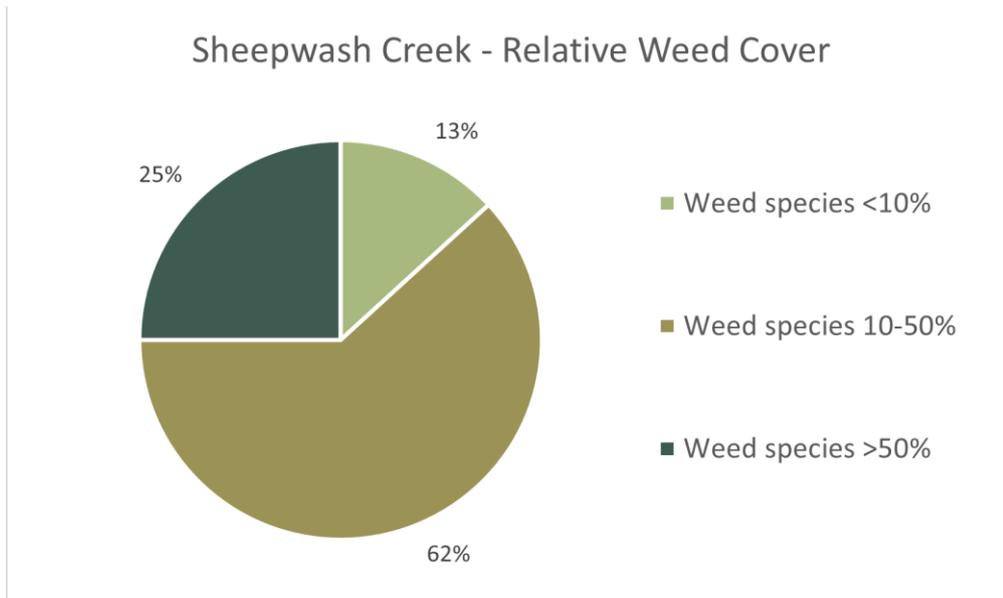


Figure 3-75. Sheepwash Creek Vegetation Visions survey area: relative weed cover

Sheepwash Creek

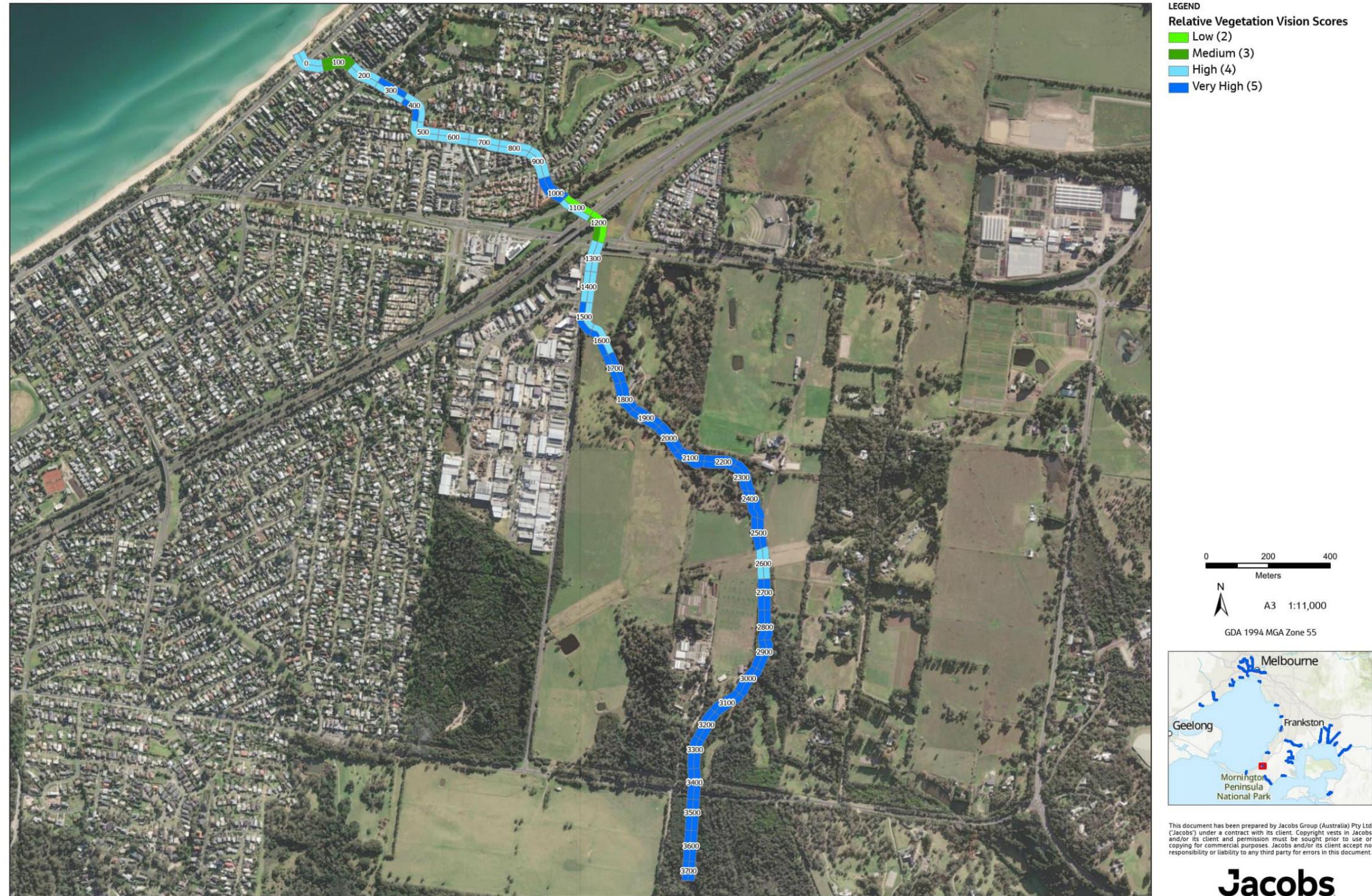


Figure 3-76. Sheepwash Creek: Vegetation Visions scoring

3.21 Skeleton Creek

Values	Skeleton Creek flows into Port Phillip Bay via Cheetham Wetlands which has significant and well-documented biodiversity values. The northern bank through this section comprises mostly Wet Saltmarsh Shrubland and smaller areas of Wet Saltmarsh Herbland. The southern bank includes a berm which runs most of the length of the lower section of estuary. It has had dredged material placed on top and now comprises a mix of native and weed species. In some section vegetation is functionally Berm Grassy Shrubland while other sections are Coastal Dry Saltmarsh due to the more elevated ground level. The vegetation behind the berm is Wet Saltmarsh Herbland, Wet Saltmarsh Shrubland, Coastal Hypersaline Saltmarsh. The upper section of the estuary west of the shared trail bridge comprises mostly Estuarine Marsh, with some Wet Saltmarsh Herbland and other EVCs. Most patches of saltmarsh EVCs represent the EPBC Act listed Subtropical and Temperate Coastal Saltmarsh community.
Threats	Weeds in the lower reaches are confined to areas of soil disturbance. The berm on the south side includes various weeds, some of which are high threat but unlikely to establish successfully in undisturbed saltmarsh communities. Weed of management concern include <i>*Nassella</i> spp. (needle-grasses), <i>*Chrysanthemoides monilifera</i> (African Boneseed) and <i>*Lycium ferocissimum</i> (African Box-thorn). The broader riparian zone of the upper reaches is managed as mown lawn, fenced remnants and revegetation beds where environmental weeds are mostly controlled. There was some evidence of rabbits in these open lawn areas. Due to the protection of the reserve areas, disturbance-related threats are minimal.
Survey access	Both sides of the estuarine are accessible for almost all the study area. Access on foot to the lower sections can be made from the bridge to Altona Meadows (shared trail), while areas north of the bridge are via shared trails. At the entrance, Skeleton Creek runs north-south behind a dune as an extended arm. This section requires access along a management vehicle track on the north side. A 5 m wide tributary on the south side of Skeleton Creek, near the pipe crossing, needs to be crossed to access the lower reaches on the south side of Skeleton Creek. It is possible to walk through with gumboots during low tide. Access to some of the transects requires several hundred metres of walking through saltmarsh.
Survey safety	Care should be taken when crossing tributaries. Walking through saltmarsh is generally low risk as a route through low vegetation can be followed. Walking on the bund is generally safe and done so by others for access (there is a narrow trail along most of it). Water at the entrance is deeper and flows between upper and lower tide. Care should be taken on shared trails for bike traffic. Snakes are common in this area.
Survey risks	Damage to plants of <i>Tecticornia arbuscula</i> (Shrubby Glasswort) will result where this species occurs in dense stands. This species is noted to be slow growing and is very brittle, and major branches may be snapped off when moving through stands.

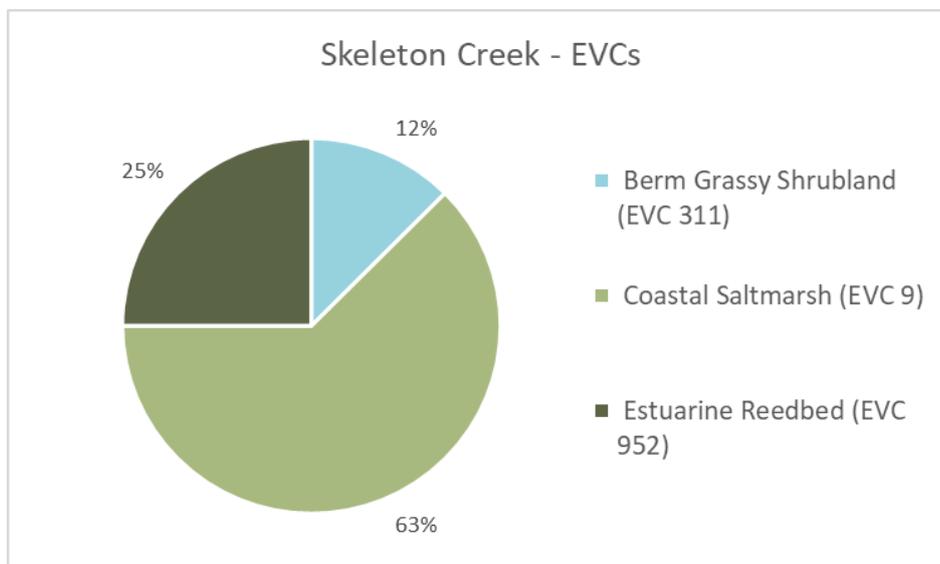


Figure 3-77. Skeleton Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

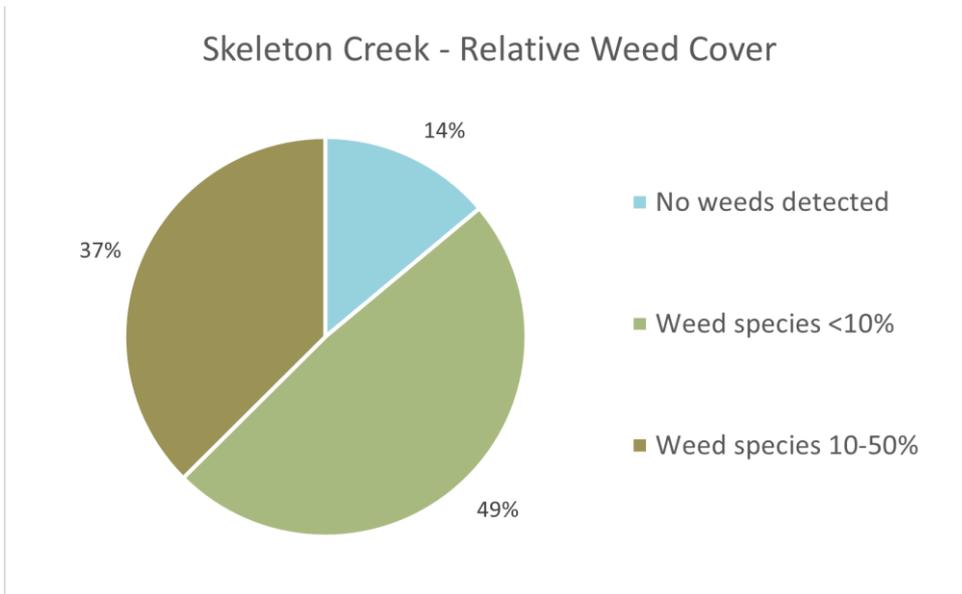


Figure 3-78. Skeleton Creek Vegetation Visions survey area: relative weed cover



Picture 3-31. Skeleton Creek: grid-plot photographs (left – Transect 1; right – Transect 2)



Picture 3-32. Skeleton Creek: grid-plot photographs (left – Transect 3; right – Transect 4)

Skeleton Creek



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Figure 3-79. Skeleton Creek: Vegetation Visions scoring



Figure 3-80. Skeleton Creek: transect locations

3.22 Stoney Creek

Values	Stoney Creek includes areas of Riparian Woodland and Swampy Riparian Woodland in low to moderate condition. It is evident that some sections of the waterway have undergone restoration work including revegetation, with limited success. Values include a significant number of mature River Red-gums, some with small hollows or nest boxes installed. Sections close to the confluence with the Yarra River include Mangrove Shrubland and small areas of Wet Saltmarsh Herbland. The entire reach includes a moderate diversity of habitat with most remnant treed vegetation comprising some influence of older revegetation. There are some reserves such as Stoney Creek Reserve which are managed more intensively to control threats and promote native vegetation.
Threats	Industrial sections of Stony Creek include some remnant vegetation (Riparian Woodland / Floodplain Riparian Woodland) although it has arguably the greatest number of threats compared with any other treed vegetation in the western estuaries that were assessed. Both sides have intensive industrial land use from 20 m on each side. Hard waste from these industrial areas has accumulated and one section has an informal vehicle crossing constructed over the creek. There are occupied and abandoned shelters amongst the riparian vegetation. Woody and herbaceous weeds comprise 100% cover in some sections, many of which are high threat weeds. Rabbits occupy these sections. Threats are less evident within riparian sections adjacent to residential areas further downstream.
Survey access	Almost all sections of Stoney Creek have relatively easy access, however some backtracking is required in parts. The creek runs through a golf course at Anderson Reserve and this section needs to be accessed across fairways. The south side of the creek, on the outbound side of Westgate Bridge had construction works at the time of assessment and had limited access; this may not be the case for future monitoring. The industrial sections between Paramount Road and Sunshine Road do not have paths and are accessed along the banks of the creek. The creek needs to be crossed at least once to enable access along the length of the creek. Some sections are very dense with a mix of remnant and introduced vegetation.
Survey safety	Access between Paramount Rd and Sunshine Rd requires two people for safety. The terrain is difficult to walk over and there is hard rubbish to avoid, some of which is partially covered by vegetation. Informal shelters amongst the vegetation may be occupied. The most western section of the industrial area is difficult to access due to dense weedy vegetation. Access from factories is not possible without permission. The narrow creek sections here require crossing over logs. A letter drop to factories backing on to this section should be considered prior to the next survey. Lower reaches of Stoney Creek are alongside bike paths which include some fast-moving riders.
Survey risks	No risks identified.

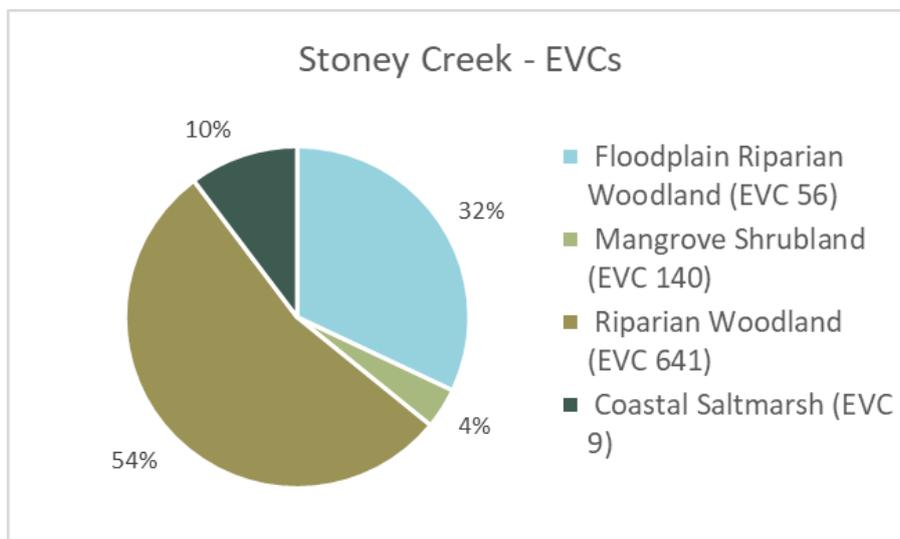


Figure 3-81. Stoney Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

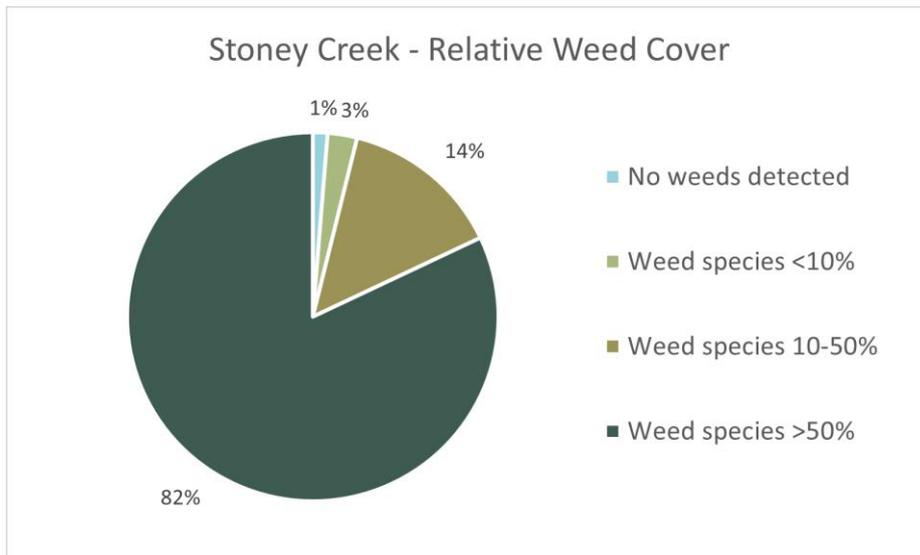


Figure 3-82. Stoney Creek Vegetation Visions survey area: relative weed cover



Picture 3-33. Stoney Creek: grid-plot photographs (Transect 1)

