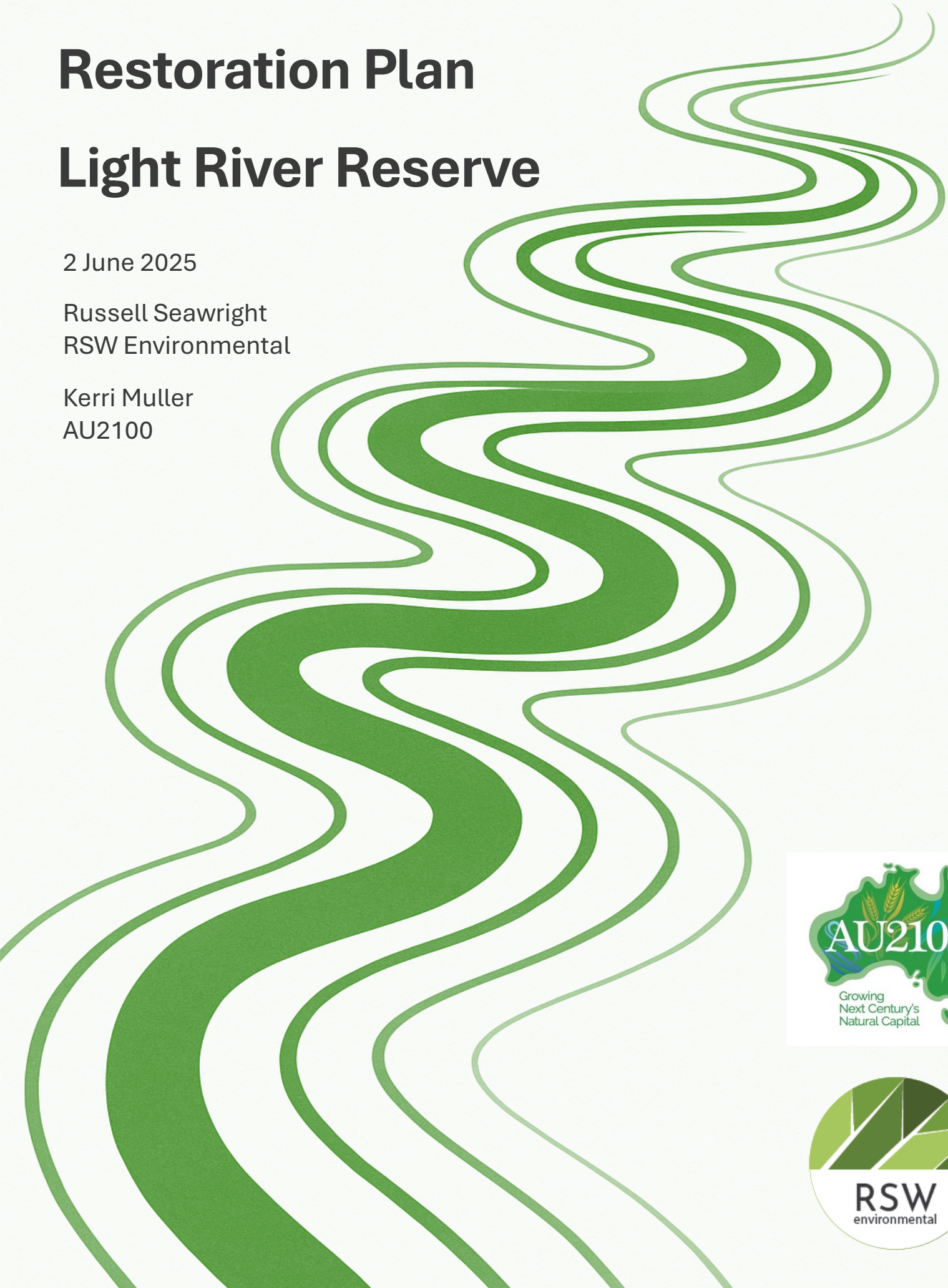
# Restoration Plan

# Light River Reserve

2 June 2025

Russell Seawright
RSW Environmental

Kerri Muller
AU2100



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# Executive Summary

This restoration plan outlines a staged ecological rehabilitation strategy for the Light River Reserve at Hamley Bridge, developed in collaboration with Wakefield Regional Council under the AU2100 program. The primary focus is to stabilise and enhance a degraded drainage corridor from Owen Road to the Light River, tackling erosion, weed invasion, and declining landscape function.

**Key zone-based actions include:**

- **Zone 1**: Critical erosion control using engineered gabion walls and riprap structures to stabilise steep banks and reduce stormwater velocity at the site inlet.
- **Zone 2**: Full-slope treatment using jute matting and stabilisation planting to prevent undercutting and support natural re-vegetation.
- **Zones 3–5**: Construction of a continuous vegetated swale with minor earthworks, selective tree removal (>40 introduced trees), and targeted planting of native sedges, shrubs, and groundcovers to support stormwater filtration, biodiversity uplift, and sediment load reduction.

**Outcomes and Considerations:**

- Removal of over 40 invasive trees (e.g. Pepper Tree, Ash), replaced with drought-tolerant native species
- Site-wide restoration designed for long-term function, ecological uplift, and public amenity
- Estimated project cost: **$58,275 (ex GST)** across five active zones
- Supported by detailed design specifications, procurement tables, ecological benefit scores, and site-specific restoration graphics for implementation guidance

This project positions Light River Reserve as a demonstration site for water-sensitive design, climate-adaptive restoration, and community-supported land stewardship.

# Project Scope

The Light River Reserve (LRR) at Hamley Bridge is a vital ecological precinct within the Mid North region of South Australia. This restoration plan aims to rehabilitate one of the reserve's riparian ecosystem - Specifically, the drainage area that links Owen Road and Light River is the focus of this report.

The restoration plan also aims to enhance biodiversity, stabilise sediment loads, and improve water quality. The initiative aligns with regional conservation priorities such as Light River Catchment Action Plan and seeks to foster community engagement in their local reserve.

There is strong interest among local town volunteers in Hamley Bridge to work in collaboration with the Wakefield Regional Council (WRC) to revegetate the LRR area adjacent to the Owen Road.

The Wakefield Regional Council (WRC) have engaged AU2100 (Kerri Muller and Russell Seawright) to provide options for improved water and vegetation management within Light River Reserve.

## Goals

Several goals for this plan have been developed, these include:

- **Enhance Biodiversity:** Re-establish native vegetation to support local wildlife.
- **Stabilise Riverbanks:** Reduce erosion through strategic planting and soil contouring.
- **Improve Water Quality:** Use vegetated swales to filter runoff and reduce sedimentation into the Light River.
- **Community Engagement:** Involve residents and stakeholders in restoration activities.

## Objectives:

Several to assist tracking progress over time, several objectives are suggested:

- **Vegetation Cover:** Achieve 70% native vegetation cover within five years.
- **Erosion Control:** Stabilise 80% of identified erosion-prone areas within three years.
- **Water Quality Improvement:** Reduce nutrient runoff in three years.
- **Community Participation:** Seek annual, or as needed, input from the community regarding the management of the reserve.

