

Welcome to Gilbertson Gully

Marni naa pudni
Kaurna yarta-ana



GILBERTSON GULLY MASTERPLAN

FEBRUARY 2021

Acknowledgement of Country

The City of Holdfast Bay acknowledges the Kaurna People as the traditional owners and custodians of the land. We respect the spiritual relationship with Country that has developed over thousands of years, and the cultural heritage and beliefs that remain important to the Kaurna People today.

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SUMMARY

Gilbertson Gully is one of four designated natural areas in our city. It is a natural space for the community to enjoy, and provides habitat for local wildlife.

Gilbertson Gully is located adjacent Gilbertson Road at Seacliff Park - immediately downstream of Gully Road North Reserve in the City of Marion. It has an area of around 3.3 hectares.

Managing the gully to ensure sustainable use into the future is a priority for the City of Holdfast Bay. This masterplan has been developed to provide objectives and strategies to manage Gilbertson Gully for the community.

The masterplan for Gilbertson Gully has involved an assessment of opportunities and constraints, together with reviews of the environment, landscape and infrastructure. The recommendations that have been developed from the masterplan process will protect and enhance the local biodiversity, improve access and safety for the community, and improve the amenity of Gilbertson Gully.

Gilbertson Gully is a long, narrow natural space that follows an ancient watercourse. After European settlement, the gully was progressively cleared and much of the original native vegetation has gone. In the last 50 years, efforts by the local community and Council have helped to revegetate the gully, but there is still the opportunity to improve the biodiversity by removing weeds and planting appropriate local native species.

The gully has a number of informal trails, some of which have contributed to erosion of the steep slopes. There is the opportunity to formalise some of these trails, linking them to the existing path network and improve access points to the area. This will assist in reducing erosion, improving safety, and enhancing the visitor experience.

Stormwater harvesting and re-use opportunities have been considered for Gilbertson Gully, however the implementation of any re-use scheme is unlikely to be viable. The recommendations from the masterplan focus on reducing erosion and improving water quality, through appropriate revegetation, bank stability and trail improvements, and some stormwater infrastructure upgrades.

Implementing the masterplan recommendations will increase the area's appeal and contribute to enhancing the enjoyment that residents and others gain from using the gully. This masterplan provides the direction to ensure the sustainable use of Gilbertson Gully for future generations.

ABOUT THE MASTERPLAN

PURPOSE

This document is a high-level plan that sets the objectives and strategies to manage Gilbertson Gully for the community of the City of Holdfast Bay.

VISION

Our vision for Gilbertson Gully is to:

- Protect and enhance local biodiversity
- Provide a safe, natural space for the community to enjoy
- Improve amenity and enhance beauty
- Connect people with nature in different settings
- Encourage appropriate and safe use of the natural space
- Manage stormwater sustainably

MASTERPLAN PROCESS

The masterplan for Gilbertson Gully has involved the assessment of the opportunities and constraints of the area, as well as reviews of the existing environment, landscape, and infrastructure. Recommendations for stormwater management, landscaping and vegetation have been developed, and are outlined in this document.

INTEGRATION WITH OTHER STRATEGIES AND PLANS

This masterplan has been considered in conjunction with a number of Council's existing strategies and plans, including:

- Environment Strategy 2020
- Open Space and Public Realm Strategy 2018 - 2030
- Masterplans for Pine Gully and Barton Gully.



Figure 1. Location of Gilbertson Gully.

ABOUT GILBERTSON GULLY

Gilbertson Gully is located on Gilbertson Road in Seacliff Park and is one of the four designated natural areas in our city. Gilbertson Gully is a significant natural open space that follows an ephemeral watercourse. Upstream and downstream of Gilbertson Gully, the watercourse has been piped and the channel in Gilbertson Gully is highly modified. The long, narrow gully is currently used for low-key, unstructured passive activity, such as walking, and provides connections between local streets for residents adjacent to the gully.

HISTORY

In pre-European times, Gilbertson Gully was a place where the Kaurna People of the Adelaide Plains would frequent and camp during the summer months. Over time, clearing from the mid-late 1800s removed many of the native plants, and the area was used for livestock grazing. In the early 1900s, the gully was used as a shooting range and a centre for annual military exercises. It finally became a reserve in the 1930s.

Following a natural watercourse, the gully has been prone to erosion during rainfall, and in the last 50 years, efforts to revegetate the area have resulted in a mix of non-native and native species, some of which have become weeds.

ACTIVITIES UNDERTAKEN

Informal tracks have steadily been replaced by Council with more formal paths and steps in steep areas to encourage appropriate use and reduce erosion.

Weeding and revegetation have been undertaken over the past 50 years, much of this by the local community. Some weeds have been successfully eradicated from the gully, including albizia, boxthorn, broom and pepper trees.

Most recently, 4,155 new plants, including local native grasses, groundcovers, wildflowers, climbers, shrubs and small trees, were planted in the winter of 2020. This recent revegetation of the gully is consistent with this masterplan's recommendations.

Some stormwater works have been undertaken to create a detention basin, although this has been largely unsuccessful due to the design and constant blockage by vegetation debris. Some erosion protection has also been installed, although this also has been only partially successful due to the fast-flowing stormwater.

The local community has installed makeshift bridges over the creek in some locations.

Council has undertaken an on-site consultation with the Kaurna Nation and received advice about the proposed works.