Stoney Creek

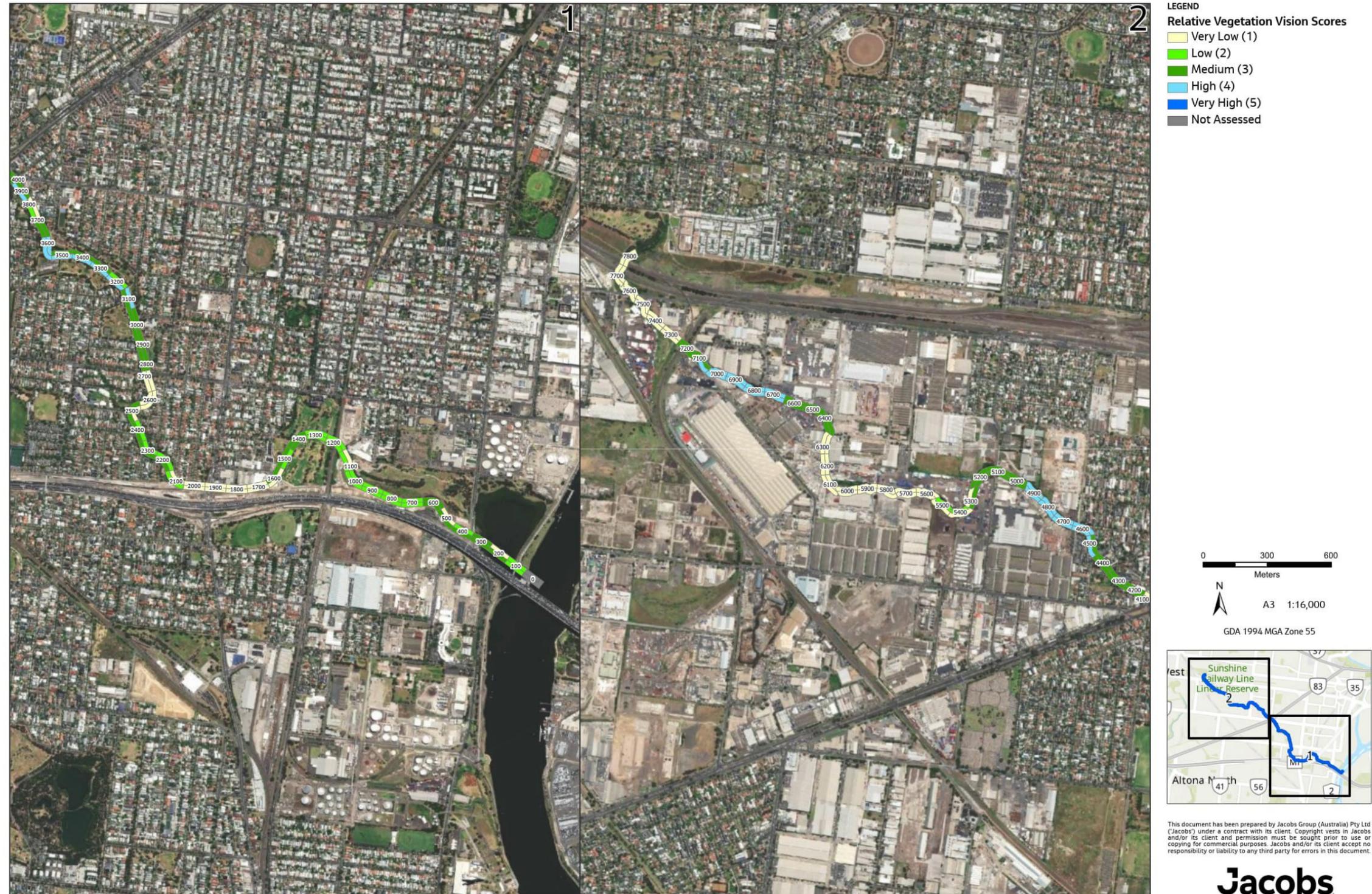


Figure 3-83. Stoney Creek: Vegetation Visions scoring



Figure 3-84. Stoney Creek: transect locations

3.23 Stony Creek (WFB)

Values	Native vegetation is continuous along the estuary, varying in quality throughout. Higher quality remnant vegetation is present where the creek intersects Bald Hill Bushland Reserve. While the majority of the estuary contains some degree of native species cover, it is also tainted by weed invasion - particularly in areas where private property and grazing paddocks are adjacent. With regards to EVCs the majority of native vegetation present was referable to Riparian Woodland and Swampy Riparian Woodland closer towards the mouth of the estuary.
Threats	The majority of the estuary supports > 50% weed cover (relative to native species), and a significant proportion of this weed cover is due to high-threat weed species of management concern. Sections of the creek become dense with woody weed species such as <i>*Rubus fruticosus</i> spp. agg. (Blackberry). The majority of the estuary is also subject to encroachment from adjoining farmland/private property. Evidence of fox presence (i.e., scats) were also observed in the lower half of the creek.
Survey access	Access is limited throughout much of the estuary, and private property access was required to minimise backtracking. Additionally, due to impenetrable vegetation and steep slopes in a number of locations it was necessary to move into adjoining paddock/private land to pass these locations.
Survey safety	Safety considerations relate to negotiating dense and/or prickly vegetation, fences, cattle-pugged ground and the presence of cattle/horses within or immediately adjoining the creek corridor. Additionally, access/egress points need to be determined prior to survey given the potentially large distances between suitable locations.
Survey risks	No risks identified.

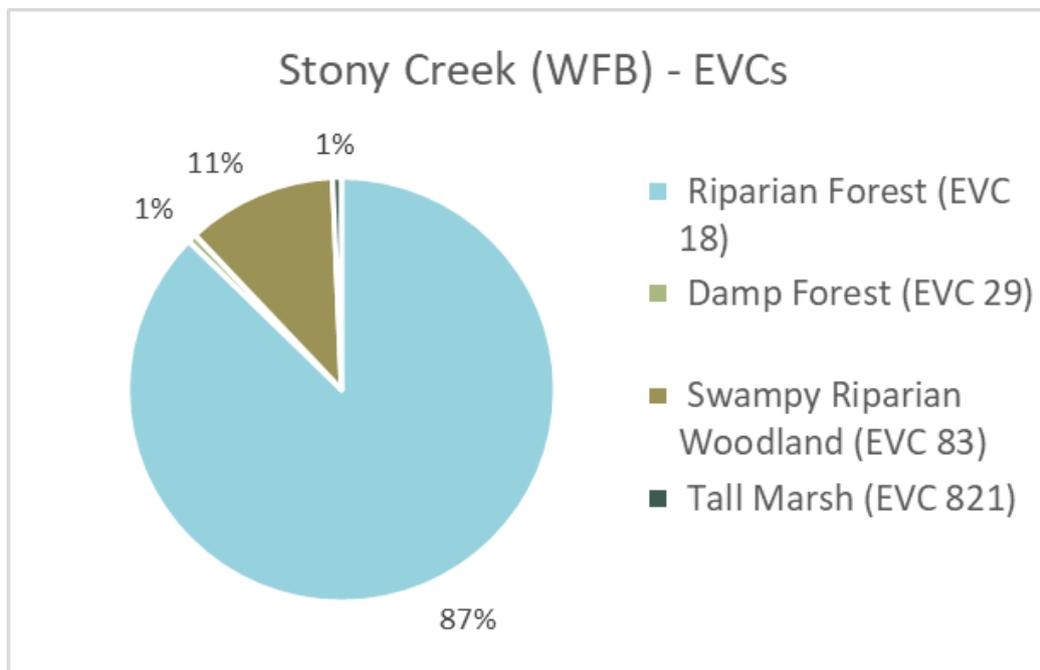


Figure 3-85. Stony Creek (WFB) Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

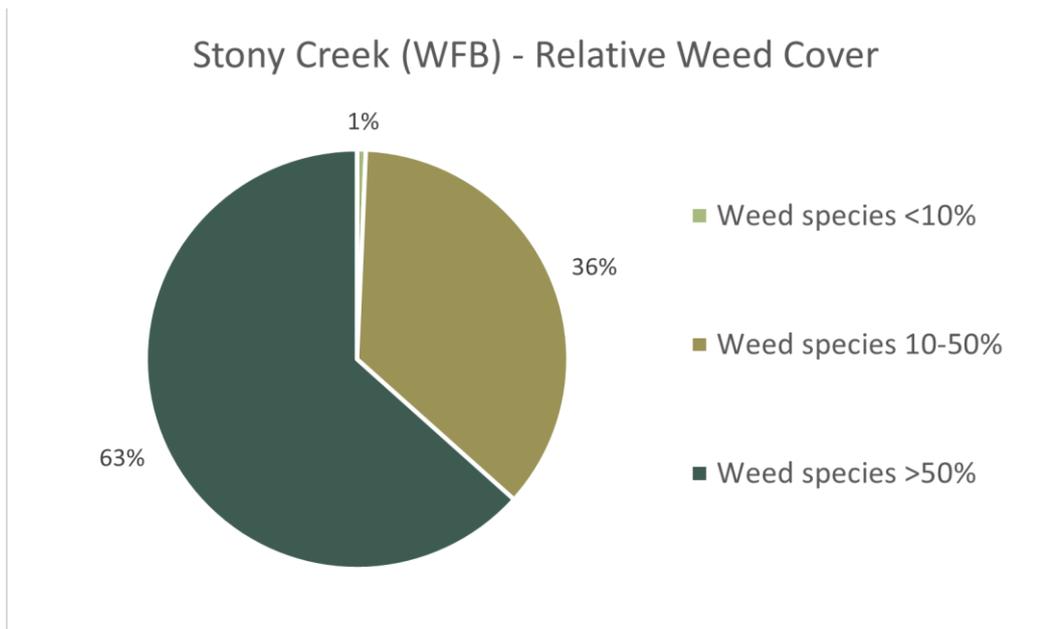


Figure 3-86. Stony Creek (WFB) Vegetation Visions survey area: relative weed cover

Stony Creek (wpb)



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Figure 3-87. Stony Creek (WPB): Vegetation Visions scoring

3.24 Tooradin Rd Drain

Values	Coastal Saltmarsh, Mangrove Shrubland and Estuarine Wetland are the dominant EVCs within the lower portion of the estuary south of Tooradin Esplanade. Vegetation here is generally of high-quality with little to no weeds present. Vegetation becomes increasingly degraded to the north and dominated by emergent species which are referable to Tall Marsh and Swamp Scrub EVCs.
Threats	The majority of the estuary to the north supports > 50% weed cover (relative to native species), and a significant proportion of this weed cover is due to high-threat weed species of management concern. A large proportion of the estuary is subject to encroachment from adjoining farmland/private property. Stock access and related stream bank collapse was also observed in one location.
Survey access	Pedestrian access is good for the majority of the estuary to the north as it runs parallel along Tooradin Road Station Road. Accessing the lower end of the estuary is difficult as it is adjacent to private property and very muddy. Use of a kayak is recommended up until the point where the drain splits as the channel becomes too narrow, shallow and dense with emergent vegetation. From here, access is limited due to private property abutting the estuary. Permission to access these properties is difficult due to the lack of contact information.
Survey safety	Safety considerations relate to kayaking at the appropriate tide times, as too low a tide will make the channel too shallow to move through. Additionally, access/egress points need to be determined prior to survey given the potentially large distances between suitable locations.
Survey risks	No risks identified.

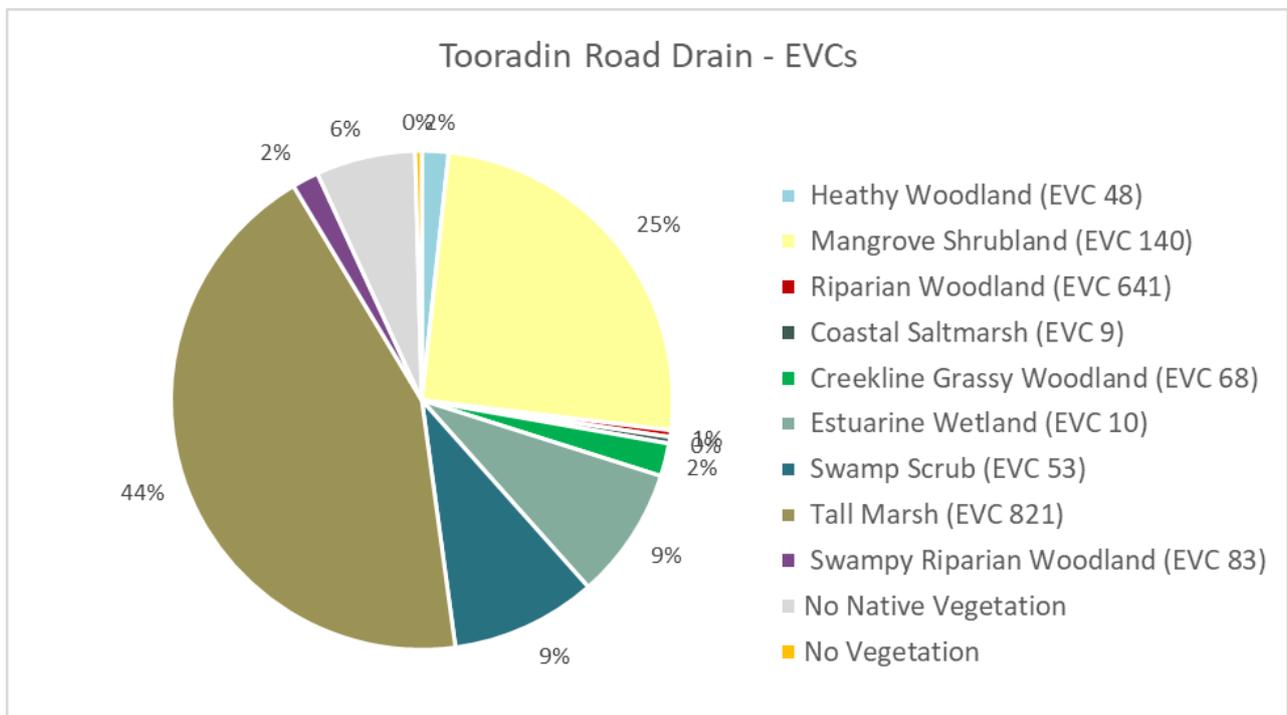


Figure 3-88. Tooradin Road Drain Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

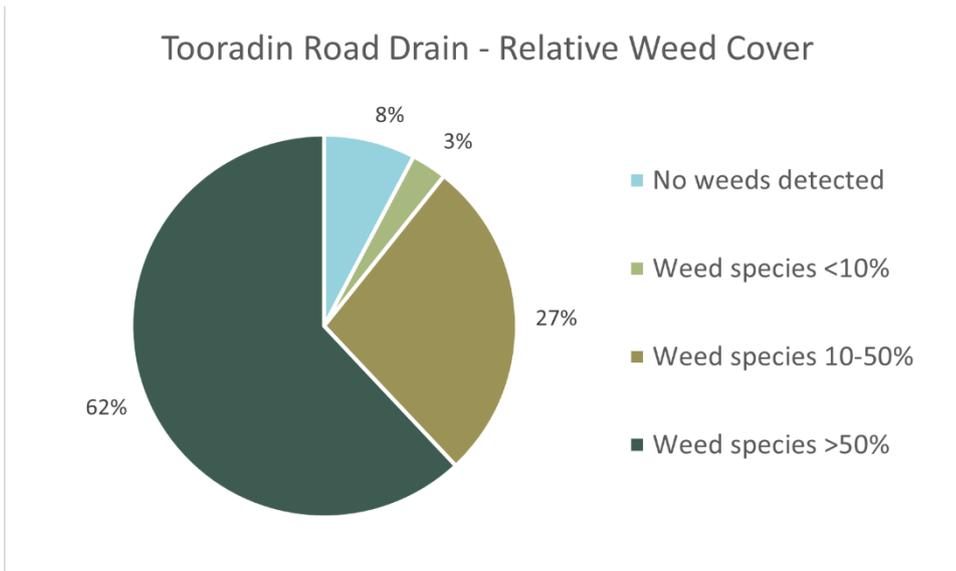
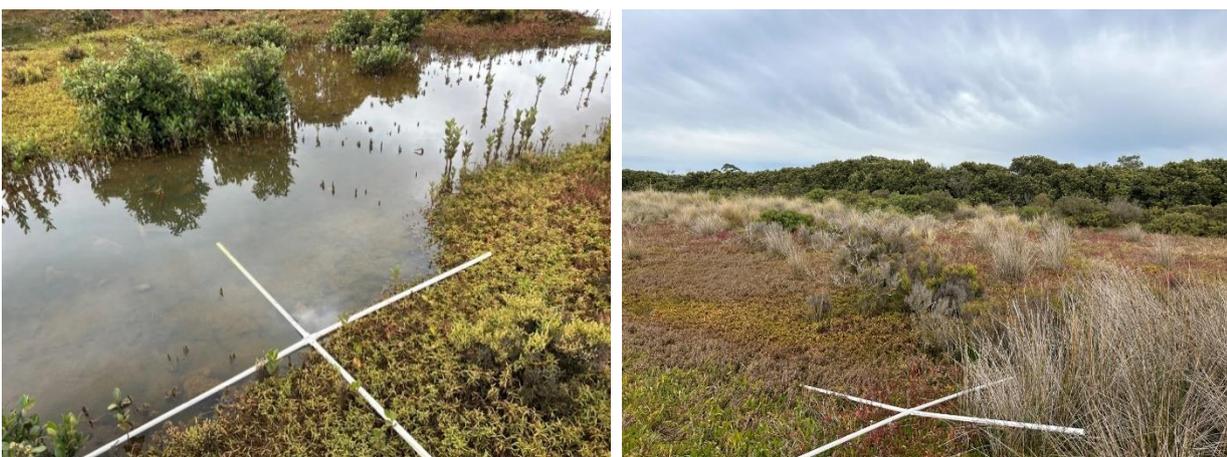


Figure 3-89. Tooradin Road Drain Vegetation Visions survey area: relative weed cover



Picture 3-34. Tooradin Road Drain: grid-plot photographs (left - Transect 1; right – Transect 2, 20m)



Picture 3-35. Tooradin Road Drain: grid-plot photographs (left - Transect 2, 100m [photo taken from gridplot 2 due to deep water in gridplot 1]; right – Transect 3)



Picture 3-36. Tooradin Road Drain: grid-plot photographs (Transect 5)

Tooradin rd Drain



Figure 3-90. Tooradin Road Drain: Vegetation Visions scoring (1 of 2)