## Site Overview

### Location

Light River Reserve (LRR) is located approximately 80km north-west from Adelaide, within the township of Hamley Bridge, Refer to Figure 1

The LRR can be accessed from Owen Road, south from the township. The LRR comprises of two property titles which overlay the study area, (CT/5878/938, CT/5878/934). The area is approximately 2 Ha. Refer to Figure 2.

The area under investigation is from the stormwater discharge area from Owen Road, follows the drainage line to the picnic table near the Light River. Figure 3 illustrates the study boundary.




*Figure 1: Hamley Bridge location*

Figure 2 below illustrates the parcel CT/5878/934 containing the direct study area. The property is owned by the Wakefield Regional Council.




*Figure 2: LRR property boundaries*

Figure 3 below illustrates the study boundary starting at Owen Road (top of image) and concluding at the picnic table Bottom of image).



*Figure 3: LRR restoration area*

## Landscape setting

LRR is in the northern Adelaide agricultural plains which generally receives a mean annual rainfall of 424mm. The native vegetation in the region is highly fragmented with small remnants along roadsides and occasional paddocks. The highest concentration of native vegetation is along the Light River.

The overstorey vegetation present is dominated by *Eucalyptus camaldulensis* (Red-Gum), with understorey consisting of scattered *Muehlenbeckia florulenta* (Lignum), and reeds comprising of *Cyperus gymnocaulos* (Spiny Flat Sedge), *Phragmites australis* (Common Reed), *Typha domingensis* (Cumbungi or Cattail).

The Light River is an impressive land system, its catchment origins, along with the Gilbert River, start in the Hamley Bridge area. The Light River spans approximately 164 kilometres where it exits into the Gulf St Vincent between Dublin and Two Wells.

Refer to Figure 4 for the Native Vegetation Floristic Areas.

Figure 5 and 6 illustrates the landscape linkage upstream from the LRR and the LRR watercourse adjacent to the study area.

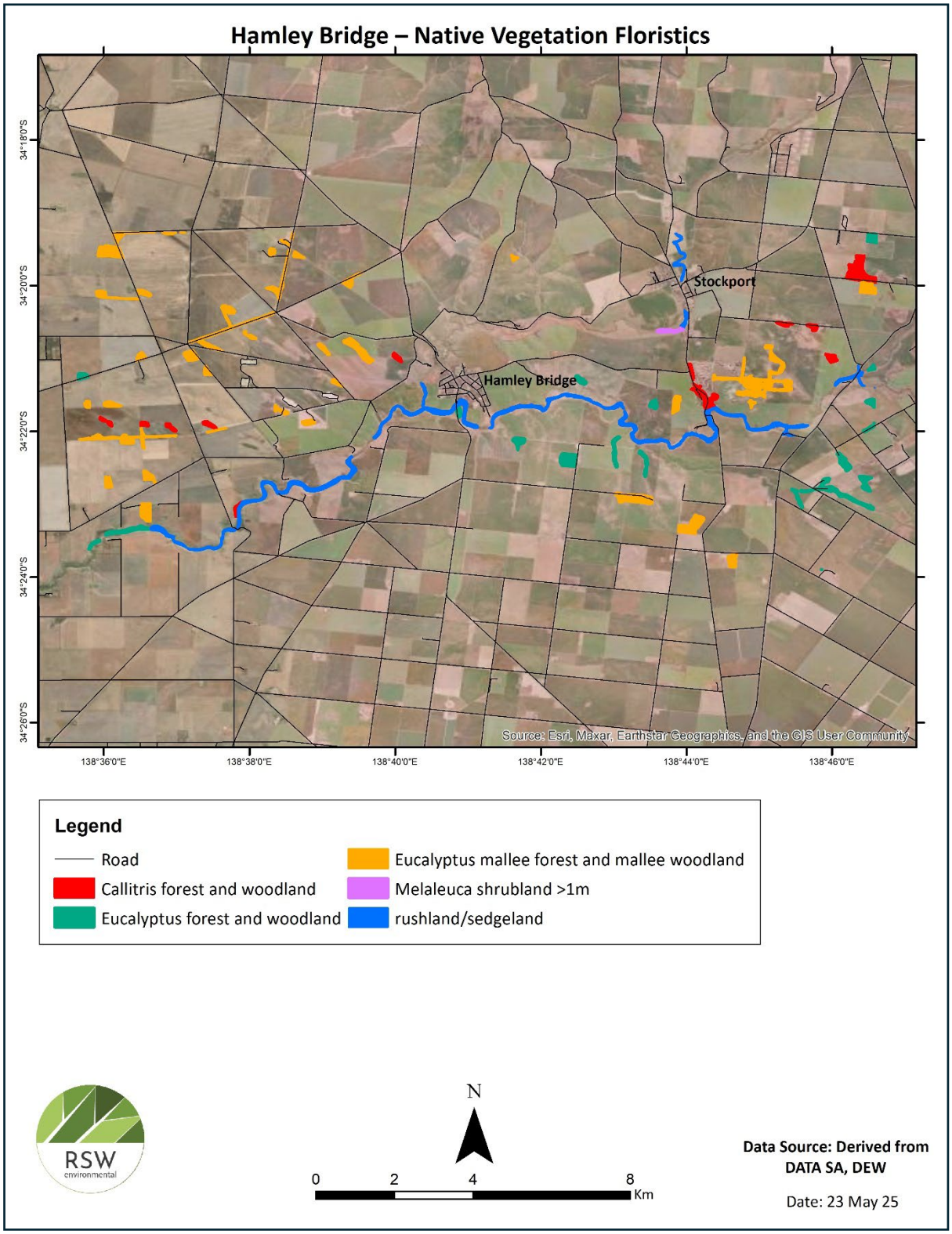



*Figure 4: Hamley Bridge Region – Native Vegetation Floristic Areas.*



*Figure 5: Light River upstream from LRR.*



*Figure 6: LRR and Light River*

## Site Assessment

The study area has been divided into six management zones. Figure 7 illustrates the location of each zone. Many of the zones are dominated by introduced trees, understorey and weed species. The dominant species includes *Schinus molle* (Pepper Tree) and several *Fraxinus* (Ash) species, with *Fraxinus angustifolia* (desert ash) the most dominant. There are approximately forty individual trees in the area, with over half of these over 10m tall.