Tooradin rd Drain

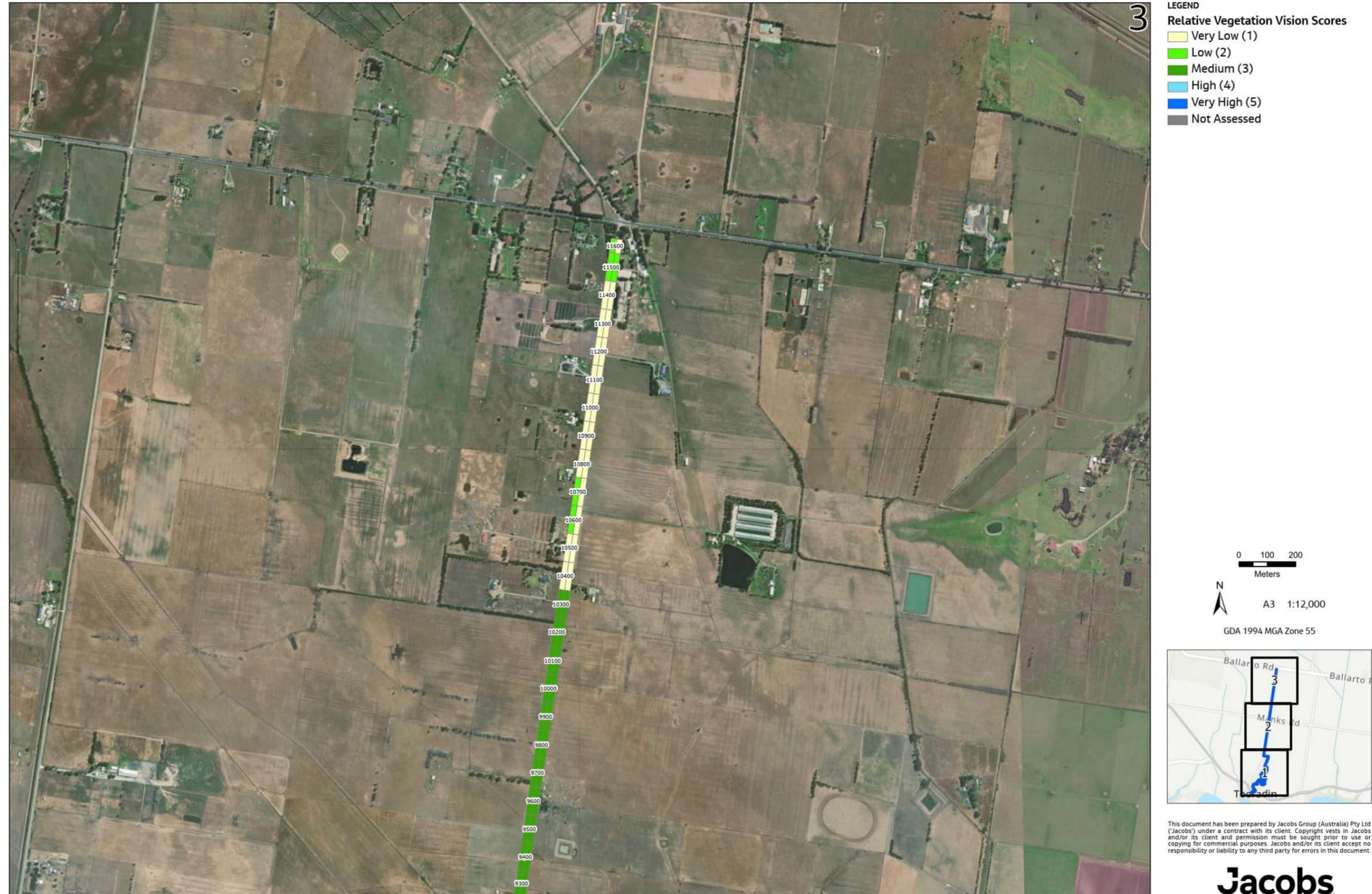


Figure 3-91. Tooradin Road Drain: Vegetation Visions scoring (2 of 2)



Figure 3-92. Tooradin Road Drain: transect locations

3.25 Warringine Creek

Values	Downstream section of the estuary (located within Western Port Coastal Reserve) is dominated by extensive stands of high-quality remnant vegetation, largely comprising Mangrove Shrubland, Coastal Saltmarsh (predominantly Wet Saltmarsh Shrubland and Wet Saltmarsh Herbland) and Estuarine Scrub. The vast majority of Coastal Saltmarsh forms part of the EPBC Act-listed community. Other EVCs—notably Estuarine Wetland and open areas associated with Saline Aquatic Meadow—were also present but with lower cover. Vegetation condition drops significantly at c. 1.5 km upstream where Swampy Riparian Woodland and Swamp Scrub become the dominant EVCs. Woodland located between the lower estuary and Hendersons Road is structurally intact and contains a moderate diversity of native species, though also contains substantial weed infestation of high-threat species. Upstream vegetation is variable in terms of structure condition, though is generally more degraded than downstream vegetation.
Threats	Weed cover increases from generally low cover in the lower third of the waterway, to 10-50% cover in the middle third, and >50% cover in the upper third. High cover of woody weed species in many locations. North of Hendersons Road Warringine Creek is often confined to a narrow corridor between grazing paddocks and residences.
Survey access	Good access to the lower estuary via the Bittern Coastal Wetlands Boardwalk which can be accessed from Warringine Crescent to the north. Good access to the lower half of the waterway can be achieved from Frankston-Flinders Road, Reid Parade and Hendersons Road. Limited access is available between Hendersons Road and Carpenters Lane in the upstream half of the waterway.
Survey safety	Safety issues relate to the requirement to traverse private property in upper reaches of the waterway, as well as the high density of vegetation in some areas (notably very dense thickets of Coral Fern downstream of Carpenters Lane. Moving along the creek requires crossing numerous fence lines.
Survey risks	Damage to plants of <i>Tecticornia arbuscula</i> (Shrubby Glasswort) will result where this species occurs in dense stands (generally in the Coastal Saltmarsh sub-community Wet Saltmarsh Shrubland). This species is noted to be slow growing and is very brittle, and major branches may be snapped off when moving through stands.

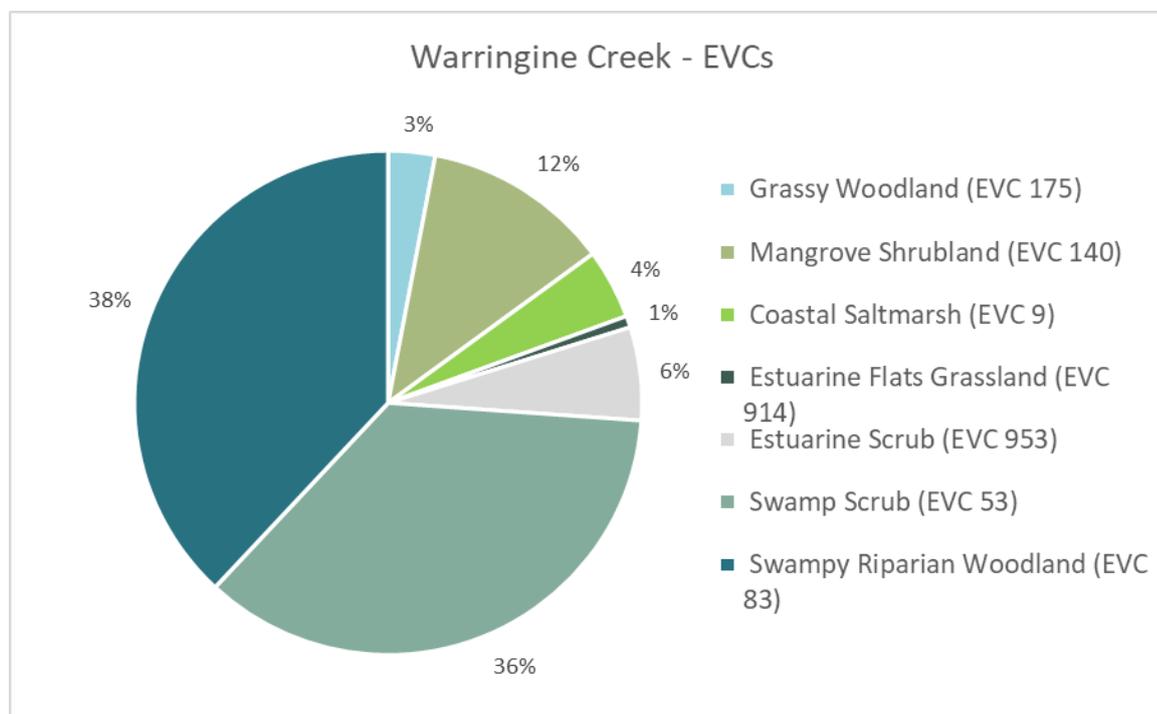


Figure 3-93. Warringine Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

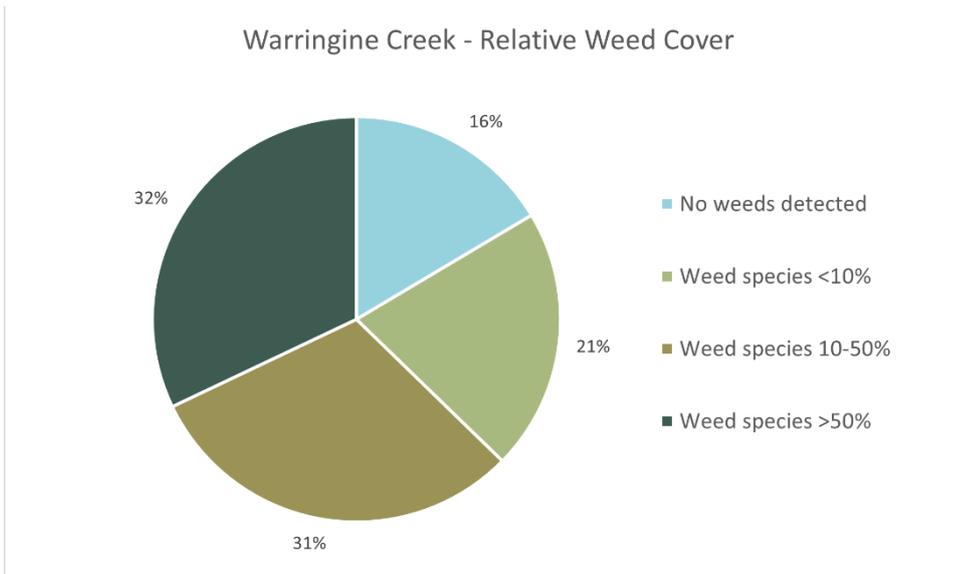


Figure 3-94. Warringine Creek Vegetation Visions survey area: relative weed cover



Picture 3-37. Warringine Creek: grid-plot photographs (left – Transect 2; right – Transect 3, 80m)



Picture 3-38. Warringine Creek: grid-plot photographs (left – Transect 3, 160m; right – Transect 4)

Warringine creek

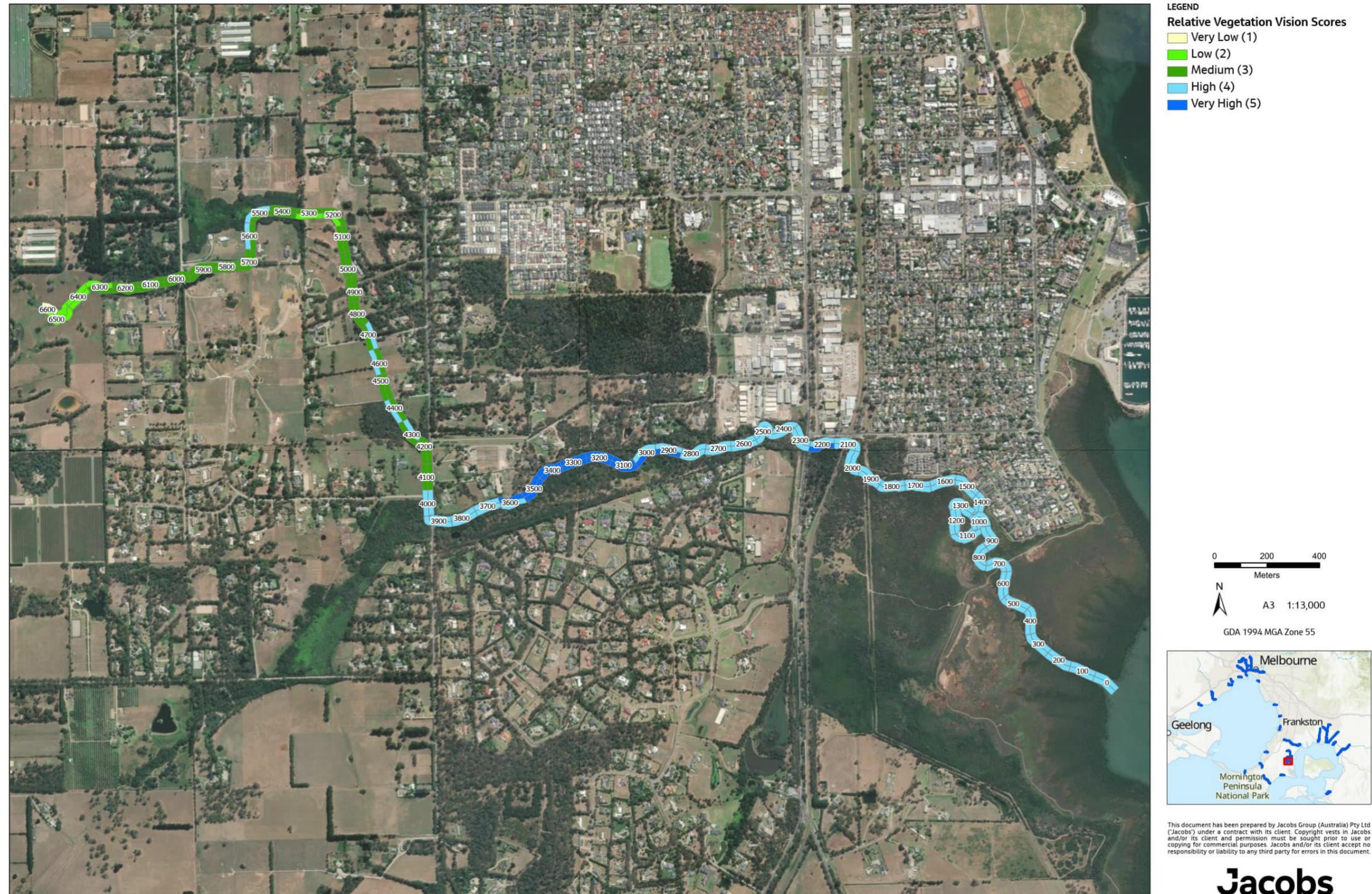


Figure 3-95. Warringine Creek: Vegetation Visions scoring



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Figure 3-96. Warringine Creek: transect locations

3.26 Watson Creek

Values	This estuary falls within Western Port Coastal Reserve and is comprised of high quality remnant vegetation. This section of the Watson Creek was generally lined with Mangrove Shrubland which also extended perpendicular to the creek across large areas along the foreshore. Further inland, areas were dominated by Coastal Saltmarsh represented mainly by Wet Saltmarsh Shrubland, Wet Saltmarsh Herbland and Coastal Dry Saltmarsh which occasionally formed the dominant vegetation directly along the waterway. Estuarine Wetland was commonly encountered in low lying areas between saltmarsh and Esuarine Scrub with Heathy Woodland also occurring on the higher elevated fringes. As the waterway headed further away from the foreshore, the Mangrove Shrubland and Coastal Saltmarsh graded into Swamp Scrub. The upper reaches were dominated by varying qualities of Swamp Scrub, Swampy Riparian Woodland and Tall Marsh.
Threats	Lower reach areas were generally devoid of exotic species. In areas further upstream the relative cover of weeds varied but was generally high (>50%) in areas where streamside vegetation was narrow due to surrounding residential and industrial development. Swamp Scrub vegetation was generally invaded by Blackberry (<i>*Rubus fruticosus</i> spp. agg.) with other woody weeds also present.
Survey access	Areas within Western Port Coastal Reserve along the northern side of Watson Creek was accessed by entering from South Boundary Road East. Access to the southern side of the waterway was via Bungower Road and then walking north along the foreshore. Directly upstream of Western Port Coastal Reserve, the waterway was accessed via a Melbourne Water pipeline easement off Bembridge Road. The remainder of the waterway was accessed by intersecting roads including Tyabb-Tooradin Road, Eramosa Road East, Lower Somerville Road, Grant Road and Hawkins Road.
Survey safety	Safety considerations include dense vegetation (especially within Estuarine Scrub and Swamp Scrub) which was occasionally impenetrable and forced the assessors to walk on private land. Notice should be given to landholders prior to walking along sections of the waterway to avoid confrontation. Other considerations include unstable ground due to waterlogging (especially during high tide in saltmarsh vegetation), and tripping hazards including large holes amongst dense tussock vegetation likely caused by erosion. Semi-collapsed rabbit warrens present (approximately 2.7km from the mouth of the estuary) create a significant tripping hazard and this area should be traversed with care.
Survey risks	Damage to plants of <i>Tecticornia arbuscula</i> (Shrubby Glasswort) will result where this species occurs in dense stands (generally in the Coastal Saltmarsh sub-community Wet Saltmarsh Shrubland). This species is noted to be slow growing and is very brittle, and major branches may be snapped off when moving through stands.

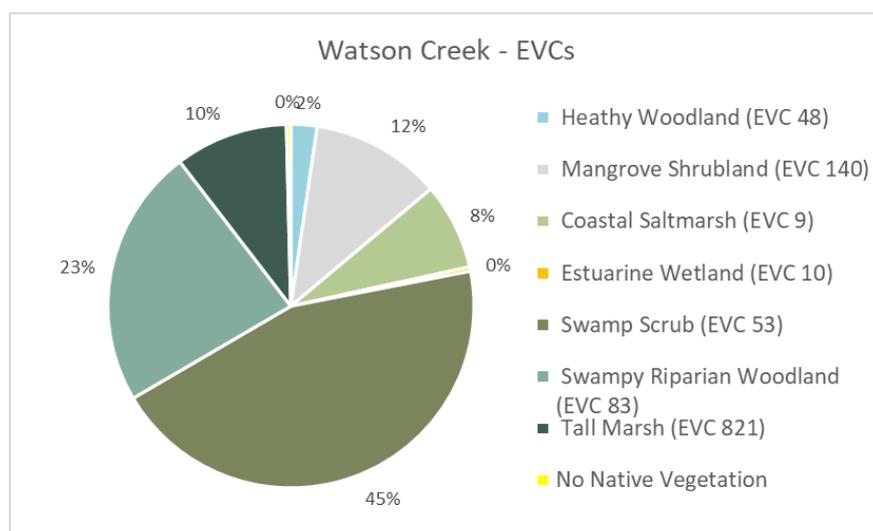


Figure 3-97. Watson Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

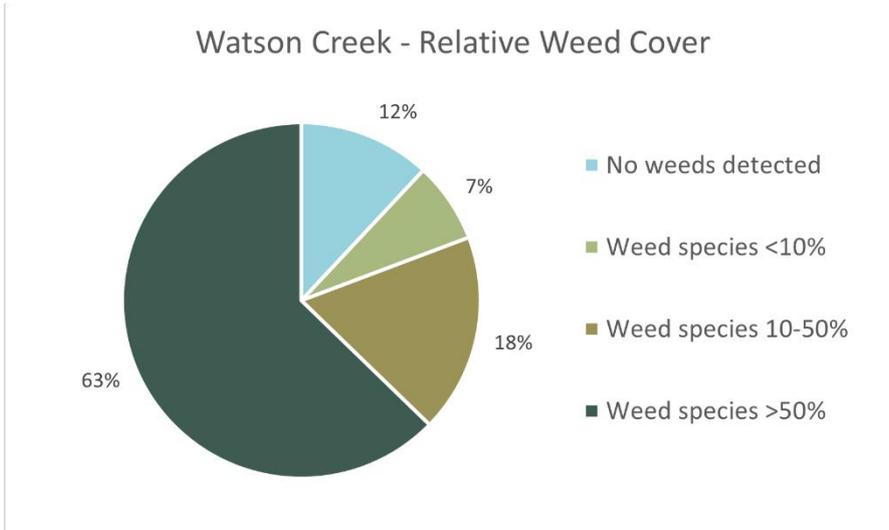
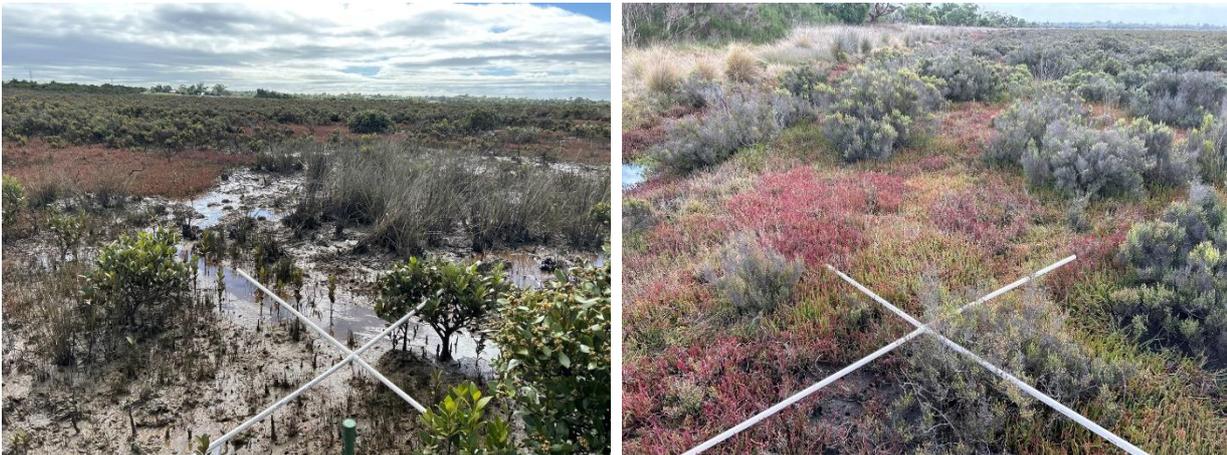


Figure 3-98. Watson Creek Vegetation Visions survey area: relative weed cover



Picture 3-39. Watson Creek: grid-plot photographs (left – Transect 1; right – Transect 2)



Picture 3-40. Watson Creek: grid-plot photographs (left – Transect 3; right – Transect 4)

Watson Creek



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Figure 3-99. Watson Creek: Vegetation Visions scoring (1 of 2)

Watson Creek

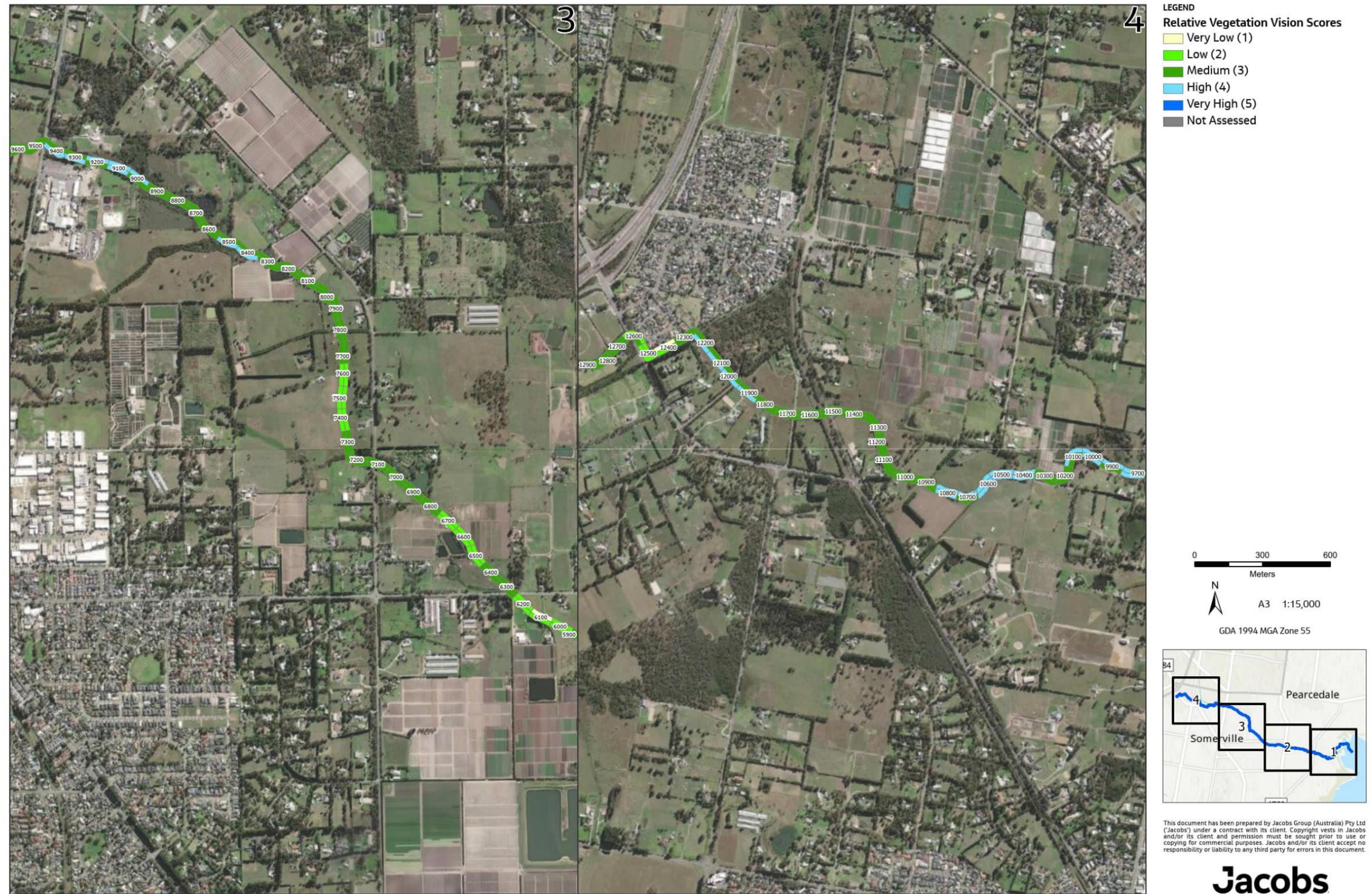


Figure 3-100. Watson Creek: Vegetation Visions scoring (2 of 2)



Figure 3-101. Watson Creek: transect locations

3.27 Werribee River

Values	Native vegetation in the upper reaches is mostly Riparian Woodland. Tree density is contrastingly sparse in the lower reaches due to treeless EVCs and agricultural land use. Estuarine Reedbed and Wet Saltmarsh Herbland are dominant EVCs in the lower reaches. Saltmarsh and related vegetation nearest the mouth of the estuary include Coastal Dry Saltmarsh, Coastal Hypersaline Saltmarsh and Berm Grassy Shrubland. There is evidently a greater extent of Wet Saltmarsh Herbland EVC along the banks of the Werribee River than what is indicated in the Victorian Saltmarsh Study mapping. There is also a much larger expanse of Coastal Dry Saltmarsh than is indicated. Most patches of saltmarsh EVCs represent the EPBC Act listed Subtropical and Temperate Coastal Saltmarsh community.
Threats	The upper reach of the study area has a low cover of woody weeds while sections on the western side have a high cover of introduced grasses e.g. Kikuya. Estuarine Reedbed and the escarpment above has scattered African Box-thorn. *Aizoon pubescens (Galenia) is a dominant weed along some sections of the riparian zone where it may provide the majority of ground cover. Bank collapse was observed to be minimal with bank erosion mostly limited to the tidal zone.
Survey access	Most of the Werribee River Vegetation Visions assessment is best done from a small boat or kayak. Boat access is either via the Werribee South boat ramp or at an accessible place at the north end of the Werribee Open Range Zoo. There is a contiguous river frontage of adjoining properties owned by Werribee Open Range Zoo, Werribee Park Golf Course, Werribee Park and agriculture land. Alternatively access to these areas may be arranged via property access via management. From the water, regular bank access is required to view vegetation above the immediate bank. Access to the west side of lower reaches of Werribee River is via the Western Treatment Plant, a short walk from the nearest car access.
Survey safety	If accessing via water, boating is the greatest safety consideration. It was noted that while staying near the edge of the river, the water depth is less than 1 m and therefore lower risk if capsized. A personal floatation device is mandatory. Separate kayakers is recommended with one person surveying a side each. Some bank sections are steep (including cliffs) so access is restricted in some sections. Snakes are common along most of the study area.
Survey risks	No risks identified.

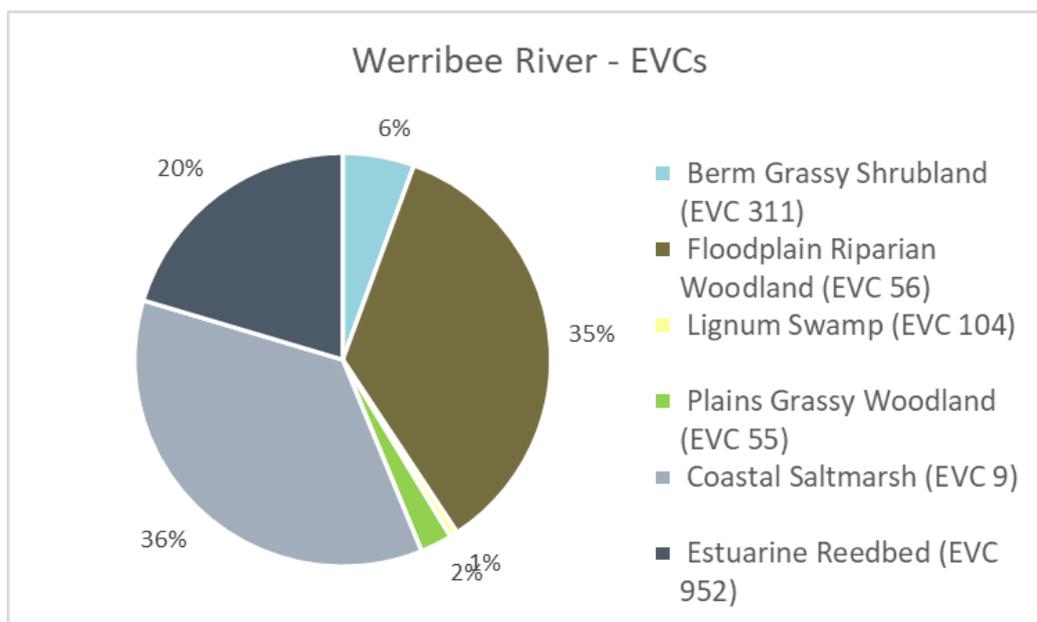


Figure 3-102. Werribee River Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

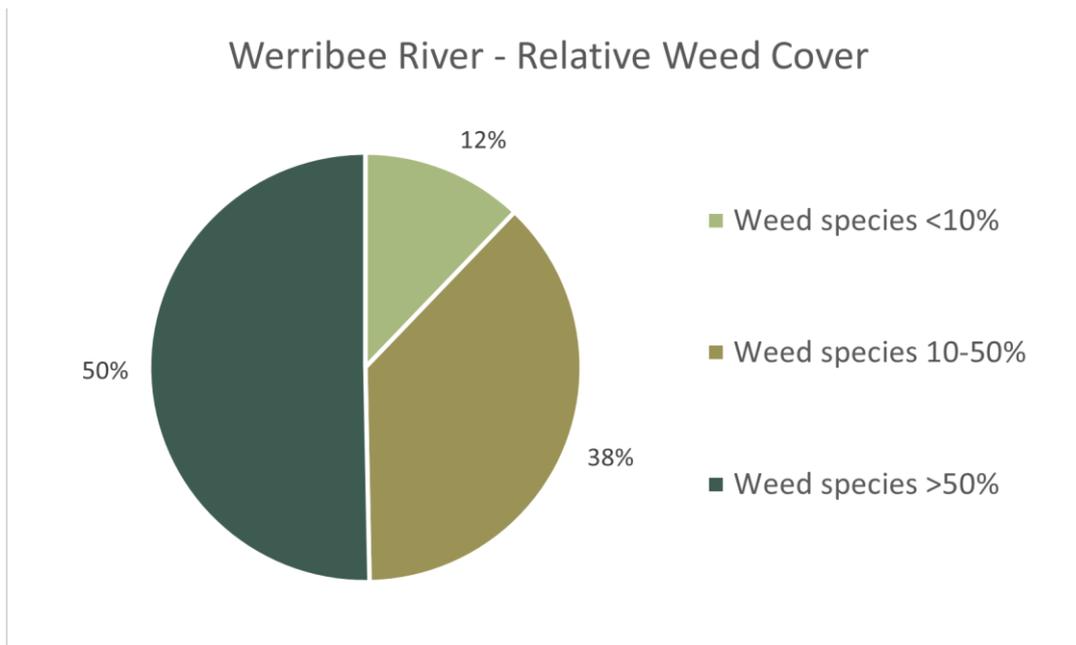


Figure 3-103. Werribee River Vegetation Visions survey area: relative weed cover



Picture 3-41. Werribee River: grid-plot photographs (left – Transect 1; right – Transect 2)

Werribee River



Figure 3-104. Werribee River: Vegetation Visions scoring



Figure 3-105. Werribee River: transect locations

3.28 Yallock Creek

Values	Remnant vegetation is present throughout the majority of the survey area, though is generally restricted to a narrow riparian strip of Swamp Scrub and Coastal Saltmarsh (predominantly Wet Saltmarsh Herbland). The highest quality remnant vegetation is located at the downstream extent of the survey area, east of Yallock Creek and adjoining the North Western Port NCR – this vegetation comprises a mosaic of Swamp Scrub, Estuarine Scrub, Tall Marsh and Coastal Saltmarsh.
Threats	While the majority of the creek is fenced from stock, extensive pugging was noted in several fenced locations, while other areas were open to stock. Substantial dieback of <i>Suaeda australis</i> (Austral Seablite), a dominant component of the local saltmarsh, was noted though its cause could not be ascertained. High-threat weed species are present in varying abundance, increasing in cover and diversity in proximity of a residence on the west side of the creek.
Survey access	Access from South Gippsland Hwy in the north of the estuary. The riparian corridor is fenced and dense vegetation in many locations requires crossing fences into adjoining grazing paddocks. If accessing the lower estuary then walking down the adjoining unnamed waterway located several hundred metres east may be the best option.
Survey safety	Safety considerations relate to negotiating dense and/or prickly vegetation, fences, cattle-pugged ground and the presence of cattle immediately adjoining the riparian corridor. Additionally, the relatively long walk to the estuary mouth means appropriate planning must be undertaken to ensure staff have appropriate first aid equipment and provisions.
Survey risks	No risks identified.