*Figure 7: Ash and Pepper trees dominate LRR study area.*

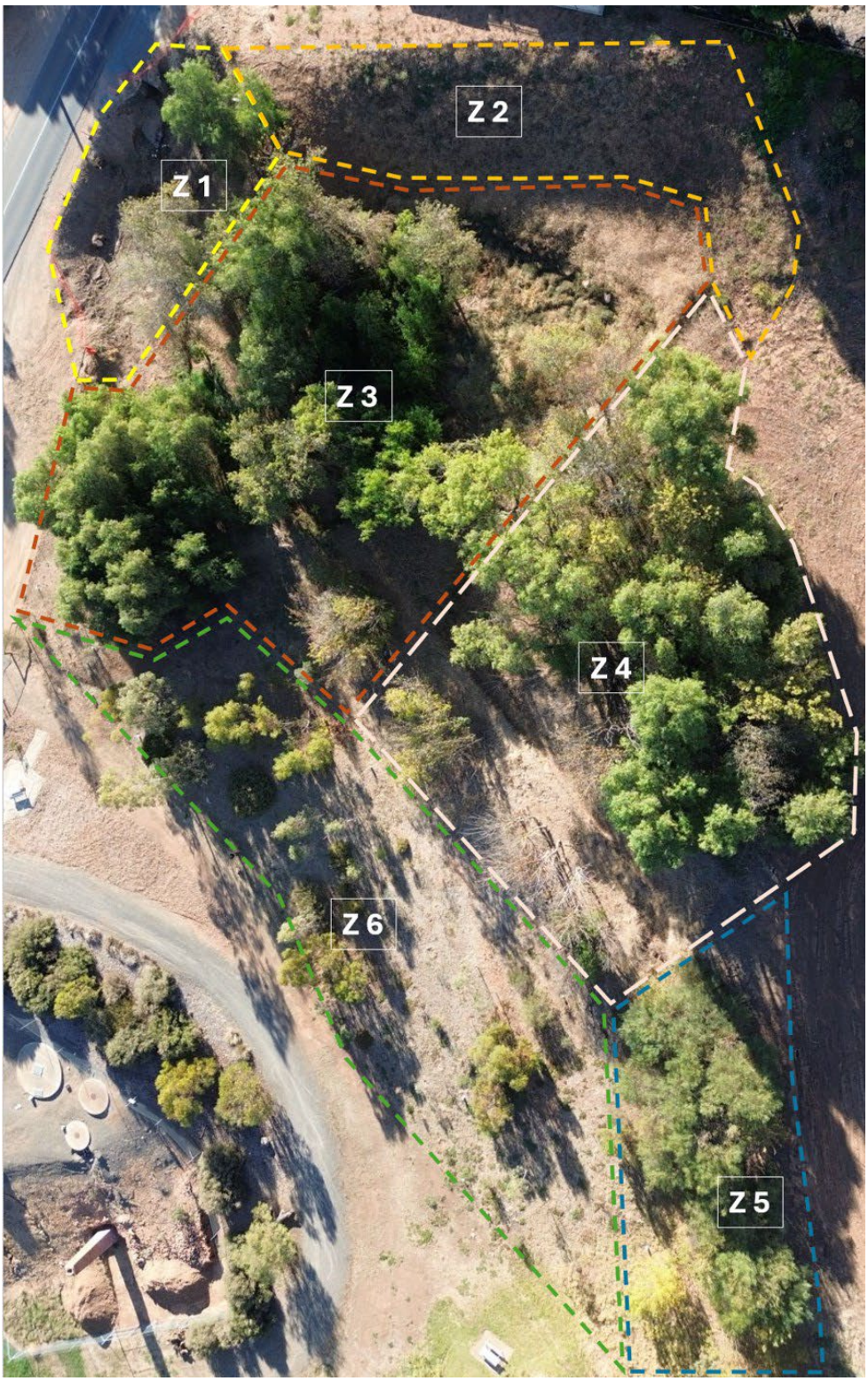



*Figure 8: LRR Management Zones*

## Zone 1

### Description

**Zone 1**, located at the catchment entry near Owen Road, receives drainage via a pipe from the north-east. Recent tree removal and a steep elevation drop are likely to increase flow velocity and exacerbate erosion if left untreated.




*Figure 9: Zone 1 location*



*Figure 10:* Zone 1 area. Drainage outlet top right of image.




*Figure 11: Drainage outlet*




*Figure 12: Start of water channel*




*Figure 13: Drainage outlet looking towards car park.*

## Treatment Options

Erosion control in this zone is a priority. Ongoing bank erosion could lead to undercutting Owen Road and increasing sediment loads into the Light River.

The next step is to seek engineering advice on treatment options. A combination of gabion walls and riprap (rock armour) is likely suitable to stabilise the bank and reduce flow velocity.

Gabion walls help dissipate flow energy, allow limited permeability, and promote sediment deposition and vegetation. Riprap structures reinforce the channel bed, protecting against scour and toe erosion while deflecting high-flow energy during storms.

*Figure 14* shows a conceptual design combining gabion and riprap treatments. *Figure 15* illustrates a constructed riprap installation preceding a vegetated swale.

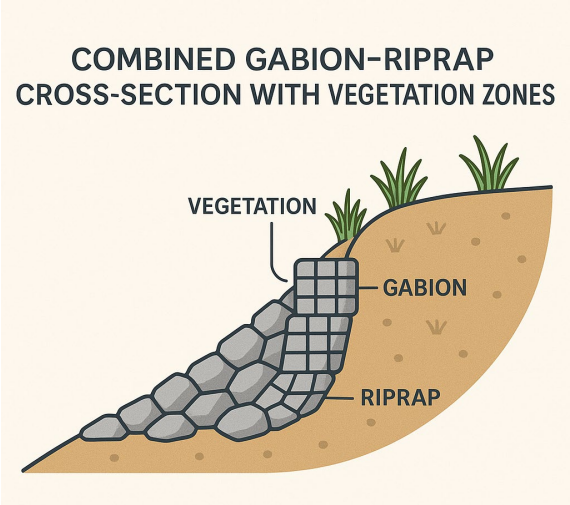



*Figure 14: Conceptual diagram - Gabion-Riprap treatment*



*Figure 15: example of channel lining with rock. Image: Water Sensitive SA*

## Zone 2

### Description

Zone 2 comprises of a steep bank which runs parallel to Zone 3. The bank is showing signs of cracking and is likely to be  to erosion during winter rainfall events. Slumping of the bank is likely to occur over time.

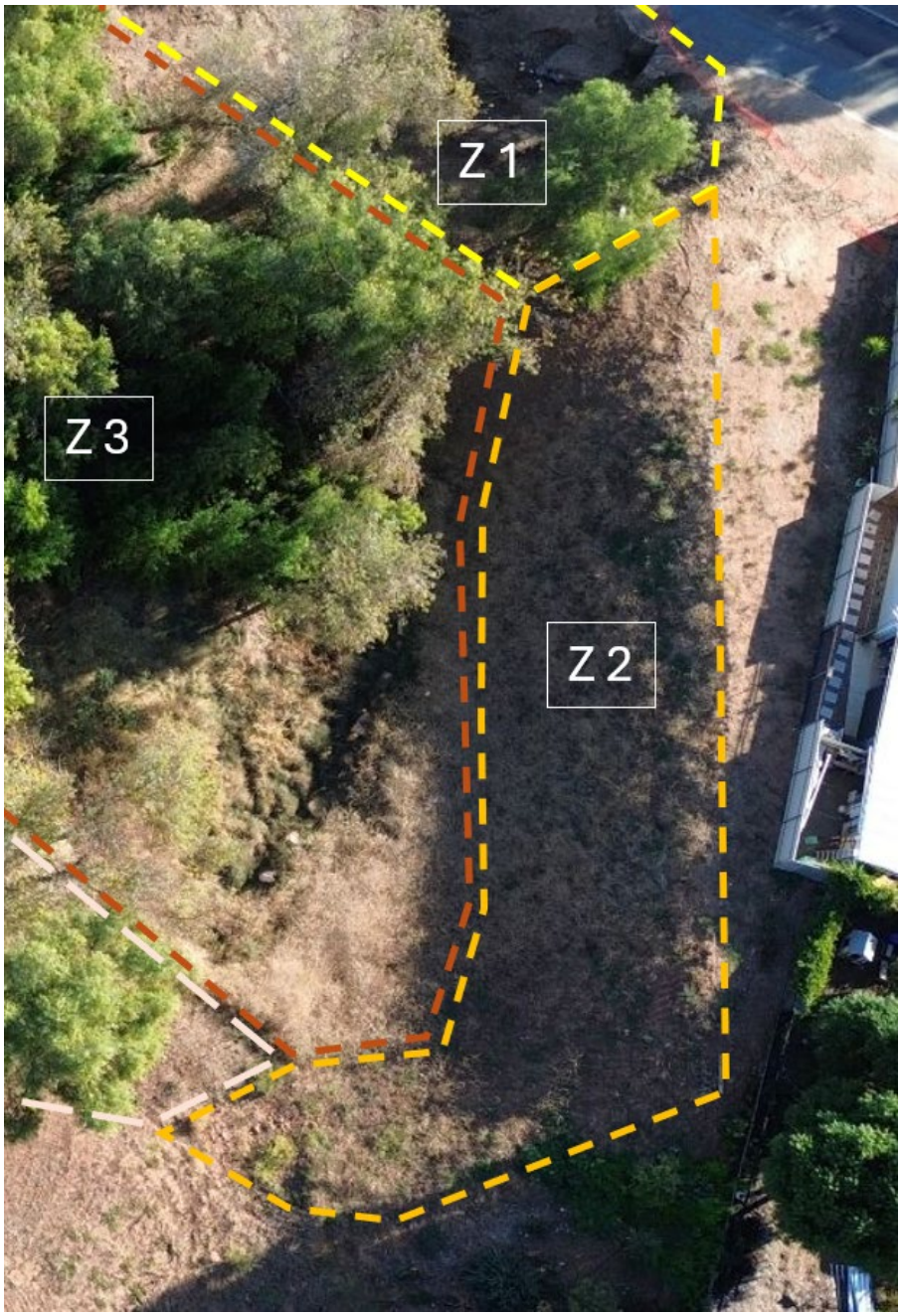



*Figure 16: Zone 2 location*



*Figure 17: Zone 2 slope parallel to Zone 3.*




*Figure 18: Zone 2 bank showing signs of cracking.*

## Treatment Options

Weed control is required with follow up planting of stabilising native plants. The use of erosion matting, such as Jute Matting, may be necessary to stabilise soil and provide weed control and moisture retention for revegetation.



*Figure 19: Example of Jute matting.*
*Image: Aussie Environmental*

## Zone 3

### Description

**Zone 3** contains approximately twenty introduced trees, predominantly Pepper Trees, with an understorey of invasive weeds, including thistles and exotic grasses. The soil is highly compacted and shows signs of extensive erosion and water channelling.

A shallow depression in the south-east of the zone acts as a temporary water collection area during high-flow events (*see Figure 20 – light blue circle*). Concentrating runoff in this area is accelerating erosion at the base of the Zone 2 bank, particularly during intense rainfall.

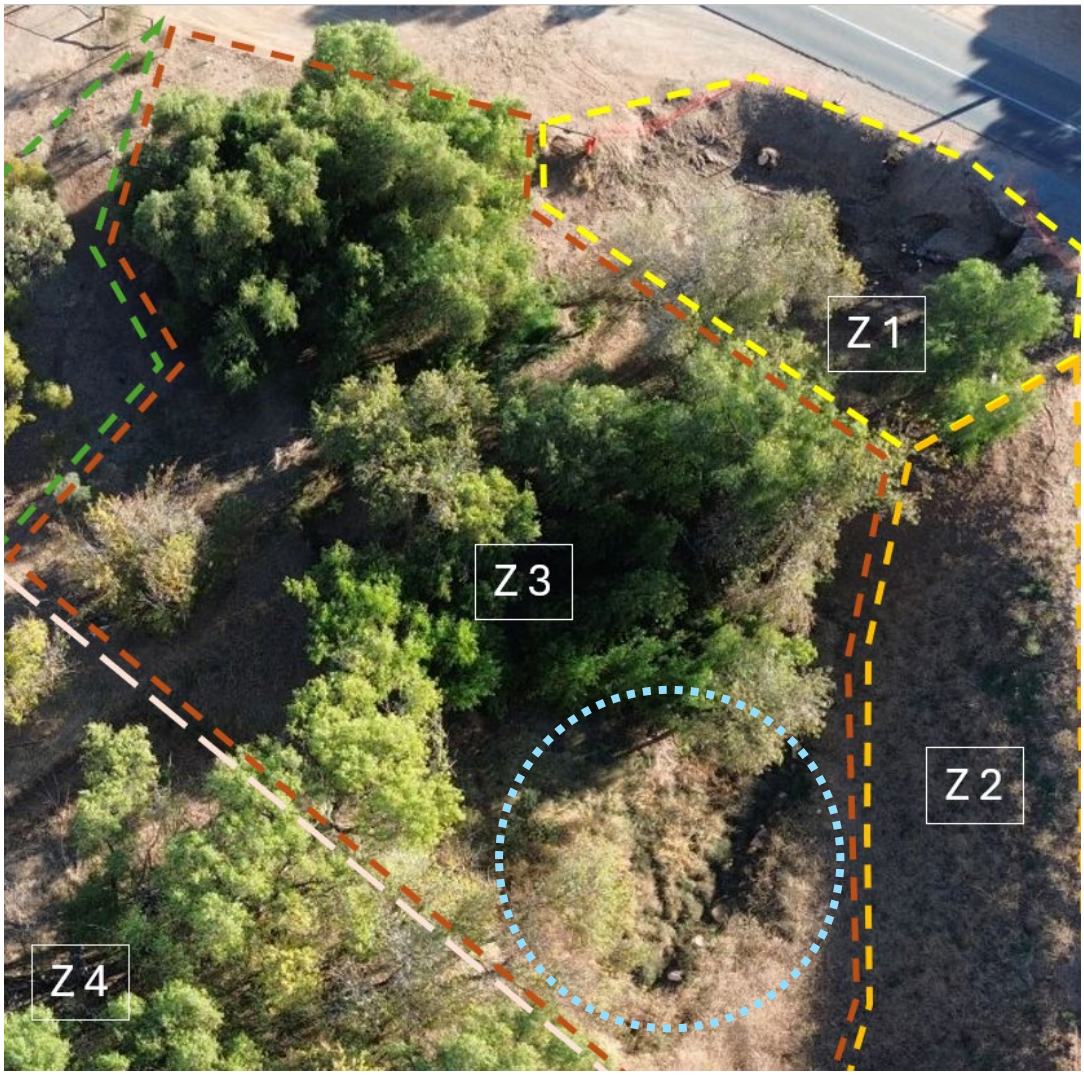



*Figure 20: Zone 3 location*.