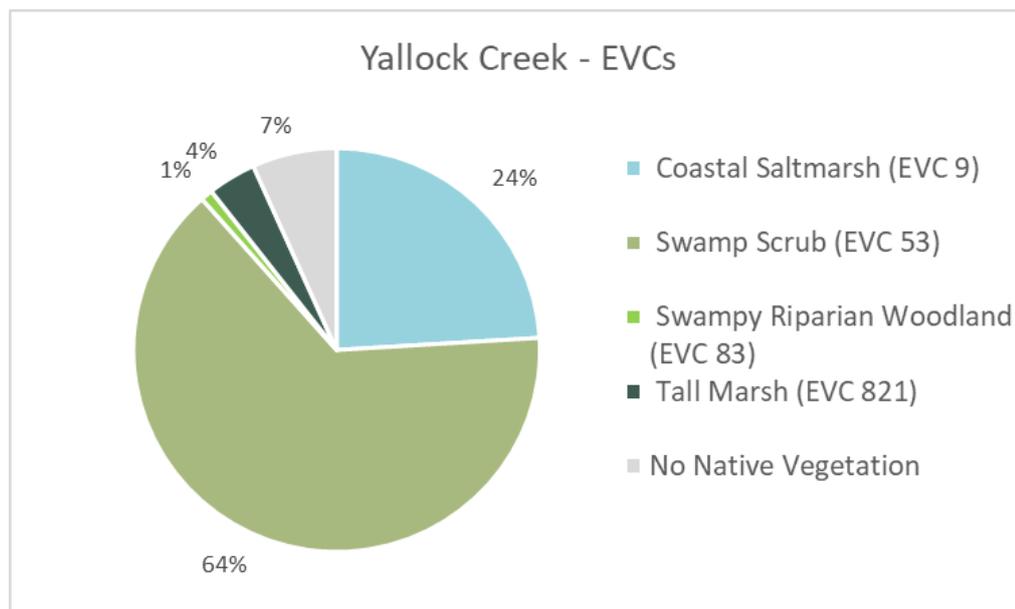


Figure 3-106. Yallock Creek Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

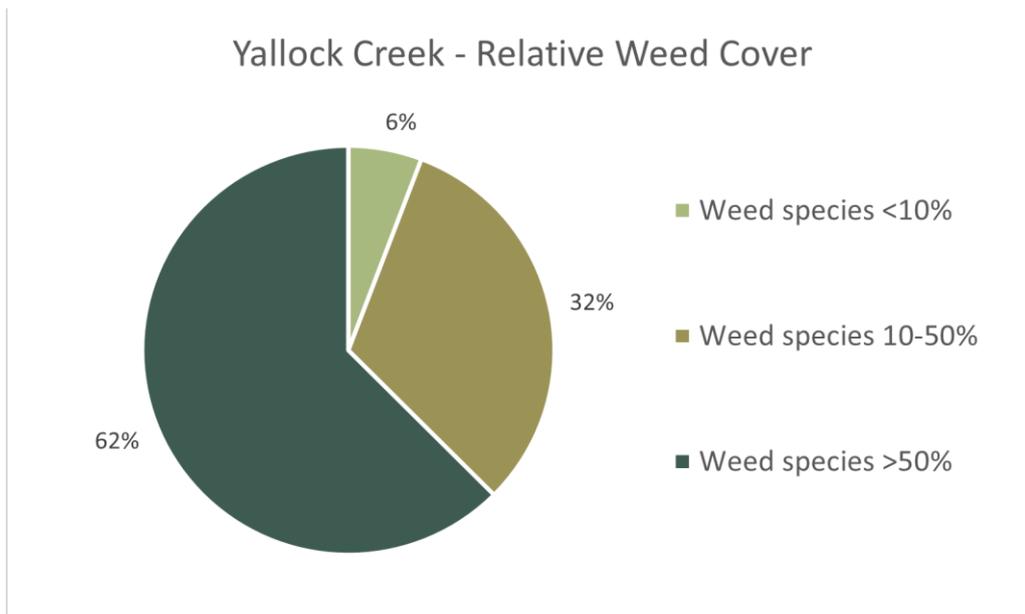
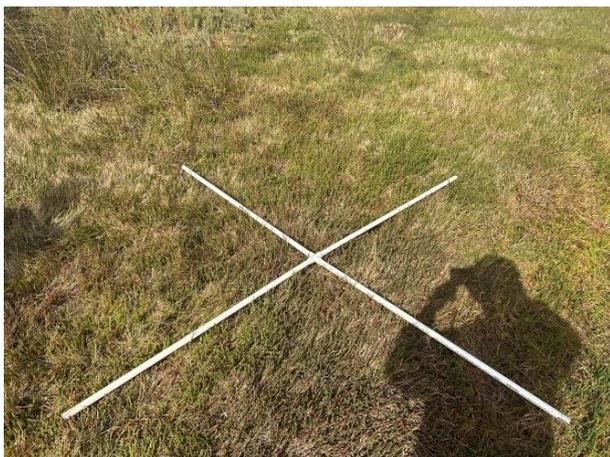
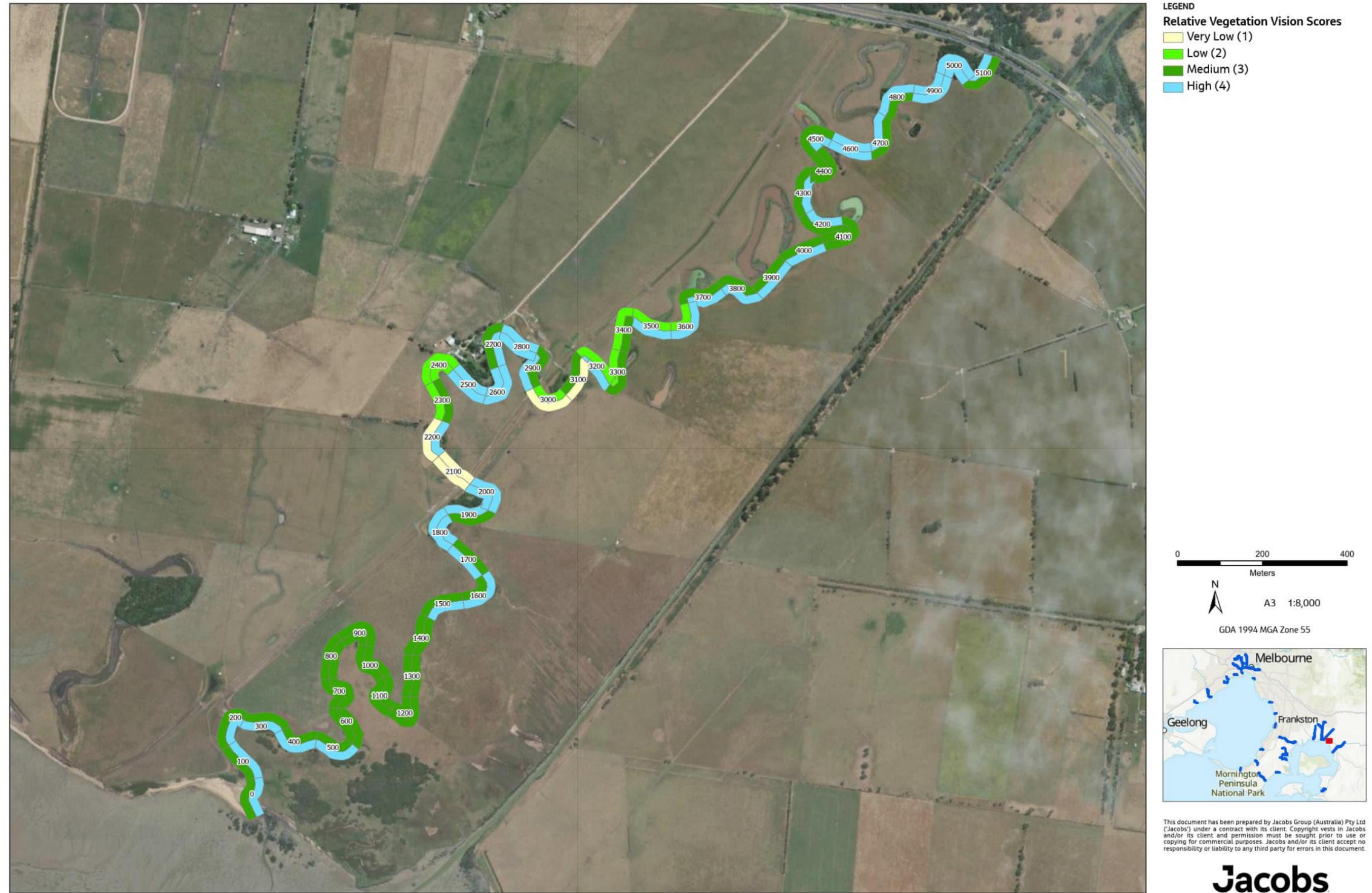


Figure 3-107. Yallock Creek Vegetation Visions survey area: relative weed cover



Picture 3-42. Yallock Creek: grid-plot photograph (Transect 1)

Yallock Creek



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Figure 3-108. Yallock Creek: Vegetation Visions scoring

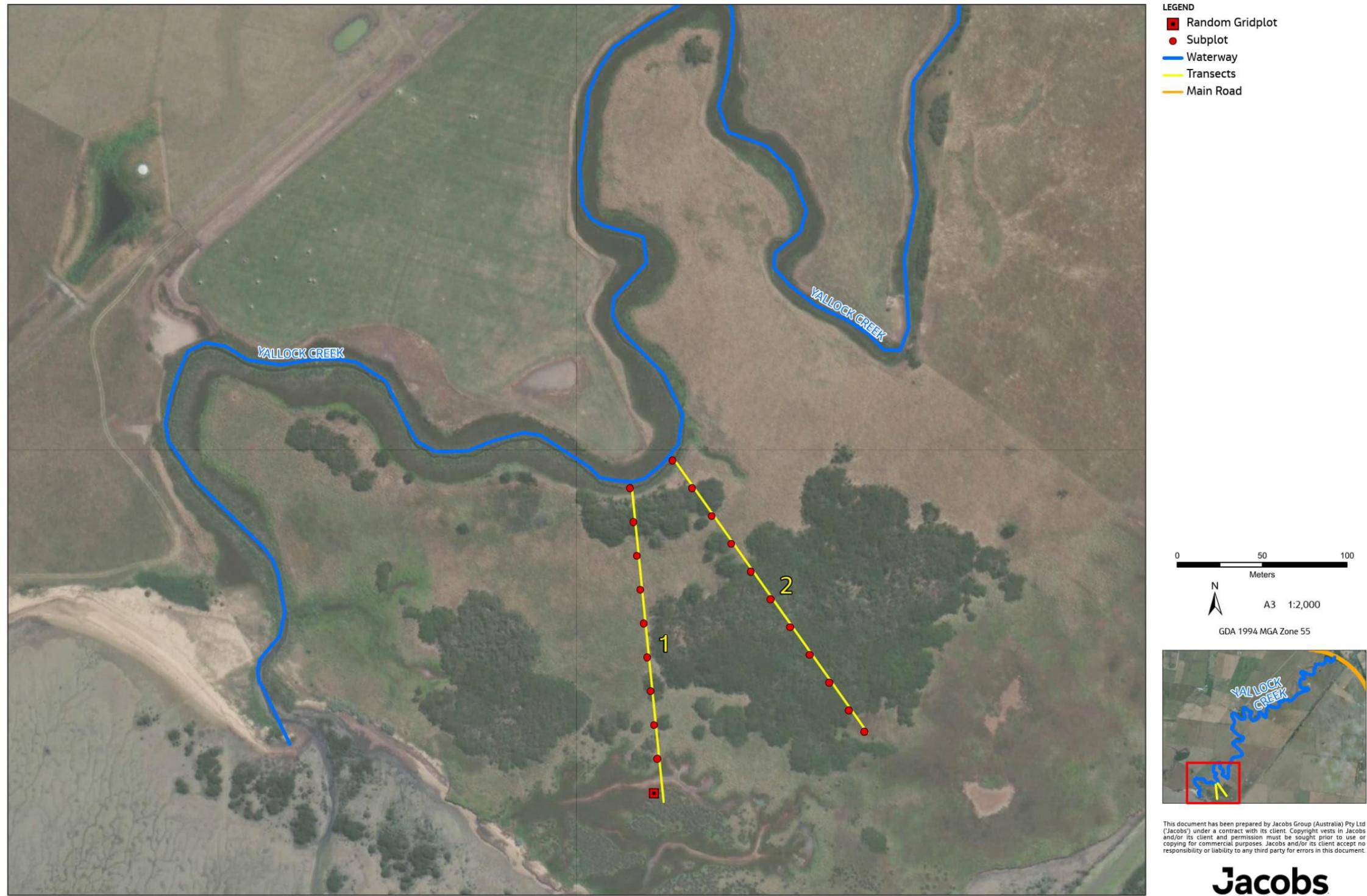


Figure 3-109. Yallock Creek: transect locations

3.29 Yarra River

Values	Treed areas of riparian vegetation within the assessed area comprised Floodplain Woodland or Floodplain Riparian Woodland. Native vegetation patches in the upstream sections (e.g. around Herring Island) contain better quality examples of these EVCs. All native vegetation within the assessed areas can be considered highly modified. Narrow bands of treeless estuarine vegetation occur along lower sections of the Yarra, however none of these are well formed. The treeless EVCs are Wet Saltmarsh Herbland and Estuarine Reedbed however these occupy less than 10% of the area. In most cases patches 0.5-2 m wide on the bank were assessed in combination with scattered remnant native vegetation higher up the bank.
Threats	Better quality areas of native vegetation upstream are either managed as open space by Parks Victoria or local government, or are on private property on escarpments that are too steep for development. There is a large suite of weed species which occupy upper reaches (too many to list here) with varying cover. Other threats include the accumulation of rubbish from stormwater and minor erosion (on some steep banks). Bluestone used to stabilise banks of the Yarra River limit aquatic plant growth on the margins of the water. Most of the Yarra River study area has negligible space available for recruitment of native vegetation. Some mature <i>Eucalyptus camaldulensis</i> (River Red-gum) and other eucalypt species occupy areas where recruitment will not continue under current conditions.
Survey access	All sections of the Yarra River are readily accessible by bike track or other access. Herring Island requires boat access however this section is only a few hundred metres long. Access in some sections around North Warf is restricted to the public. Similarly the industrial docks on the north side are inaccessible, however mostly devoid of riparian vegetation. Sections along Lorimer St side require access where possible to pick up revegetation and some remnant vegetation. Riverside Spit Reserve and surrounds on the west bank near the mouth is relatively easy to access.
Survey safety	Bike and pedestrian traffic is common along the banks of the study area. Care should be taken by wearing high visibility clothing and watching for others. Steep sections of the bank should be avoided on foot. Some access requires road crossing in busy traffic.
Survey risks	No risks identified.

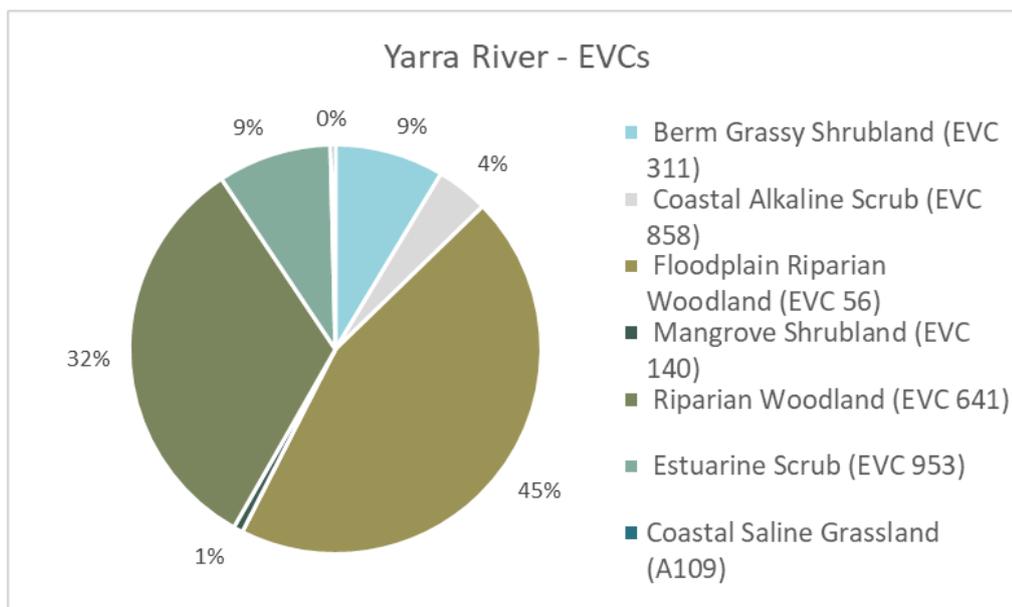


Figure 3-110. Yarra River Vegetation Visions survey area: Ecological Vegetation Classes (EVCs)

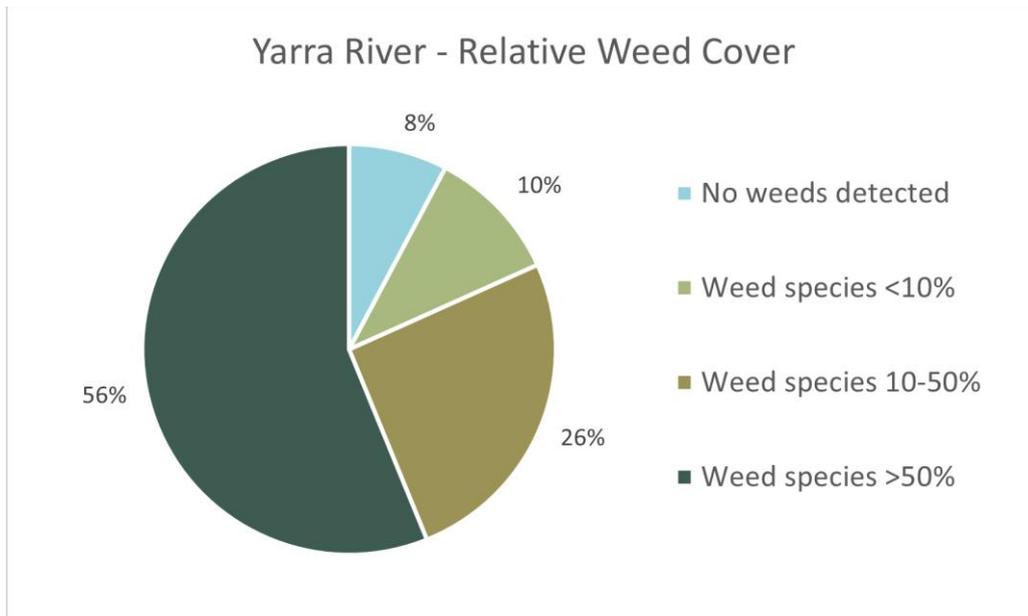


Figure 3-111. Yarra River Vegetation Visions survey area: relative weed cover

Yarra River



Figure 3-112. Yarra River: Vegetation Visions scoring (1 of 3)

Yarra River



Figure 3-113. Yarra River: Vegetation Visions scoring (2 of 3)

Yarra River

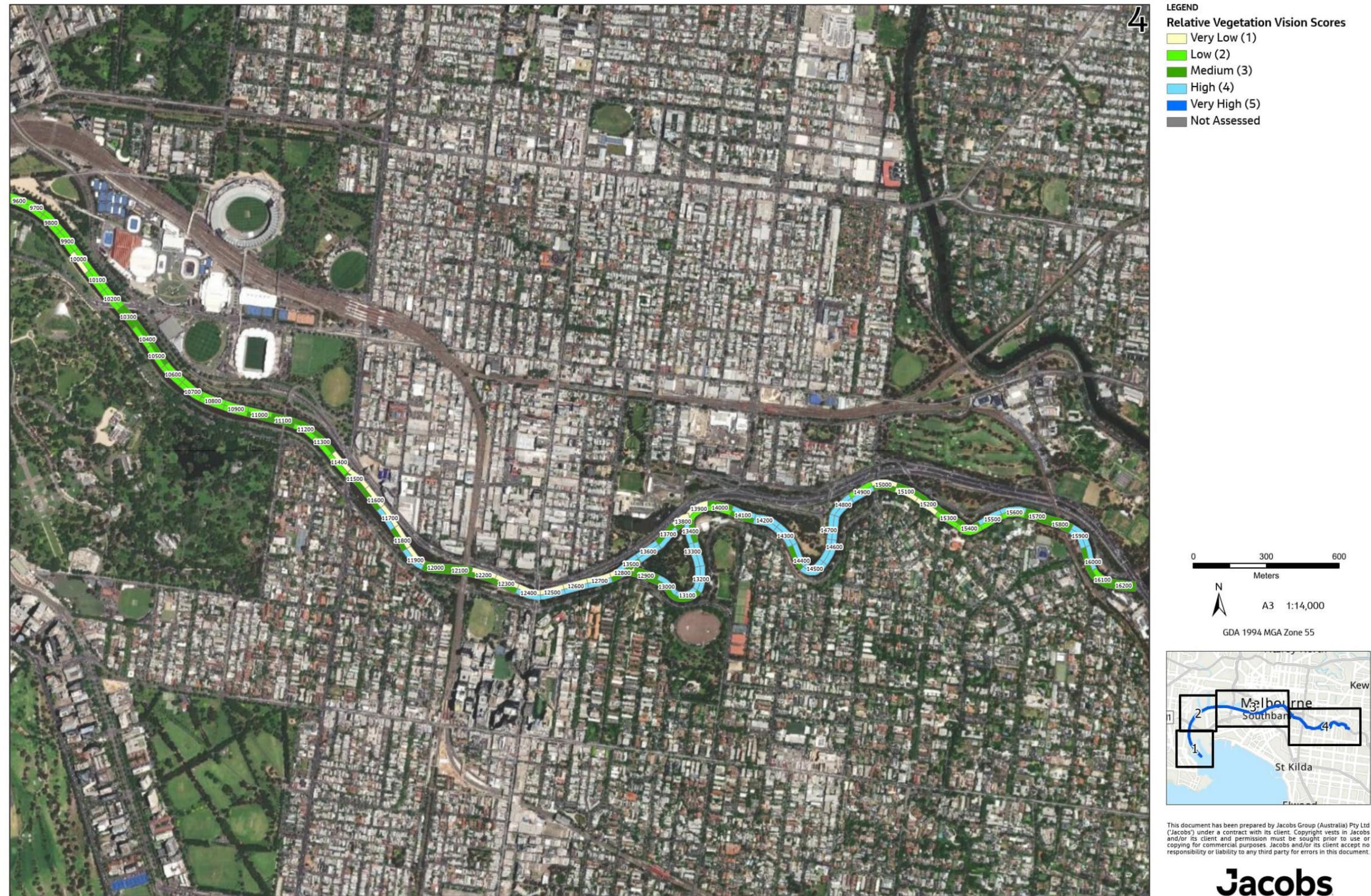


Figure 3-114. Yarra River: Vegetation Visions scoring (3 of 3)

4. Recommendations

The following recommendations are made to address issues encountered during this baseline data collection. Broadly speaking the monitoring method utilised worked well and data collection was able to be undertaken for the majority of sites without issue.