*Figure 21: Pepper Trees in Zone 3.*

## Treatment Options

It is recommended all vegetation is removed from this zone, including stumps if practical. Once the site is cleared, earthworks will be required to establish a gentle swale. A conventional swale is a vegetated, formed depression or trapezoidal channel that utilises overland flow and mild slopes to convey stormwater runoff from impervious areas slowly downstream. They are typically linear, shallow and wide with a defined base and batters, and can be used in combination with conventional piped drainage.

During low intensity rainfall events, swales and vegetated buffer strips also filter the flow and capture course sediment, and encourage infiltration, thereby providing some water treatment functionality. The Australian Rainfall and Runoff guidelines suggest that vegetated swales are only effective up to ~1–1.5 m/s flow velocity without reinforcement.

Information regarding swales can be found here: https://www.watersensitivesa.com/wp-content/uploads/Swales-Planting-Guideline-240325-FINAL.pdf

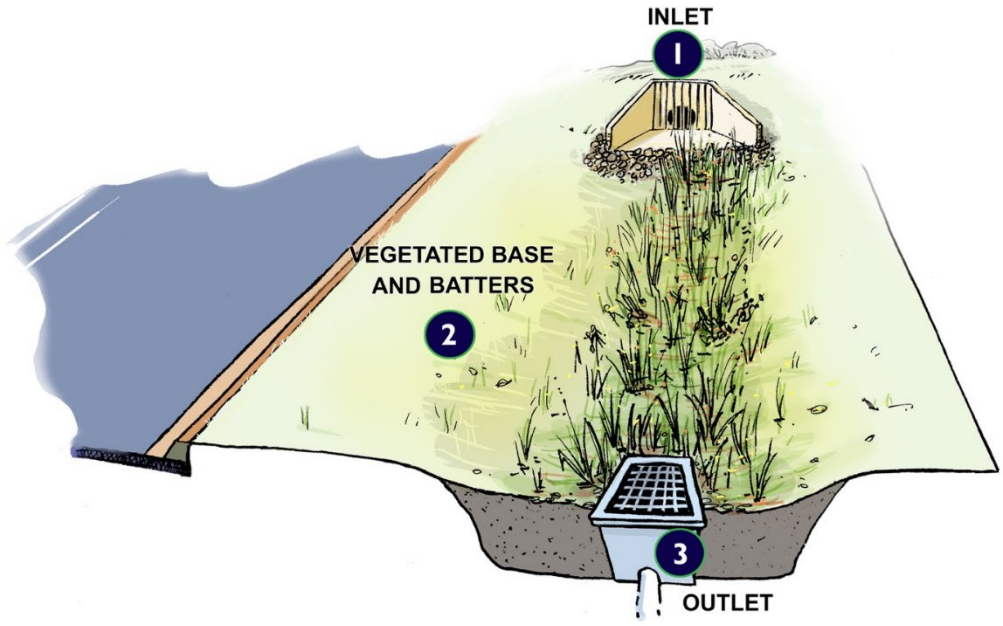



*Figure 22: Schematic of conventional swale showing functional components. Image Water Sensitive SA.*

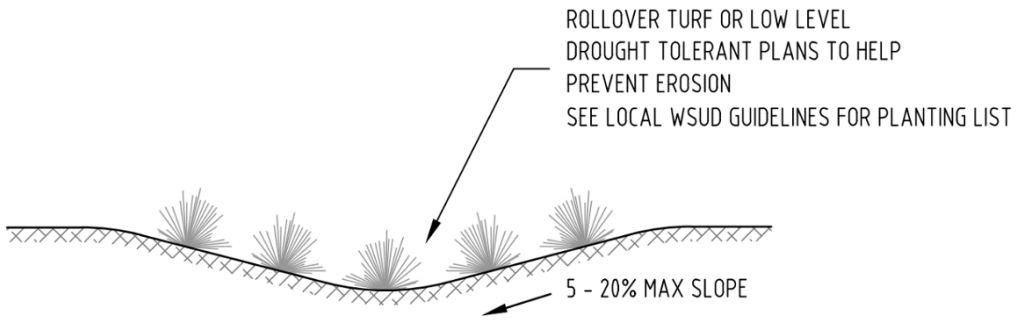



*Figure 23: Conceptual drawing of a swale. Image: Water Sensitive SA.*

# Zone 4

## Description

**Zone 4** is much like Zone 3, with approximately twenty introduced trees mainly comprising of *Fraxinus* spp. The surface is not as disturbed as Zone 3, however, the water is directed through an incised channel which is showing signs of erosion.




*Figure 24: Zone 4 location.*

Figure 25 below illustrates the highest density of introduced trees in Zone 4 which is adjacent to the water channel. Figure 26 illustrates the straight channel located in Zone 4.




*Figure 25: Introduced trees and grasses*




*Figure 26: Water channel*

## Treatment Options

It is recommended that all vegetation is removed from this Zone. The swale from Zone 3 can be expanded into this Zone.

## Zone 5

### Description

This zone contains several planted *Acacia Retinodes*, (Swamp Wattles) and several introduced Fraxinus spp. This Zone is the least modified and is not showing signs of erosion or significant degradation.




*Figure 27: Zone 5 location.*



*Figure 28: Zone 5 illustrating southern boundary at picnic table.*

## Treatment Options

Careful removal of introduced trees and understorey species is recommended. Full swale construction may not be necessary; instead, lining the existing channel with rock and installing rock batters along the banks offers a low-impact stabilisation option.

Supplementary planting at the southern end near the picnic table could enhance amenity and serve as a final filtration point for stormwater and sediment before it disperses onto the lawn area.

## Zone 6

### Description

**Zone 6** lies between the public path from the carpark and the target restoration area. It serves as a functional buffer zone, already planted with native trees and shrubs.




*Figure 29: Zone 6 location.*

## Treatment options

No specific treatment is required in this Zone. Infill planting and weed control could be considered.

# Restoration strategy

Stabilising the banks and high-erosion areas in **Zone 1** is the highest priority. Engineering assessment and water modelling are required to inform appropriate infrastructure design and ensure adequate rock protection is provided.

*Figure 30* illustrates the proposed water treatment concept, including infrastructure and swale integration.

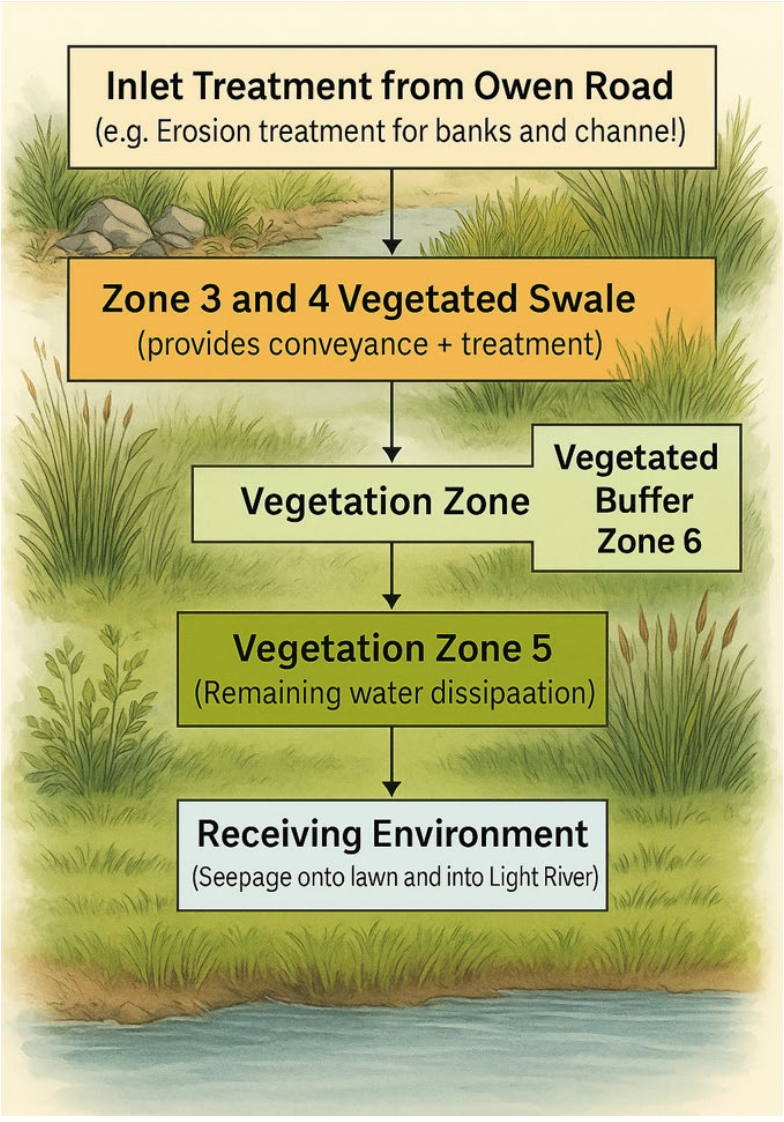



*Figure 30: Conceptual water treatment*




*Figure 31: Restoration areas with suggested treatments.*

# Planting Palette

Revegetation in each zone does not need to be extensive. Instead, targeted planting using a limited number of hardy species tolerant to varied climatic conditions is recommended. Pursuing high species diversity can complicate restoration and significantly increase costs.

Existing revegetation on site offers useful guidance for selecting well-adapted species.

The proposed plantings will support:

- Water-sensitive landscape restoration
- Biodiversity enhancement
- Erosion control and salinity resilience

## Planting Zones & Species – Light River Swale System

Below is the suggested list of species which is functionally grouped and ecologically appropriate native species for dry ephemeral swale planting, including recommended planting densities. This is a guide only and will likely need adjustment once final site designs are completed and revegetation contractor engaged.

## Central Vegetated Base of Swale

Inundated during rain events; dries seasonally.

| Species | Common Name | Function | Density (plants/m$^2$) |
|---|---|---|---|
| *Cyperus gymnocaulos* | Spiny Sedge | Excellent for base stabilisation; tolerates periodic inundation; native and robust. | 4–6 |
| *Juncus kraussii* | Sea Rush | Salinity-tolerant; fibrous root matrix; key for bank erosion control. | 4–5 |
| *Poa labillardierei* | Common Tussock Grass | Shade-tolerant, strong clumping form; adds structural diversity. | 3–4 |
| *Ficinia nodosa (optional)* | Knobby Club Rush | Adds base texture variety. | 3–5 |
| *Carex appressa (optional)* | Tall Sedge | Suitable where swale holds deeper storm flows. | 4–6 |

## Banks and Buffer Adjacent to Swale

Periodically wet, mostly dry; key buffer transition zone.

| Species | Common Name | Function | Density (plants/m$^2$) |
|---|---|---|---|
| *Melaleuca brevifolia* | Mallee Honey Myrtle | Structural shrub; salt and drought-tolerant; supports pollinators. | 1–2 |
| *Melaleuca lanceolata* | Dryland Tea Tree | Shade and wind buffer; nesting cover; ideal for outer swale edge. | 1–2 |
| *Acacia ligulata* | Umbrella Wattle | Fast cover; nitrogen fixer; handles harsh margins. | 1–2 |
| *Acacia victoriae* | Elegant Wattle | Biodiversity value; thorny shelter for small birds. | 1–2 |
| *Enchylaena tomentosa* | Ruby Saltbush | Groundcover to medium shrub; edible and resilient. | 3–5 |

| | | | |
|---|---|---|---|
| *Atriplex semibaccata* | Creeping Saltbush | Mounding or prostrate; excellent slope stabiliser in alkaline soils. | 3–6 |
| *Dodonaea viscosa (optional)* | Sticky Hop Bush | Adds height layering and visual diversity. | 1–2 |
| *Eremophila glabra (optional)* | Tar Bush | Bird and insect attracting; vibrant flowers. | 1–2 |
| *Rhagodia spinescens (optional)* | Creeping Saltbush | Low, salt-tolerant groundcover for dry or saline margins. | 4–6 |

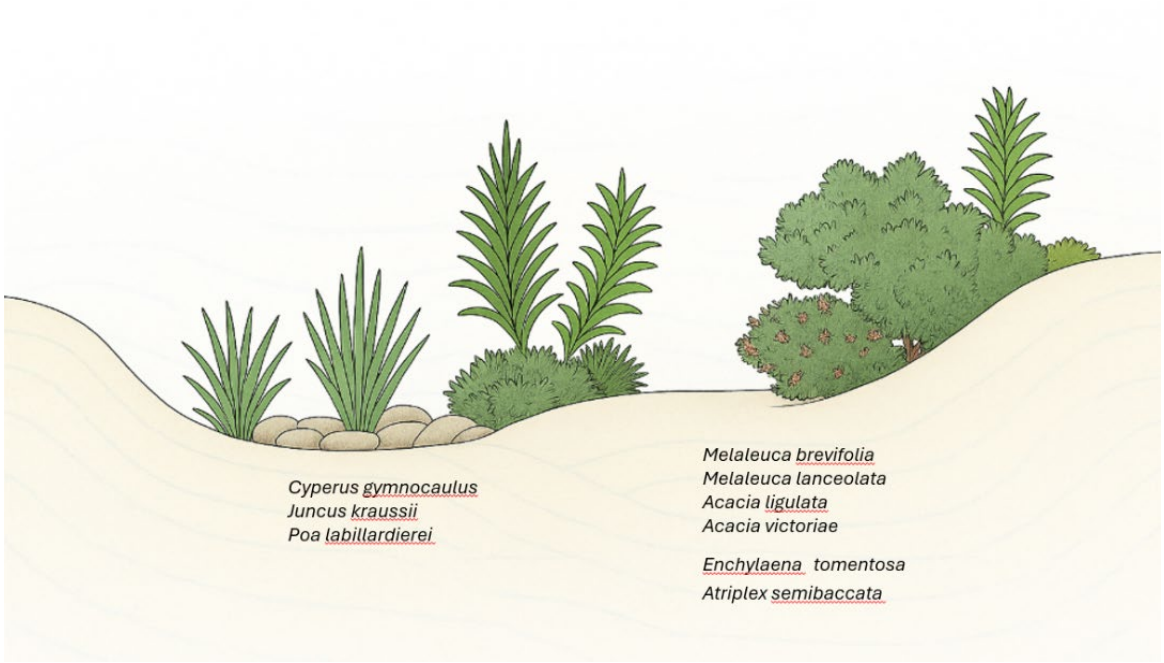



*Figure 32: Conceptual diagram of plant groupings.*

## Maintenance and Monitoring Plan

Controlling and eradicating weeds will be a high priority over the first two years. Depending on rainfall, supplementary watering in year one may also be required.