Method:

- Vegetation Visions scoring does not appear to accurately reflect the condition of some estuarine plant communities. Structurally and/or floristically 'simple' communities in excellent condition may receive lower scores than other communities in relatively poor condition. Notable examples include Coastal Saltmarsh, Estuarine Wetland and Estuarine Reedbed.
- A standardised method for collecting electrical conductivity and pH should be established prior to the next round of monitoring. While manufacturer's instructions address basic usage and calibration of devices, discrepancies between devices used were noted. Devices used were the Milwaukee MW802 Pro and the Hanna Instruments HI 98129 pH Meter.
- Vegetation Visions monitoring plots could foreseeably be reduced for some estuaries, as they include substantial areas not/barely subject to estuarine influence. Estuaries include Stoney Creek, Watson Creek, Cardinia Creek, Bunyip River and Lang Lang River.
- Review the monitoring data to determine what level of transect/grid-plot replication has been achieved for each EVC. If there is too much (>6 replicates for any EVC) there could be an argument to reduce the surplus grids and hence reduce future monitoring costs (or relocate to areas of EVC lacking replication).
- It is recommended that the location of monitoring plots in the field is conducted using handheld GPS devices with sub-metre accuracy (30 cm accuracy was achieved during this round of data collection). Use of tape-measures is likely to result in poor relocation of plots, particularly in dense vegetation.
- Consideration should be given to difficulties assessing submergent instream vegetation. Many of the waterways surveyed are likely to maintain high levels of turbidity which limits the ability to accurately detect the number of submergent species present.

Data collection:

- Land access communications/negotiations should begin a couple months prior fieldwork to minimise the risk of timeline overrun. It is recommended that Melbourne Water lead this process.
- The accuracy of the Victorian Saltmarsh Study mapping was found to be inaccurate in a number of estuaries, notably those west of the Yarra River. This must be taken into consideration when allocating EVCs during monitoring and when considering the re-allocation of transects (refer discussion of EVC replication above).
- The use of kayaks was found to be highly beneficial for estuaries with poor access.
- Care must be taken not to damage native vegetation during sampling. Of particular concern is damage to plants of *Tecticornia arbuscula* (Shrubby Glasswort) which tends to occur in dense stands and is the dominant component of the Coastal Saltmarsh sub-community Wet Saltmarsh Shrubland. This species is noted to be slow growing and is very brittle, and major branches and trunks may be snapped off with very little effort. Other susceptible vegetation includes low herb-fields located on soft sediments (often associated with the Coastal Saltmarsh sub-community Wet Saltmarsh Herbland).
- Consideration should be given to conducting future monitoring events in spring, to better capture seasonal flora that may otherwise be overlooked. The benefit of doing this must be weighed against discrepancies arising from monitoring in a different season, as changes to monitoring elements (e.g. weed cover) may be confounded by annual weed growth.

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- [^]Paul I. Boon, Tim Allen, Jennifer Brook, Geoff Carr, Doug Froud, Jasmine Hoye, Chris Harty, Andrew McMahon, Steve Mathews, Neville Rosengren, Steve Sinclair, Matt White, and Jeff Yogovic.

Appendix A. Comparison of Vegetation Vision and Index of Estuary Condition scoring for each estuary

The Department of Land Water and Planning (DELWP)—now the Department of Energy, Environment and Climate Action (DEECA)—developed a condition assessment method for estuaries called the Index of Estuary Condition (IEC). The IEC was applied to estuaries throughout Victoria to document their current condition and establish a baseline for future assessments. The IEC focuses on five components (or sub-indices) of estuaries: physical form, hydrology, water quality, flora and fish (DELWP 2021a). The first state-wide IEC assessment for Victorian estuaries was delivered in 2021. This project was part of an investment by the Victorian Government funded through the Water and Catchments group to improve the health of waterways and catchments and guide the management of Victoria's estuaries. IEC scores were assigned to the whole estuary and hence, provides a course-grain understanding of estuary condition. Comparably, the vegetation vision method assesses condition every 100m which attempts to provide a more fine-grain analysis. Table A-1 below compares the total vegetation vision scores (shown as a range 0-25 due to our scale of 100m plots) and associated condition classes, to the results of the 2021 IEC assessment for each estuary (DELWP 2021b). It also compares the vegetation vision scores to the flora sub-index scores of the IEC, as this is a more comparable element to what was assessed using the vegetation vision method (DELWP 2021b). It should be noted that the vegetation vision scores reflected in the table are associated with the 100m plots that overlap with areas assessed during the 2021 IEC assessment. The condition classes are also not of the same scale (Table A-2) but have been used here to provide a visual comparison.

Table A-1. Comparison of Vegetation Vision, IEC and flora sub-index scores and associated condition classes for each estuary

Site (Relevant 100m Plots)	Vegetation Vision Score (0-25)	Vegetation Vision Condition Class (Ordinal Score 0-5)	2021 Total IEC Score (0-50)	IEC Condition Class	IEC Flora Score (0-10)	IEC Flora Condition Class
Balcombe Creek (0m-1900m)	17-25	High – Very High (4-5)	23	Poor	7	Moderate
Bass River (0m-6000m)	11-20	Medium – High (3-4)	27	Moderate	7	Moderate
Bunyip River (0m-5100m)	11-18	Medium – High (3-4)	26	Poor	9*	Good
Cardinia Creek	10-20	Low – High (2-4)	28	Moderate	9*	Good
Cardinia Creek 1 (0m-5200m)†						
Cardinia Creek/Deep Creek	8-22	Low – Very High (2-5)	26	Poor	9*	Good
Cardinia Creek 2 (0m-5100m), 3 (0m-4700m) and 4 (0m-7100m)*						
Chinamans Creek (0m-1800m)	7-25	Low – Very High (2-5)	N/A	N/A	N/A	N/A
Elwood Canal (0m-1200m)	1-19	Very Low – High (1-4)	11	Very Poor	N/A	N/A
Kananook Creek (0m-2500m)	6-19	Low – High (2-4)	26	Poor	8	Good
Kings Creek (0m-3600m)	13-25	Medium – Very High (3-5)	N/A	N/A	N/A	N/A
Kororoit Creek (0m-1500m)	13-19	Medium – High (3-4)	26	Poor	6	Moderate

Estuarine Vegetation Condition Assessment: Baseline data collection

Site (Relevant 100m Plots)	Vegetation Vision Score (0-25)	Vegetation Vision Condition Class (Ordinal Score 0-5)	2021 Total IEC Score (0-50)	IEC Condition Class	IEC Flora Score (0-10)	IEC Flora Condition Class
Lang Lang River (0m-5100m)	8-15	Low – Medium (2-3)	22	Poor	N/A	N/A
Laverton Creek (0m-2400m)	6-21	Low – Very High (2-5)	27	Moderate	6	Moderate
Little River (0m-2700m)	0-21	Very Low – Very High (1-5)	21	Poor	6*	Moderate
Maribyrnong River‡ (0m-15800m)	0-19	Very Low – High (1-4)	24	Poor	7*	Moderate
Merricks Creek (0m-2500m)	10-25	Low – Very High (2-5)	20	Poor	9*	Good
Moonee Ponds‡ Creek (0m-2900m)	6-19	Low – High (2-4)	24	Poor	7*	Moderate
Mordialloc River (0m-1900m)	0-21	Very Low – Very High (0-5)	19	Very Poor	4	Poor
Olivers Creek (0m-7700m)	0-19	Very Low – High (1-4)	N/A	N/A	N/A	N/A
Paisley Drain (0m-300m)	16-19	High (4)	N/A	N/A	N/A	N/A
Patterson River (0m-1200m)	0-21	Very Low – Very High (1-5)	19	Very Poor	N/A	N/A
Sheepwash Creek (0m-3700m)	8-25	Low – Very High (2-5)	N/A	N/A	N/A	N/A
Skeleton Creek (0m-2500m)	12-21	Medium – Very High (3-5)	22	Poor	9*	Good
Stoney Creek‡ (0m-1500m)	5-15	Very Low – Medium (1-3)	24	Poor	7*	Moderate
Stony Creek (WPB) (0m-7400m)	4-20	Very Low – High (1-4)	N/A	N/A	N/A	N/A
Tooradin Road Drain^ (0m-4700m)	5-18	Very Low – High (1-4)	-	-	9	Good
Warringine Creek (0m-2000m)	17-21	High – Very High (4-5)	29	Moderate	10*	Excellent
Watson Creek (0m-2800m)	11-21	Medium – Very High (3-5)	25	Poor	10*	Excellent
Werribee River (0m-7500m)	3-21	Very Low – Very High (1-5)	18	Very Poor	5	Poor
Yallock Creek^ (0m-1500m)	12-19	Medium – High (3-4)	-	-	9	Good
Yarra River (0m-16200m)	0-19	Very Low – High (1-4)	24	Poor	7*	Moderate

* Flora sub-index for marked estuaries based solely on fringing vegetation measure. These estuaries were not assessed for submerged vegetation (reference).

‡ IEC scores for these estuaries are combined with Yarra River

^ No total IEC score due to insufficient data

+ Cardinia Creek split into four (Cardinia Creek 1, 2, 3 & 4) for vegetation vision assessment. The 100m plots shown in brackets are those that align with what was surveyed in the 2021 IEC assessment for Cardinia and Deep Creek.

N/A = Not Assessed

Table A-2. The thresholds of the overall Vegetation Visions, IEC and sub-index Flora scores and their corresponding condition classes

Vegetation Visions Condition Class (0-5)	IEC Condition Class (0-50)	Flora Condition Class (1-10)
Very Low (1)	Very Poor (5-19)	Very Poor (1-3)
Low (2)	Poor (20-26)	Poor (4-5)
Medium (3)	Moderate (27-33)	Moderate (6-7)
High (4)	Good (34-40)	Good (8-9)
Very High (5)	Excellent (41-50)	Excellent (10)

Appendix B. Transect amendments

The following table details changes made to the location and composition of transects. Changes were required to address discrepancies between EVC mapping and onsite vegetation, private land access issues or where plots were situated in inaccessible or inappropriate locations (e.g. open water).

Estuary	Change	Reason for change
Balcombe Creek	Remove subplot 180m transect 2	Subplot located in front yard of private residential property. No access granted to property.
Balcombe Creek	Transect 1 gridplot 20m moved to 11m	Grid relocation to appropriate EVC
Bass River	Transect 3 removed from project	Multiple plots inaccessible due to multiple creek intersections. Large portion in private property (at least one plot on a house).
Bass River	Transect 3 grid plot moved to Transect 1 (120m)	Grid relocation to appropriate EVC
Bunyip River	Remove subplot 160m and 180m from Transect 2	Subplots located in private property in grazed paddock. No access granted to property.
Cardinia Creek	Remove subplot 140m, 160m and 180m from Transect 2	Subplots located on private land (boat club)
Cardinia Creek	Relocated Warringine Creek Transect 5 gridplot to Cardinia Transect 4 (40m)	Moved to capture target EVC
Cardinia Creek	Transect 3 gridplot 140m moved to 137m	Moved to capture target EVC
Cardinia Creek	Transect 2 gridplot 120m moved to 117m	Moved to capture target EVC
Cardinia Creek	Transect 1 gridplot 40m moved to 26m	Moved to capture target EVC
Cardinia Creek	Transect 6 gridplot 20m moved to 15m	Moved to capture target EVC
Deep Creek	Transect 1 subplot 60m moved to 40m	Moved to capture target EVC
Deep Creek	Transect 1 gridplot 40m moved to 60m	Moved to capture target EVC
Kings Creek	Transect 2 subplot 80m moved to 85m	Moved to capture target EVC
Kororoit Creek	Transect 1 gridplot changed to a subplot	Gridplot vegetation not representative of the target EVC
Laverton Creek	Transect 1 grid (120m) swapped with subplot 140m	Moved to capture target EVC
Merricks Creek	Remove subplot 180m from Transect 2	Subplot located in private property in grazed paddock. No access granted to property.
Merricks Creek	Transect 1 grid 80m swapped with subplot 40m	Moved to capture target EVC
Olivers Creek	Transect 1 grid (180m) swapped with subplot 160m	Moved to capture target EVC
Olivers Creek	Transect 3 grid (20m) swapped with subplot 40m	Moved to capture target EVC
Tooradin Road Drain	Transect 1 grid (200m) swapped with subplot 180m	Moved to capture target EVC
Tooradin Road Drain	Replace Transect 2 subplot (20m) with Transect 4 gridplot	Gridplot created to replace gridplot from transect 4

Estuary	Change	Reason for change
Tooradin Road Drain	Transect 4 removed from project	Private land – no access
Warringine Creek	Transect 1 gridplot 140m moved to transect 3 subplot 80m	Moved to capture target EVC
Watson Creek	Transect 5 removed from project	Private land access required to access transect. No access granted to property.

Appendix C. Flora species recorded within transect grid-plots and sub-plots

Scientific name	Common name
Balcombe creek	
<i>Acacia mearnsii</i>	Black Wattle
<i>Acacia paradoxa</i>	Hedge Wattle
<i>Acrotriche serrulata</i>	Honey-pots
<i>Allocasuarina verticillata</i>	Drooping Sheoak
* <i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
* <i>Asparagus asparagoides</i>	Bridal Creeper
* <i>Atriplex prostrata</i>	Hastate Orache
<i>Austrostipa</i> spp.	Spear Grass
<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia
<i>Billardiera</i> spp.	Apple Berry
<i>Bursaria spinosa</i>	Sweet Bursaria
<i>Cassinia aculeata</i> subsp. <i>aculeata</i>	Common Cassinia
<i>Cassytha</i> spp.	Dodder Laurel
* <i>Chrysanthemoides monilifera</i>	Boneseed
<i>Clematis microphylla</i> s.l.	Small-leaved Clematis
<i>Correa reflexa</i>	Common Correa
<i>Dianella revoluta</i> var. <i>revoluta</i>	Black-anther Flax-lily
<i>Dichondra repens</i>	Kidney-weed
<i>Distichlis distichophylla</i>	Australian Salt-grass
* <i>Ehrharta erecta</i>	Panic Veldt-grass
* <i>Ehrharta longiflora</i>	Annual Veldt-grass
<i>Exocarpos cupressiformis</i>	Cherry Ballart
<i>Ficinia nodosa</i>	Knobby Club-sedge
<i>Gahnia radula</i>	Thatch Saw-sedge
* <i>Genista linifolia</i>	Flax-leaf Broom
<i>Goodenia ovata</i>	Hop Goodenia
<i>Goodenia radicans</i>	Shiny Swamp-mat
* <i>Hedera helix</i> s.s.	English Ivy
<i>Hibbertia</i> spp.	Guinea Flower
* <i>Hypochaeris radicata</i>	Flatweed
<i>Isolepis cernua</i> s.l.	Nodding Club-sedge
<i>Isolepis cernua</i> s.s.	Nodding Club-sedge
<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush
<i>Juncus</i> spp.	Rush
<i>Lepidosperma</i> spp.	Sword Sedge
<i>Leptinella longipes</i>	Cotula
<i>Leptospermum laevigatum</i>	Coast Tea-tree
<i>Leucopogon parviflorus</i>	Coast Beard-heath
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Melaleuca ericifolia</i>	Swamp Paperbark
<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
<i>Muehlenbeckia adpressa</i>	Climbing Lignum

	<i>Myoporum insulare</i>	Common Boobialla
	<i>Ozothamnus ferrugineus</i>	Tree Everlasting
	<i>Phragmites australis</i>	Common Reed
*	<i>Pittosporum undulatum</i>	Sweet Pittosporum
*	<i>Plantago lanceolata</i>	Ribwort
	<i>Poa labillardierei</i>	Common Tussock-grass
	<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass
*	<i>Polygala myrtifolia</i>	Myrtle-leaf Milkwort
	<i>Poranthera microphylla</i>	Small Poranthera
	<i>Rhagodia candolleana</i> subsp. <i>candolleana</i>	Seaberry Saltbush
	<i>Rytidosperma setaceum</i> var. <i>setaceum</i>	Bristly Wallaby-grass
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio glomeratus</i>	Annual Fireweed
*	<i>Stellaria</i> spp.	Starwort
*	<i>Symphotrichum subulatum</i>	Aster-weed
*	<i>Symphotrichum subulatum</i>	Aster-weed
	<i>Tetragonia implexicoma</i>	Bower Spinach
	<i>Triglochin striata</i>	Streaked Arrowgrass
Bass river		
	<i>Apium prostratum</i>	Sea Celery
	<i>Apium prostratum</i> subsp. <i>prostratum</i>	Sea Celery
	<i>Atriplex paludosa</i> subsp. <i>paludosa</i>	Marsh Saltbush
	<i>Avicennia marina</i> subsp. <i>australasica</i>	Grey Mangrove
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
	<i>Gahnia filum</i>	Chaffy Saw-sedge
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush
*	<i>Parapholis incurva</i>	Coast Barb-grass
	<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass
	<i>Poaceae</i> spp.	Grass
	<i>Puccinellia stricta</i> s.s.	Australian Saltmarsh-grass
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Suaeda australis</i>	Austral Seablite
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Triglochin striata</i>	Streaked Arrowgrass
Bunyip river		
	<i>Atriplex paludosa</i> subsp. <i>paludosa</i>	Marsh Saltbush
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Avicennia marina</i> subsp. <i>australasica</i>	Grey Mangrove
*	<i>Bromus hordeaceus</i>	Soft Brome
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
	<i>Gahnia filum</i>	Chaffy Saw-sedge
	<i>Goodenia radicans</i>	Shiny Swamp-mat

	<i>Hemichroa pentandra</i>	Trailing Hemichroa
*	<i>Holcus lanatus</i>	Yorkshire Fog
	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush
	<i>Juncus</i> spp.	Rush
*	<i>Parapholis incurva</i>	Coast Barb-grass
	<i>Poa poiiformis</i> var. <i>poiiformis</i>	Coast Tussock-grass
	<i>Poaceae</i> spp.	Grass
*	<i>Poaceae</i> spp. (naturalised)	Grass (naturalised)
*	<i>Poaceae</i> spp. (naturalised)	Grass (naturalised)
*	<i>Polygonum aviculare</i> s.s.	Hogweed
	<i>Puccinellia stricta</i> s.s.	Australian Saltmarsh-grass
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio glomeratus</i>	Annual Fireweed
*	<i>Sonchus asper</i> s.s.	Rough Sow-thistle
	<i>Suaeda australis</i>	Austral Seablite
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Triglochin striata</i>	Streaked Arrowgrass
Cardinia creek		
*	<i>Acetosella vulgaris</i>	Sheep Sorrel
	<i>Aira</i> spp.	Hair Grass
	<i>Apium prostratum</i>	Sea Celery
	<i>Apium prostratum</i> subsp. <i>prostratum</i>	Sea Celery
	<i>Apodasmia brownii</i>	Coarse Twine-rush
*	<i>Asparagus asparagoides</i>	Bridal Creeper
*	<i>Asparagus officinalis</i>	Asparagus
	<i>Atriplex paludosa</i> subsp. <i>paludosa</i>	Marsh Saltbush
	<i>Atriplex paludosa</i> subsp. <i>paludosa</i>	Scrub Sheoak
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Austrostipa stipoides</i>	Prickly Spear-grass
	<i>Avicennia marina</i> subsp. <i>australasica</i>	Grey Mangrove
	<i>Brachyscome graminea</i>	Grass Daisy
	<i>Brachyscome</i> spp.	Daisy
*	<i>Bromus hordeaceus</i>	Soft Brome
	<i>Cassytha pubescens</i> s.s.	Downy Dodder-laurel
*	<i>Centaureum tenuiflorum</i>	Slender Centaury
*	<i>Cirsium vulgare</i>	Spear Thistle
	<i>Clematis microphylla</i> s.s.	Small-leaved Clematis
*	<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch
*	<i>Daucus carota</i>	Carrot
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
*	<i>Ehrharta erecta</i>	Panic Veldt-grass
*	<i>Ehrharta longiflora</i>	Annual Veldt-grass
	<i>Epilobium billardioreanum</i>	Variable Willow-herb
	<i>Epilobium hirtigerum</i>	Hairy Willow-herb
*	<i>Erigeron</i> spp.	Fleabane
*	<i>Erigeron sumatrensis</i>	Tall Fleabane

	<i>Ficinia nodosa</i>	Knobby Club-sedge
	<i>Gahnia filum</i>	Chaffy Saw-sedge
	<i>Gahnia trifida</i>	Coast Saw-sedge
*	<i>Genista linifolia</i>	Flax-leaf Broom
	<i>Goodenia radicans</i>	Shiny Swamp-mat
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
*	<i>Holcus lanatus</i>	Yorkshire Fog
*	<i>Hypochaeris radicata</i>	Flatweed
	<i>Isolepis spp.</i>	Club Sedge
	<i>Juncus kraussii subsp. australiensis</i>	Sea Rush
*	<i>Lactuca serriola</i>	Prickly Lettuce
	<i>Laphangium luteoalbum</i>	Jersey Cudweed
	<i>Lawrenzia spicata</i>	Salt Lawrenzia
*	<i>Leontodon saxatilis subsp. saxatilis</i>	Hairy Hawkbit
*	<i>Lolium rigidum</i>	Wimmera Rye-grass
*	<i>Lysimachia arvensis</i>	Pimpernel
*	<i>Lysimachia arvensis var. arvensis</i>	Scarlet Pimpernel
	<i>Melaleuca ericifolia</i>	Swamp Paperbark
	<i>Olearia ramulosa var. ramulosa</i>	Twiggy Daisy-bush
*	<i>Parapholis incurva</i>	Coast Barb-grass
*	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
*	<i>Phalaris minor</i>	Lesser Canary-grass
	<i>Phragmites australis</i>	Common Reed
*	<i>Plantago coronopus</i>	Buck's-horn Plantain
*	<i>Plantago coronopus subsp. coronopus</i>	Buck's-horn Plantain
	<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass
	<i>Poa spp.</i>	Tussock Grass
	<i>Puccinellia spp.</i>	Saltmarsh Grass
	<i>Puccinellia stricta s.s.</i>	Australian Saltmarsh-grass
*	<i>Rosa rubiginosa</i>	Sweet Briar
*	<i>Rubus fruticosus spp. agg.</i>	Blackberry
*	<i>Rumex crispus</i>	Curled Dock
*	<i>Rumex spp. (naturalised)</i>	Dock (naturalised)
	<i>Rytidosperma setaceum var. setaceum</i>	Bristly Wallaby-grass
	<i>Rytidosperma spp.</i>	Wallaby Grass
	<i>Salicornia quinqueflora subsp. quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Schoenus nitens</i>	Shiny Bog-sedge
	<i>Schoenus nitens</i>	Shiny Bog-rush
	<i>Senecio glomeratus</i>	Annual Fireweed
	<i>Senecio glomeratus subsp. longifructus</i>	Annual Fireweed
	<i>Senecio pinnatifolius</i>	Variable Groundsel
	<i>Senecio pinnatifolius var. lanceolatus</i>	Lance-leaf Groundsel
	<i>Senecio spp.</i>	Groundsel
*	<i>Solanum nigrum s.s.</i>	Black Nightshade
*	<i>Sonchus oleraceus</i>	Common Sow-thistle
	<i>Spergularia tasmanica</i>	Native Sea-spurrey
	<i>Suaeda australis</i>	Austral Seablite

*	<i>Symphytotrichum subulatum</i>	Aster-weed
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Triglochin striata</i>	Streaked Arrowgrass
*	<i>Vulpia bromoides</i>	Squirrel-tail Fescue
*	<i>Vulpia spp.</i>	Fescue
Kings creek		
	<i>Apium prostratum</i>	Sea Celery
	<i>Apodasmia brownii</i>	Coarse Twine-rush
*	<i>Asparagus asparagoides</i>	Bridal Creeper
	<i>Atriplex paludosa subsp. paludosa</i>	Marsh Saltbush
	<i>Austrostipa stipoides</i>	Prickly Spear-grass
	<i>Avicennia marina subsp. australasica</i>	Grey Mangrove
	<i>Cassytha pubescens s.s.</i>	Downy Dodder-laurel
	<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
*	<i>Ehrharta erecta</i>	Panic Veldt-grass
*	<i>Ehrharta longiflora</i>	Annual Veldt-grass
*	<i>Festuca arundinacea</i>	Tall Fescue
	<i>Gahnia filum</i>	Chaffy Saw-sedge
	<i>Goodenia radicans</i>	Shiny Swamp-mat
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
	<i>Isolepis cernua s.s.</i>	Nodding Club-sedge
	<i>Juncus kraussii subsp. australiensis</i>	Sea Rush
	<i>Lobelia anceps</i>	Angled Lobelia
	<i>Melaleuca ericifolia</i>	Swamp Paperbark
	<i>Phragmites australis</i>	Common Reed
	<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass
	<i>Salicornia quinqueflora subsp. quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio glomeratus</i>	Annual Fireweed
*	<i>Sonchus oleraceus</i>	Common Sow-thistle
	<i>Sporobolus virginicus</i>	Salt Couch
	<i>Suaeda australis</i>	Austral Seablite
*	<i>Symphytotrichum subulatum</i>	Aster-weed
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Triglochin striata</i>	Streaked Arrowgrass
Kororoit creek		
	<i>Acrobolbus cinerascens</i>	Grey Pouchwort
*	<i>Aizoon pubescens</i>	Galenia
	<i>Alternanthera denticulata s.s.</i>	Lesser Joyweed
*	<i>Apiaceae spp.</i>	Umbellifer
	<i>Apium prostratum subsp. prostratum</i>	Sea Celery
	<i>Atriplex cinerea</i>	Coast Saltbush
	<i>Atriplex paludosa subsp. paludosa</i>	Marsh Saltbush
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Austrostipa stipoides</i>	Prickly Spear-grass
*	<i>Avena spp.</i>	Oat
	<i>Avicennia marina subsp. australasica</i>	Grey Mangrove

*	<i>Beta vulgaris subsp. maritima</i>	Wild Beet
	<i>Bolboschoenus caldwellii</i>	Salt Club-sedge
*	<i>Brassica fruticulosa</i>	Twiggy Turnip
*	<i>Brassicaceae spp.</i>	Crucifer
*	<i>Bromus catharticus</i>	Prairie Grass
*	<i>Bromus catharticus var. catharticus</i>	Prairie Grass
*	<i>Bromus hordeaceus</i>	Soft Brome
*	<i>Carduus spp.</i>	Slender Thistle
*	<i>Cenchrus clandestinus</i>	Kikuyu
*	<i>Cynodon dactylon var. dactylon</i>	Couch
*	<i>Cyperus eragrostis</i>	Drain Flat-sedge
*	<i>Dactylis glomerata</i>	Cocksfoot
	<i>Dianella brevicaulis</i>	Small-flower Flax-lily
	<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
	<i>Duma florulenta</i>	Tangled Lignum
*	<i>Ehrharta erecta</i>	Panic Veldt-grass
*	<i>Erigeron bonariensis</i>	Flaxleaf Fleabane
	<i>Ficinia nodosa</i>	Knobby Club-sedge
	<i>Frankenia pauciflora var. gunnii</i>	Southern Sea-heath
	<i>Gahnia filum</i>	Chaffy Saw-sedge
*	<i>Helminthotheca echioides</i>	Ox-tongue
*	<i>Hordeum spp.</i>	Barley Grass
	<i>Juncus kraussii subsp. australiensis</i>	Sea Rush
*	<i>Lactuca serriola</i>	Prickly Lettuce
*	<i>Lolium rigidum</i>	Wimmera Rye-grass
*	<i>Malva spp.</i>	Mallow
*	<i>Melilotus indicus</i>	Sweet Melilot
*	<i>Modiola caroliniana</i>	Red-flower Mallow
*	<i>Nassella neesiana</i>	Chilean Needle-grass
*	<i>Nassella spp.</i>	Neelde Grass
*	<i>Parapholis incurva</i>	Coast Barb-grass
*	<i>Paspalum distichum</i>	Water Couch
*	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
*	<i>Plantago coronopus subsp. coronopus</i>	Buck's-horn Plantain
*	<i>Plantago lanceolata</i>	Ribwort
	<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass
*	<i>Polygonum aviculare s.s.</i>	Hogweed
	<i>Puccinellia spp.</i>	Saltmarsh Grass
	<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush
*	<i>Rumex conglomeratus</i>	Clustered Dock
*	<i>Rumex crispus</i>	Curled Dock
	<i>Salicornia quinqueflora subsp. quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
*	<i>Solanum nigrum s.s.</i>	Black Nightshade
*	<i>Sonchus asper s.s.</i>	Rough Sow-thistle
	<i>Sonchus hydrophilus</i>	Native Sow-thistle
*	<i>Sonchus oleraceus</i>	Common Sow-thistle

*	<i>Sonchus spp.</i>	Sow Thistle
	<i>Spergularia tasmanica</i>	Native Sea-spurrey
	<i>Spinifex sericeus</i>	Hairy Spinifex
*	<i>Sporobolus africanus</i>	Rat-tail Grass
	<i>Suaeda australis</i>	Austral Seablite
*	<i>Symphotrichum subulatum</i>	Aster-weed
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Tecticornia pergranulata subsp. pergranulata</i>	Blackseed Glasswort
*	<i>Thinopyrum junceiforme</i>	Sea Wheat-grass
	<i>Triglochin striata</i>	Streaked Arrowgrass
Laverton creek		
	<i>Acacia implexa</i>	Lightwood
*	<i>Aizoon pubescens</i>	Galenia
	<i>Anthosachne scabra s.s.</i>	Common Wheat-grass
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Atriplex semibaccata</i>	Berry Saltbush
	<i>Austrostipa flavescens</i>	Coast Spear-grass
	<i>Austrostipa spp.</i>	Spear Grass
*	<i>Avena spp.</i>	Oat
*	<i>Beta vulgaris subsp. maritima</i>	Wild Beet
	<i>Bolboschoenus caldwellii</i>	Salt Club-sedge
*	<i>Briza maxima</i>	Large Quaking-grass
*	<i>Briza spp.</i>	Quaking Grass
*	<i>Bromus diandrus</i>	Great Brome
*	<i>Bromus hordeaceus</i>	Soft Brome
	<i>Carpobrotus rossii</i>	Karkalla
*	<i>Catapodium rigidum</i>	Fern Grass
*	<i>Cenchrus clandestinus</i>	Kikuyu
	<i>Cotula bipinnata</i>	Ferny Cotula
*	<i>Cynodon dactylon var. dactylon</i>	Couch
*	<i>Cyperus eragrostis</i>	Drain Flat-sedge
	<i>Dianella brevicaulis</i>	Small-flower Flax-lily
	<i>Dichondra repens</i>	Kidney-weed
	<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
	<i>Dodonaea viscosa</i>	Sticky Hop-bush
*	<i>Ehrharta erecta</i>	Panic Veldt-grass
	<i>Eleocharis acuta</i>	Common Spike-sedge
*	<i>Erigeron bonariensis</i>	Flaxleaf Fleabane
	<i>Ficinia nodosa</i>	Knobby Club-sedge
	<i>Gahnia filum</i>	Chaffy Saw-sedge
	<i>Goodenia radicans</i>	Shiny Swamp-mat
*	<i>Helminthotheca echioides</i>	Ox-tongue
	<i>Heterozostera spp.</i>	Eelgrass
*	<i>Hordeum hystrix</i>	Barley Grass
*	<i>Hordeum hystrix</i>	Mediterranean Barley-grass
*	<i>Hordeum marinum</i>	Sea Barely-grass
*	<i>Hordeum spp.</i>	Barley Grass

*	<i>Hypochaeris glabra</i>	Smooth Cat's-ear
	<i>Isolepis spp.</i>	Club Sedge
	<i>Juncus kraussii subsp. australiensis</i>	Sea Rush
	<i>Lachnagrostis filiformis s.s.</i>	Common Blown-grass
*	<i>Lagurus ovatus</i>	Hare's-tail Grass
*	<i>Leontodon saxatilis subsp. saxatilis</i>	Hairy Hawkbit
	<i>Lepyrodon pseudolagurus</i>	Furry Pincushion-moss
*	<i>Lolium rigidum</i>	Wimmera Rye-grass
*	<i>Medicago spp.</i>	Medic
*	<i>Nassella leucotricha</i>	Texas Needle-grass
*	<i>Nassella spp.</i>	Neelde Grass
*	<i>Nassella trichotoma</i>	Serrated Tussock
*	<i>Nasturtium spp.</i>	Watercress
*	<i>Oxalis incarnata</i>	Pale Wood-sorrel
	<i>Panicum spp.</i>	Panic
*	<i>Paspalum dilatatum</i>	Paspalum
*	<i>Paspalum spp.</i>	Paspalum
	<i>Persicaria decipiens</i>	Slender Knotweed
*	<i>Phalaris spp.</i>	Canary Grass
	<i>Phragmites australis</i>	Common Reed
*	<i>Plantago coronopus</i>	Buck's-horn Plantain
*	<i>Plantago coronopus subsp. coronopus</i>	Buck's-horn Plantain
*	<i>Plantago lanceolata</i>	Ribwort
	<i>Poaceae spp.</i>	Grass
*	<i>Polygonum aviculare s.s.</i>	Hogweed
*	<i>Polypogon monspeliensis</i>	Hogweed
	<i>Puccinellia spp.</i>	Saltmarsh Grass
	<i>Ranunculus spp.</i>	Buttercup
	<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush
*	<i>Rumex crispus</i>	Curled Dock
	<i>Rytidosperma racemosum var. racemosum</i>	Slender Wallaby-grass
	<i>Salicornia quinqueflora subsp. quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Schoenoplectus tabernaemontani</i>	River Club-sedge
*	<i>Sonchus spp.</i>	Sow Thistle
*	<i>Sporobolus africanus</i>	Rat-tail Grass
	<i>Suaeda australis</i>	Austral Seablite
*	<i>Symphotrichum subulatum</i>	Aster-weed
	<i>Tecticornia pergranulata subsp. pergranulata</i>	Blackseed Glasswort
	<i>Triglochin striata</i>	Streaked Arrowgrass
	<i>Tripogonella loliiformis</i>	Rye Beetle-grass
	<i>Typha domingensis</i>	Narrow-leaf Cumbungi
*	<i>Vulpia spp.</i>	Fescue
	<i>Wilsonia rotundifolia</i>	Round-leaf Wilsonia
Little river		
*	<i>Aizoon pubescens</i>	Galenia
*	<i>Arctotheca calendula</i>	Cape Weed
*	<i>Asteraceae spp.</i>	Composite

	<i>Atriplex cinerea</i>	Coast Saltbush
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Bolboschoenus caldwellii</i>	Salt Club-sedge
*	<i>Brassica fruticulosa</i>	Twiggy Turnip
*	<i>Bromus spp.</i>	Brome
	<i>Calystegia spp.</i>	Bindweed
*	<i>Cenchrus clandestinus</i>	Kikuyu
*	<i>Cerastium vulgare</i>	Common Mouse-ear Chickweed
*	<i>Cirsium vulgare</i>	Spear Thistle
	<i>Crassula decumbens var. decumbens</i>	Spreading Crassula
*	<i>Cynodon dactylon var. dactylon</i>	Couch
*	<i>Cynodon dactylon var. dactylon</i>	Couch
	<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
	<i>Einadia nutans</i>	Nodding Saltbush
*	<i>Festuca spp.</i>	Fescue
*	<i>Lolium rigidum</i>	Wimmera Rye-grass
*	<i>Malva pseudolavatera</i>	Cretan Hollylock
*	<i>Oxalis incarnata</i>	Pale Wood-sorrel
*	<i>Oxalis perennans</i>	Grassland Wood-sorrel
*	<i>Oxalis pes-caprae</i>	Soursob
*	<i>Paspalum distichum</i>	Water Couch
*	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
	<i>Phragmites australis</i>	Common Reed
*	<i>Plantago coronopus subsp. coronopus</i>	Buck's-horn Plantain
	<i>Poaceae spp.</i>	Grass
	<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush
*	<i>Rumex crispus</i>	Curled Dock
	<i>Salicornia quinqueflora subsp. quinqueflora</i>	Beaded Glasswort
	<i>Senecio quadridentatus</i>	Cotton Fireweed
*	<i>Sonchus oleraceus</i>	Common Sow-thistle
	<i>Suaeda australis</i>	Austral Seablite
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Tetragonia implexicoma</i>	Bower Spinach
	<i>Triglochin striata</i>	Streaked Arrowgrass
Merricks creek		
	<i>Acacia longifolia subsp. sophorae</i>	Coast Wattle
	<i>Acacia mearnsii</i>	Black Wattle
	<i>Acacia paradoxa</i>	Hedge Wattle
	<i>Actites megalocarpus</i>	Dune Thistle
*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Austrostipa spp.</i>	Spear Grass
	<i>Banksia integrifolia subsp. integrifolia</i>	Coast Banksia
*	<i>Bromus diandrus</i>	Great Brome
	<i>Carex spp.</i>	Sedge
	<i>Carpobrotus sp.</i>	Pigface
	<i>Clematis microphylla s.s.</i>	Small-leaved Clematis