A suggested plan is outlined below:

**Year 1:**

Quarterly:

- Weed control and monitoring of plant survival rates.
- Watering of new plantings during dry periods

**Years 2-3:**

- **Biannual:** Maintenance of plantings and continued weed management.
- **Annual:** Monitoring of vegetation cover and erosion control measures.

# Specifications and Budget

The following analysis is a guide only, final costs will need to be sourced from contractors and suppliers.

Final specifications associated with the following will need to be refined:

- water flow rates from Owen Rd
- Specific swale width and lengths
- Amount of rock treatment required
- Final species list and numbers
- Amount of Jute matt and other erosion control measures

## Specifications

### Zone 1 – Bank Stabilisation

This zone includes the primary inlet from Owen Road and is subject to high-energy stormwater inflows and visible bank erosion.

**Scope of Works**

- Staged removal of exotic vegetation and root systems (≥20 trees)
- Excavation and placement of gabion baskets at key erosion sites (20m total width)
- Rock lining at toe of slope to mitigate scour (15m length)
- Backfilling and profiling of bank to ensure structural stability
- Supplemental planting for erosion control (e.g., sedges and native shrubs)

**Design Notes**

Gabions can be double-galvanised steel mesh, filled with 150–300mm rock. Toe rock should extend into the creek bed at a minimum depth of 300mm. Bank reshaping must retain a slope not steeper than 1:3. Ensure geotextile is used under rock to reduce soil loss.

## Zones 3–5 – Swale & Rock Channel System

Zones 3 to 5 form a continuous vegetated swale corridor and act as the main treatment and conveyance channel between the inlet (Zone 1) and downstream grass/lawn interface.

**Scope of Works**

- Vegetation removal (≤20 exotic trees total) and root excavation
- Minor earthworks to shape swale: 20m long x 10m wide (Zone 3 and 4)
- Rock batter installation and in-channel armoring to reduce velocity and erosion
- Supplemental stabilisation planting: sedges and grasses in base, shrubs on banks
- Final filter zone plantings in Zone 5 prior to entry into grassed reserve

**Design Notes**

Swale must maintain a shallow trapezoidal profile with a flat base. Rocks may be embedded in-situ during earthworks to stabilise base and sides. Planting density should approximate 1 plant/$m^2$ for stabilisation species. Drainage through rock channel should be tested under light rainfall prior to planting.

## Zone 2 – Jute Matting & Bank Stabilisation

This mid-bank area adjacent to Zone 1 is moderately eroded and requires stabilisation to prevent further bank retreat.

**Scope of Works**

- Earthworks to create stable 20m x 20m slope footprint
- Installation of jute matting with soil pins and geofabric (400m$^2$ total)
- Supplemental stabilisation planting: native grasses and groundcovers (1 plant/m$^2$)

**Design Notes**

Use woven jute erosion control matting with minimum 450gsm weight. Secure using steel U-pins every 0.5m. Do not install during heavy rainfall. Planting should occur immediately after matting installation to maximise stabilisation.

# Budget

The following cost assumptions have been used to develop the budget estimates across Zones 1–5 for the Light River Restoration Project. These are derived from regional South Australian data sources, recent tenders, and typical ecological restoration benchmarks. All values are exclusive of GST and represent current market expectations as of 2024.

| Cost Category | Description | Assumption Source / Reference |
|---|---|---|
| General Market Rates | All costs reflect typical mid-2024 contractor rates in regional SA | Green Adelaide projects, local council tender results, contractor quotes |
| Earthworks (Swale shaping etc.) | Unit rates between $30–$50/$m^2$ for basic earthworks assuming shallow excavation | 2023 Onkaparinga Urban Creek Restoration tender, Water Sensitive SA guidance, NRM board projects |
| Tree Removal | $150–$300 per tree; assumes no rigging and accessible by machinery | Green Adelaide tenders, arborist quotes from Mid-North SA |
| Jute Matting (supply + install) | $42/$m^2$ includes matting, pins, labour | Water Sensitive SA training, Light Regional Council erosion management |
| Rock Lining / Riprap | $120–$200/$m^2$ depending on size/placement | DEW riparian stabilisation guide, Barossa Council costings |
| Gabion Walls | $280–$400/$m^3$; average $320/$m^3$ used | IPWEA Practice Notes, Geofabrics, SA-based contractors |
| Planting Costs | $3–$4.50/plant supply only; $8–$15 with install/maintenance | Trees For Life, Goolwa–Wellington LAP, Landcare grant rates |
| Labour Rates | ~$75/hr average labour cost | Regional contractor quotes (2023–2024), APGA guides |

*Table 1: Cost assumptions*

***Note: These costings are intended for budget planning, grant submissions, and implementation scoping. Higher complexity or restricted access may increase costs. Assumptions should be reviewed before contract finalisation or procurement.***

Table 2 below, provides a summary of the estimated costs associated with implementing suggested treatments for each zone. Refer to Appendices 1 to 5 for individual zone cost summaries.

| Zone | Function / Landscape Context | Scope of Works | Total Cost (ex GST) |
|---|---|---|---|
| Zone 1 | Erosion control at stormwater inlet | Bank stabilisation, gabion walls, riprap installation, erosion control, energy dissipation | $20,705 |
| Zone 2 | Mid-slope treatment area | Full slope jute matting, stabilisation planting, erosion control | $8,460 |
| Zone 3 | Swale corridor and channel shaping | Swale earthworks (20m wide), weed removal, planting of shrubs and groundcovers | $14,640 |
| Zone 4 | Swale corridor and buffer planting | Swale shaping, buffer planting, 20 tree removals, groundcovers and mulch | $10,360 |
| Zone 5 | Vegetated swale transition and edge buffer | Minor earthworks and rock lining (10m x 5m), <5 tree removals, planting | $4,110 |
| **TOTAL** | | | **$58,275** |

Table 2: Costs associated with each Zone.

There are several assumptions made in preparing these estimates, these include:

- Costs are based on current market rates from regional SA contractors (2024) and typical restoration project benchmarks.
- Earthworks unit rates are derived from local revegetation programs and infrastructure tender estimates.
- Tree removal costs assume safe access and equipment; costs increase if access is restricted or additional handling required.
- Jute matting includes supply and install, based on slope stability treatment standards.
- Rock lining and gabion treatments priced per $m^2$ or $m^3$ based on NRM guidance and civil landscaping supplier quotes.
- Risks include: rainfall timing, contractor availability, inflation, and vegetation establishment success.
- Final species selection for planting is indicative and should be refined with input from ecologist prior to procurement.
- This table supports budgeting for grant submissions, council approvals, and staged implementation planning.
- The cost analysis was developed in collaboration with OpenAI's ChatGPT-4.0 (May 2025), based on user inputs and publicly available South Australian restoration benchmarks. Outputs were reviewed and edited by RSW Environmental for accuracy and local applicability

# Conclusion

This report outlines a staged and costed ecological restoration plan for the Light River Reserve, integrating erosion control, water-sensitive design, and native revegetation across five key zones. Strategic interventions—such as gabion walls in Zone 1, jute matting on eroding banks, and a continuous vegetated swale corridor—have been matched with biodiversity uplift, amenity enhancement, and sediment control functions.

Next steps could include canvassing the approaches in this report with the Hamley Bridge Community Association. Once agreement on the direction is achieved, the development of a tender specification can be developed to stress test solutions and budget outlined in this report.



# *Appendices*

## *Appendix 1: Zone 1 – Bank Stabilisation and Channel Treatment*

| Item Description | Unit | Quantity | Unit Rate | Total Cost |
|---|---|---|---|---|
| Gabion walls – 2 units (1.2m high x 1.5m wide x 2m long) | each | 2 | $8,560 | $17,120 |
| Rock chute / Riprap (10m long x 2m wide) | $m^2$ | 20 | $120 | $2,400 |
| Minor earthworks – shaping/levelling | $m^2$ | 50 | $15 | $750 |
| Stabilisation planting – native sedges/grasses | each | 100 | $2.50 | $250 |
| Weed removal – exotic grass and thistle | $m^2$ | 50 | $2.50 | $125 |
| Initial watering + mulch | $m^2$ | 50 | $1.20 | $60 |
| TOTAL (ex GST) | | | | $20,705 |

**Assumptions and Sources**

- Gabion units based on 2m length, 1.2m height, and standard wire baskets with rock infill.
- Rock chute estimated at 10m x 2m with moderate flow.
- Rates sourced from DEW tender rates, IPWEA cost guides, and landscape contractor averages.
- Pre-GST; assume moderate access, no specialised equipment required.

## *Appendix 2: Zone 2 – Jute Matting and Stabilisation Planting Estimate*

This cost estimate assumes full slope treatment over 400 $m^2$ in Zone 2, including erosion control matting and stabilisation planting at 1 plant/$m^2$. Plant species to be selected later based on native grasses and groundcovers suited to riparian systems.

| **Item Description** | **Unit** | **Quantity** | **Unit Rate** | **Total Cost** |
|---|---|---|---|---|
| Jute/Coir Matting (Heavy-duty erosion control) | $m^2$ | 400 | $12/$m^2$ | $4,800 |
| Stakes and Pins (biodegradable) | each | 800 | $0.80 | $640 |
| Labour – Installation | hour | 20 | $65/hr | $1,300 |
| Site Prep – Full Clearing & Raking | lump sum | 1 | $600 | $600 |
| Stabilisation Planting (Native grasses & groundcovers) | each | 400 | $2.80 | $1,120 |
| TOTAL (ex GST) | | | | $8,460 |

## *Appendix 3: Zone 3 – Swale Construction, Tree Removal and Revegetation (20m Wide Swale)*

| Item Description | Unit | Quantity | Unit Rate | Total Cost |
|---|---|---|---|---|
| Tree removal and stump grinding (20 trees) | each | 20 | $250 | $5,000 |
| Weed control – thistle and grass removal | $m^2$ | 200 | $2.50 | $500 |
| Swale earthworks and shaping (20m x 20m) | $m^2$ | 400 | $20 | $8,000 |
| Stabilisation planting – shrubs | each | 100 | $4.00 | $400 |
| Stabilisation planting – understorey/groundcovers | each | 200 | $2.50 | $500 |
| Initial watering + mulch | $m^2$ | 200 | $1.20 | $240 |
| TOTAL (ex GST) | | | | $14,640 |

**Assumptions and Sources**

- Swale anded to 400 $m^2$ (20m x 20m area) with $20/$m^2$ rate for excavation and shaping.
- 20 mature tree removals as scoped for Zone 3.
- Weed control and planting costs remain unchanged.
- Rates are pre-GST and tailored for South Australian environmental works.

## *Appendix 4: Zone 4 – Vegetated Swale, Tree Removal and Revegetation*

| Item Description | Unit | Quantity | Unit Rate | Total Cost |
|---|---|---|---|---|
| Tree removal and stump grinding (20 trees) | each | 20 | $250 | $5,000 |
| Swale earthworks – shaping 20m x 10m | $m^2$ | 200 | $20 | $4,000 |
| Weed control (preparation for planting) | $m^2$ | 200 | $2.50 | $500 |
| Shrub planting (e.g. Melaleuca, Acacia) | each | 80 | $4.00 | $320 |
| Understorey/groundcover planting | each | 120 | $2.50 | $300 |
| Initial watering and mulch | $m^2$ | 200 | $1.20 | $240 |
| TOTAL (ex GST) | | | | $10,360 |

**Assumptions and Sources**

- Includes tree removal based on confirmed count of 20.
- Earthworks assumes 10m wide x 20m long swale with machine excavation.
- Rates based on current SA contractor quotes and revegetation programs.

## *Appendix 5: Zone 5 – Minor Earthworks, Tree Removal, Rock Lining and Revegetation*

| Item Description | Unit | Quantity | Unit Rate | Total Cost |
|---|---|---|---|---|
| Minor earthworks shaping and rock lining 10m x 5m | $m^2$ | 50 | $35 | $1,750 |
| Tree removal and stump grinding (<5 trees) | each | 4 | $250 | $1,000 |
| Weed control (preparation for planting) | $m^2$ | 200 | $2.50 | $500 |
| Shrub planting (e.g. Melaleuca, Acacia) | each | 80 | $4.00 | $320 |
| Understorey/groundcover planting | each | 120 | $2.50 | $300 |
| Initial watering and mulch | $m^2$ | 200 | $1.20 | $240 |
| TOTAL (ex GST) | | | | $4,110 |

**Assumptions and Sources**

- Minor earthworks and rock lining assume narrower treatment zone (10m x 5m) for erosion control.
- Tree removal includes 4 trees based on field observations, consistent with previous unit rates.
- Vegetation includes native shrubs and understorey to enhance biodiversity and stabilise banks.
- Rates sourced from SA regional contractor quotes and revegetation program norms (2024).

## *Appendix 6: Acronyms & References – Light River Restoration Project*

### Acronyms Used in This Report

- AU2100 – Agreement Unit 2100 (Funding Program – assumed)
- LRR – Light River Reserve
- NRM – Natural Resources Management
- RSW – RSW Environmental
- SA – South Australia
- GST – Goods and Services Tax
- ARR – Australian Rainfall and Runoff (Engineers Australia, 2019)
- WSUD – Water Sensitive Urban Design
- IPWEA – Institute of Public Works Engineering Australasia

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