*	<i>Dipogon lignosus</i>	Common Dipogon
	<i>Distichlis distichophylla</i>	Australian Salt-grass
*	<i>Ehrharta erecta</i>	Panic Veldt-grass
*	<i>Ehrharta erecta</i>	Annual Veldt-grass
*	<i>Ehrharta longiflora</i>	Annual Veldt-grass
	<i>Eucalyptus viminalis</i>	Manna Gum
*	<i>Euphorbia paralias</i>	Sea Spurge
	<i>Ficinia nodosa</i>	Knobby Club-sedge
*	<i>Holcus lanatus</i>	Yorkshire Fog
*	<i>Hypochaeris radicata</i>	Flatweed
	<i>Isolepis spp.</i>	Club Sedge
	<i>Juncus kraussii subsp. australiensis</i>	Sea Rush
*	<i>Lagurus ovatus</i>	Hare's-tail Grass
	<i>Lepidosperma gladiatum</i>	Coast Saw-sedge
	<i>Leptospermum laevigatum</i>	Coast Tea-tree
	<i>Leucopogon parviflorus</i>	Coast Beard-heath
	<i>Microlaena stipoides var. stipoides</i>	Weeping Grass
	<i>Myoporum insulare</i>	Common Boobiolla
*	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
	<i>Phragmites australis</i>	Common Reed
*	<i>Pinus radiata</i>	Radiata Pine
	<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass
	<i>Poa spp.</i>	Tussock Grass
*	<i>Polygala myrtifolia</i>	Myrtle-leaf Milkwort
	<i>Pteridium esculentum subsp. esculentum</i>	Austral Bracken
	<i>Rhagodia candolleana subsp. candolleana</i>	Seaberry Saltbush
	<i>Rubus parvifolius</i>	Small-leaf Bramble
	<i>Salicornia quinqueflora subsp. quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio spp.</i>	Fireweed
	<i>Senecio spp.</i>	Groundsel
	<i>Spinifex sericeus</i>	Hairy Spinifex
	<i>Suaeda australis</i>	Austral Seablite
	<i>Tetragonia implexicoma</i>	Bower Spinach
*	<i>Thinopyrum junceiforme</i>	Sea Wheat-grass
	<i>Thyridia repens</i>	Creeping Monkey-flower
*	<i>Vulpia bromoides</i>	Squirrel-tail Fescue
Olivers creek		
	<i>Aira elegantissima</i>	Delicate Hair-grass
	<i>Apodasmia brownii</i>	Coarse Twine-rush
	<i>Atriplex paludosa subsp. paludosa</i>	Marsh Saltbush
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Austrostipa stipoides</i>	Prickly Spear-grass
	<i>Avicennia marina subsp. australasica</i>	Grey Mangrove
	<i>Brachyscome perpusilla</i>	Rayless Daisy
*	<i>Briza maxima</i>	Large Quaking-grass
*	<i>Cynosurus echinatus</i>	Rough Dog's-tail
	<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower

	<i>Distichlis distichophylla</i>	Australian Salt-grass
*	<i>Ehrharta erecta</i>	Panic Veldt-grass
*	<i>Ehrharta longiflora</i>	Annual Veldt-grass
	<i>Gahnia filum</i>	Chaffy Saw-sedge
	<i>Goodenia radicans</i>	Shiny Swamp-mat
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
	<i>Isolepis cernua</i> s.s.	Nodding Club-sedge
	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush
	<i>Lachnagrostis filiformis</i> s.s.	Common Blown-grass
	<i>Melaleuca ericifolia</i>	Swamp Paperbark
*	<i>Parapholis incurva</i>	Coast Barb-grass
*	<i>Parapholis incurva</i>	Saltmarsh Grass
	<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass
	<i>Puccinellia stricta</i> s.s.	Australian Saltmarsh-grass
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio glomeratus</i>	Annual Fireweed
	<i>Spergularia tasmanica</i>	Native Sea-spurrey
	<i>Suaeda australis</i>	Austral Seablite
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Triglochin striata</i>	Streaked Arrowgrass
Skeleton creek		
*	<i>Aizoon pubescens</i>	Galenia
	<i>Apium annuum</i>	Annual Celery
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Austrostipa stipoides</i>	Prickly Spear-grass
*	<i>Brassica fruticulosa</i>	Twiggy Turnip
	<i>Carpobrotus rossii</i>	Karkalla
*	<i>Chrysanthemoides monilifera</i>	Boneseed
	<i>Clematis microphylla</i> s.s.	Small-leaved Clematis
	<i>Correa glabra</i> var. <i>glabra</i>	Rock Correa
	<i>Dianella brevicaulis</i>	Small-flower Flax-lily
	<i>Dichondra repens</i>	Kidney-weed
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
*	<i>Erigeron bonariensis</i>	Flaxleaf Fleabane
	<i>Ficinia nodosa</i>	Knobby Club-sedge
	<i>Frankenia pauciflora</i> var. <i>gunnii</i>	Southern Sea-heath
	<i>Goodenia blackiana</i>	Black's Goodenia
*	<i>Helminthotheca echioides</i>	Ox-tongue
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
	<i>Heterozostera</i> spp.	Eelgrass
*	<i>Hypochaeris glabra</i>	Smooth Cat's-ear
*	<i>Lagurus ovatus</i>	Hare's-tail Grass
*	<i>Lycium ferocissimum</i>	African Box-thorn
*	<i>Nassella</i> spp.	Neelde Grass
*	<i>Oxalis incarnata</i>	Pale Wood-sorrel
*	<i>Petrorhagia</i> spp.	Carnation

	<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass
	<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass
	<i>Poa</i> spp.	Tussock Grass
	<i>Poaceae</i> spp.	Grass
	<i>Puccinellia</i> spp.	Saltmarsh Grass
	<i>Salicornia blackiana</i>	Thick-head Glasswort
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio</i> spp.	Groundsel
*	<i>Sonchus oleraceus</i>	Common Sow-thistle
*	<i>Sonchus</i> spp.	Sow Thistle
	<i>Spergularia brevifolia</i>	Salt Sea-spurrey
	<i>Suaeda australis</i>	Austral Seablite
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Tecticornia pergranulata</i> subsp. <i>pergranulata</i>	Blackseed Glasswort
	<i>Tetragonia implexicoma</i>	Bower Spinach
	<i>Threlkeldia diffusa</i>	Coast Bonefruit
	<i>Triglochin striata</i>	Streaked Arrowgrass
	<i>Zostera muelleri</i>	Dwarf Gras-wrack
	<i>Zostera</i> spp.	Grass Wrack
Stoney creek		
*	<i>Aizoon pubescens</i>	Galenia
	<i>Avicennia marina</i> subsp. <i>australasica</i>	Grey Mangrove
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower
*	<i>Juncus acutus</i> subsp. <i>acutus</i>	Spiny Rush
*	<i>Melilotus</i> spp.	Melilot
*	<i>Plantago coronopus</i> subsp. <i>coronopus</i>	Buck's-horn Plantain
*	<i>Polygonum aviculare</i> s.s.	Hogweed
	<i>Puccinellia</i> spp.	Saltmarsh Grass
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
*	<i>Scolymus hispanicus</i>	Golden Thistle
	<i>Suaeda australis</i>	Austral Seablite
*	<i>Symphotrichum subulatum</i>	Aster-weed
*	<i>Trifolium</i> spp.	Clover
	<i>Triglochin</i> spp.	Arrowgrass
	<i>Triglochin striata</i>	Streaked Arrowgrass
Tooradin rd drain		
*	<i>Allium triquetrum</i>	Angled Onion
	<i>Atriplex paludosa</i> subsp. <i>paludosa</i>	Marsh Saltbush
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Austrostipa stipoides</i>	Prickly Spear-grass
	<i>Avicennia marina</i> subsp. <i>australasica</i>	Grey Mangrove
*	<i>Brassica fruticulosa</i>	Twiggy Turnip
*	<i>Bromus diandrus</i>	Great Brome
*	<i>Bromus hordeaceus</i>	Soft Brome
*	<i>Cenchrus clandestinus</i>	Kikuyu
*	<i>Cirsium vulgare</i>	Spear Thistle
*	<i>Cotula coronopifolia</i>	Water Buttons

*	<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch
*	<i>Cyperus eragrostis</i>	Drain Flat-sedge
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
	<i>Eucalyptus radiata</i> subsp. <i>radiata</i>	Narrow-leaf Peppermint
	<i>Eucalyptus viminalis</i>	Manna Gum
	<i>Eucalyptus viminalis</i> subsp. <i>pryoriana</i>	Coast Manna-gum
	<i>Eucalyptus viminalis</i> subsp. <i>viminalis</i>	Manna Gum
*	<i>Festuca arundinacea</i>	Tall Fescue
	<i>Gahnia filum</i>	Chaffy Saw-sedge
*	<i>Genista linifolia</i>	Flax-leaf Broom
	<i>Geranium</i> spp.	Crane's Bill
	<i>Goodenia radicans</i>	Shiny Swamp-mat
*	<i>Helminthotheca echioides</i>	Ox-tongue
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
*	<i>Holcus lanatus</i>	Yorkshire Fog
*	<i>Hordeum</i> spp.	Barley Grass
*	<i>Hypochaeris radicata</i>	Flatweed
	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush
*	<i>Lolium</i> spp.	Rye Grass
*	<i>Lophopyrum ponticum</i>	Tall Wheat-grass
*	<i>Lotus corniculatus</i>	Bird's-foot Trefoil
	<i>Lythrum hyssopifolia</i>	Small Loosestrife
*	<i>Oxalis pes-caprae</i>	Soursob
*	<i>Parapholis incurva</i>	Coast Barb-grass
*	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
	<i>Phragmites australis</i>	Common Reed
*	<i>Plantago coronopus</i> subsp. <i>coronopus</i>	Buck's-horn Plantain
*	<i>Plantago lanceolata</i>	Ribwort
	<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass
*	<i>Polygonum aviculare</i> s.s.	Hogweed
	<i>Puccinellia stricta</i> s.s.	Australian Saltmarsh-grass
*	<i>Romulea rosea</i>	Onion Grass
	<i>Rumex</i> spp.	Dock
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
*	<i>Sonchus asper</i> s.s.	Rough Sow-thistle
*	<i>Sonchus oleraceus</i>	Common Sow-thistle
	<i>Spergularia</i> spp.	Sand Spurrey
*	<i>Stellaria media</i>	Chickweed
	<i>Suaeda australis</i>	Austral Seablite
*	<i>Symphotrichum subulatum</i>	Aster-weed
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
*	<i>Trifolium repens</i> var. <i>repens</i>	White Clover
*	<i>Trifolium</i> spp.	Clover
	<i>Triglochin striata</i>	Streaked Arrowgrass
	<i>Veronica gracilis</i>	Slender Speedwell
*	<i>Vicia</i> spp.	Vetch

*	<i>Vulpia spp.</i>	Fescue
Warringine creek		
*	<i>Aira spp.</i>	Hair Grass
	<i>Atriplex paludosa subsp. paludosa</i>	Marsh Saltbush
	<i>Austrostipa stipoides</i>	Prickly Spear-grass
	<i>Avicennia marina subsp. australasica</i>	Grey Mangrove
	<i>Brachyscome perpusilla</i>	Rayless Daisy
*	<i>Briza minor</i>	Lesser Quaking-grass
*	<i>Centaureum spp.</i>	Centaury
	<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
	<i>Distichlis distichophylla/Sporobolus virginicus</i>	Australian Salt-grass/Salt Couch species aggregate
	<i>Gahnia filum</i>	Chaffy Saw-sedge
	<i>Goodenia radicans</i>	Shiny Swamp-mat
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
	<i>Isolepis cernua s.s.</i>	Nodding Club-sedge
	<i>Juncus kraussii subsp. australiensis</i>	Sea Rush
	<i>Lawrenzia spicata</i>	Salt Lawrenzia
	<i>Melaleuca ericifolia</i>	Swamp Paperbark
*	<i>Plantago coronopus</i>	Buck's-horn Plantain
	<i>Poa poiformis var. poiformis</i>	Coast Tussock-grass
*	<i>Poaceae spp. (naturalised)</i>	Grass (naturalised)
*	<i>Romulea rosea</i>	Onion Grass
	<i>Salicornia quinqueflora subsp. quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio glomeratus</i>	Annual Fireweed
	<i>Spergularia spp.</i>	Sand Spurrey
	<i>Sporobolus virginicus</i>	Salt Couch
	<i>Suaeda australis</i>	Austral Seablite
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
	<i>Triglochin striata</i>	Streaked Arrowgrass
Watson creek		
*	<i>Aira spp.</i>	Hair Grass
*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
	<i>Atriplex paludosa subsp. paludosa</i>	Marsh Saltbush
	<i>Avicennia marina subsp. australasica</i>	Grey Mangrove
	<i>Brachyscome perpusilla</i>	Rayless Daisy
	<i>Centrolepis strigosa subsp. strigosa</i>	Hairy Centrolepis
*	<i>Dactylis glomerata</i>	Cocksfoot
	<i>Disphyma crassifolium subsp. clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
*	<i>Ehrharta erecta</i>	Panic Veldt-grass
	<i>Eucalyptus viminalis subsp. pryoriana</i>	Coast Manna-gum
	<i>Gahnia filum</i>	Chaffy Saw-sedge
	<i>Goodenia radicans</i>	Shiny Swamp-mat
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
*	<i>Holcus lanatus</i>	Yorkshire Fog
*	<i>Hordeum spp.</i>	Barley Grass

	<i>Isolepis cernua</i> s.s.	Nodding Club-sedge
	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush
	<i>Juncus</i> spp.	Rush
	<i>Melaleuca ericifolia</i>	Swamp Paperbark
*	<i>Parapholis incurva</i>	Coast Barb-grass
*	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
*	<i>Plantago coronopus</i> subsp. <i>coronopus</i>	Buck's-horn Plantain
	<i>Puccinellia stricta</i> s.s.	Australian Saltmarsh-grass
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio glomeratus</i>	Annual Fireweed
	<i>Spergularia tasmanica</i>	Native Sea-spurrey
	<i>Sporobolus virginicus</i>	Salt Couch
	<i>Suaeda australis</i>	Austral Seablite
*	<i>Symphotrichum subulatum</i>	Aster-weed
	<i>Tecticornia arbuscula</i>	Shrubby Glasswort
*	<i>Trifolium</i> spp.	Clover
	<i>Triglochin striata</i>	Streaked Arrowgrass
Werribee river		
*	<i>Aizoon pubescens</i>	Galenia
*	<i>Atriplex prostrata</i>	Hastate Orache
*	<i>Cirsium vulgare</i>	Spear Thistle
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
	<i>Frankenia pauciflora</i> var. <i>gunnii</i>	Southern Sea-heath
*	<i>Hordeum marinum</i>	Sea Barley-grass
*	<i>Hordeum</i> spp.	Barley Grass
*	<i>Lolium rigidum</i>	Wimmera Rye-grass
*	<i>Oxalis pes-caprae</i>	Soursob
*	<i>Parapholis incurva</i>	Coast Barb-grass
	<i>Phragmites australis</i>	Common Reed
	<i>Poaceae</i> spp.	Grass
	<i>Puccinellia</i> spp.	Saltmarsh Grass
	<i>Salicornia blackiana</i>	Thick-head Glasswort
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
*	<i>Sonchus oleraceus</i>	Common Sow-thistle
	<i>Spergularia</i> spp.	Sand Spurrey
	<i>Suaeda australis</i>	Austral Seablite
	<i>Tecticornia pergranulata</i> subsp. <i>pergranulata</i>	Blackseed Glasswort
	<i>Triglochin striata</i>	Streaked Arrowgrass
	<i>Zostera</i> spp.	Grass Wrack
Yallock creek		
	<i>Acacia mearnsii</i>	Black Wattle
*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
	<i>Atriplex paludosa</i> subsp. <i>paludosa</i>	Marsh Saltbush
*	<i>Atriplex prostrata</i>	Hastate Orache
	<i>Austrostipa stipoides</i>	Prickly Spear-grass
*	<i>Briza maxima</i>	Large Quaking-grass

*	<i>Bromus hordeaceus</i>	Soft Brome
*	<i>Cirsium vulgare</i>	Spear Thistle
	<i>Clematis microphylla</i> s.s.	Small-leaved Clematis
	<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	Rounded Noon-flower
	<i>Distichlis distichophylla</i>	Australian Salt-grass
*	<i>Ehrharta erecta</i>	Panic Veldt-grass
*	<i>Erigeron bonariensis</i>	Flaxleaf Fleabane
*	<i>Erigeron sumatrensis</i>	Tall Fleabane
	<i>Gahnia trifida</i>	Coast Saw-sedge
	<i>Goodenia radicans</i>	Shiny Swamp-mat
	<i>Hemichroa pentandra</i>	Trailing Hemichroa
*	<i>Holcus lanatus</i>	Yorkshire Fog
	<i>Juncus kraussii</i> subsp. <i>australiensis</i>	Sea Rush
*	<i>Lagurus ovatus</i>	Hare's-tail Grass
*	<i>Lotus</i> spp. (naturalised)	Trefoil
*	<i>Lycium ferocissimum</i>	African Box-thorn
	<i>Melaleuca ericifolia</i>	Swamp Paperbark
*	<i>Phalaris aquatica</i>	Toowoomba Canary-grass
*	<i>Phalaris minor</i>	Lesser Canary-grass
	<i>Phragmites australis</i>	Common Reed
*	<i>Phytolacca octandra</i>	Red-ink Weed
*	<i>Plantago coronopus</i>	Buck's-horn Plantain
*	<i>Plantago lanceolata</i>	Ribwort
	<i>Poa labillardierei</i> var. <i>labillardierei</i>	Common Tussock-grass
	<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass
	<i>Poa poiformis</i> var. <i>poiformis</i>	Coast Tussock-grass
*	<i>Poaceae</i> spp. (naturalised)	Grass (naturalised)
*	<i>Polypogon monspeliensis</i>	Annual Beard-grass
*	<i>Rumex crispus</i>	Curled Dock
	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>	Beaded Glasswort
	<i>Samolus repens</i>	Creeping Brookweed
	<i>Senecio glomeratus</i>	Annual Fireweed
	<i>Senecio</i> spp.	Groundsel
	<i>Suaeda australis</i>	Austral Seablite
*	<i>Symphotrichum subulatum</i>	Aster-weed
	<i>Triglochin striata</i>	Streaked Arrowgrass