Figure 2. Gilbertson Gully in the early 1900s
(Credit: Holdfast Bay History Collection).



Figure 3. Winter 2020 revegetation plantings.



Figure 4. Makeshift bridge over creek line.

OPPORTUNITIES AND CONSTRAINTS

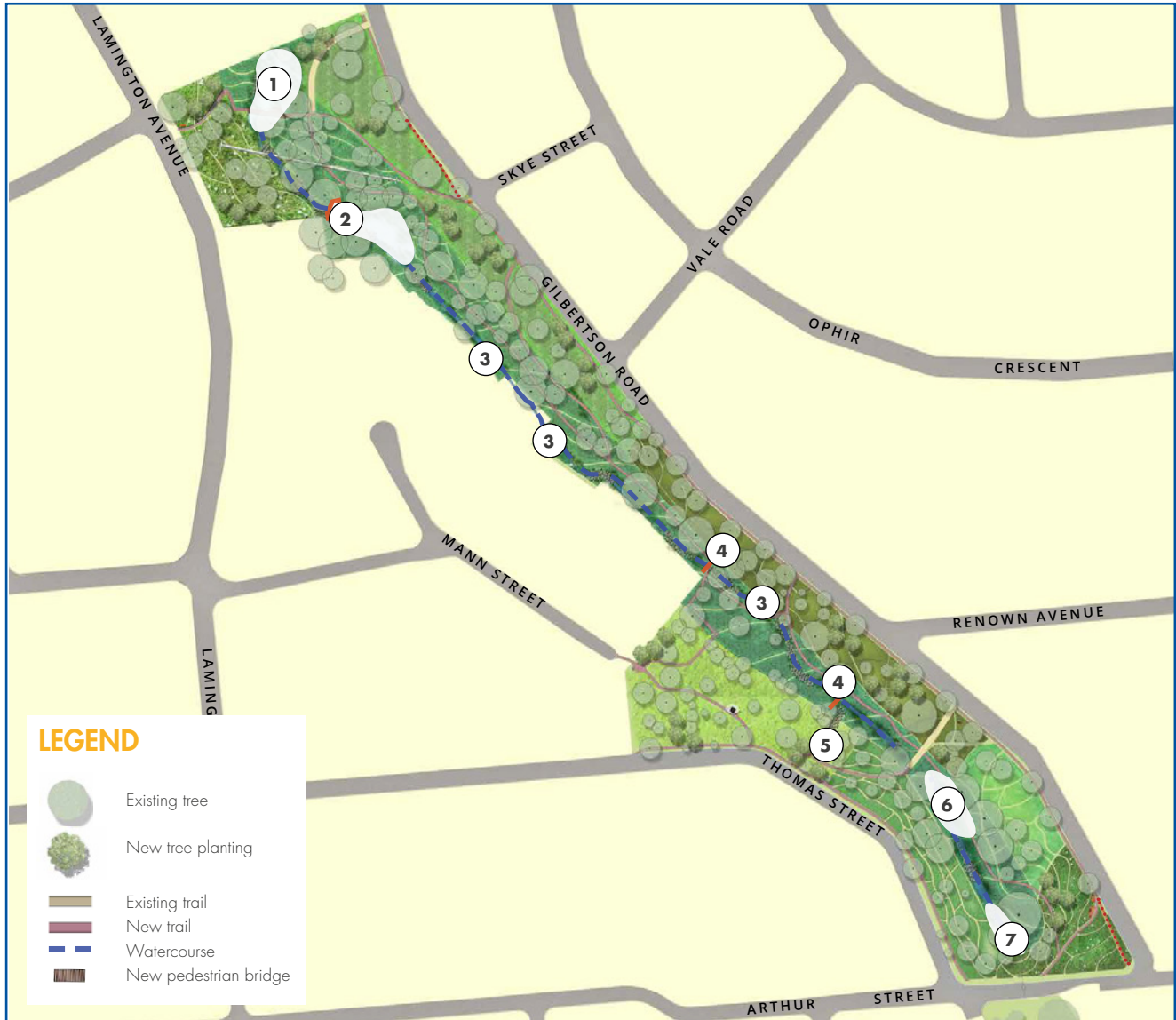


Figure 5. Opportunities and constraints.

KEY

1. Potential basin for increased infiltration and to be planted to improve water quality. Formalise outlet structure to downstream property
2. Modify basin outlet structure to formalise the overflow weir and bund adjustment to the weir to reduce outflanking. Basins to increase infiltration and to be planted to improve water quality
3. Reprofile channel and construct small rock chutes. Lay back and revegetate banks
4. Pool and riffle system at crossing locations
5. Stabilise stormwater outlet with level spreader
6. Frequent blockage of heawall. Construct screening arrangement/sediment trap upstream of inlet headwall to minimise frequency of blockage
7. Sediment accumulation between headwall and top of rock chute. May lead to outflanking of rock chute. Desilting and construction of sediment trap to be considered

The various opportunities and constraints presented by the site have been evaluated in terms of stormwater management, landscape and vegetation. A summary of the evaluation is provided below, with the locations of the opportunities and constraints shown in the attached plan (refer to Figure 5). A review of Gilbertson Gully was undertaken with Kaurua representatives in September 2019.

STORMWATER MANAGEMENT

Gilbertson Gully is quite steep in places and therefore, when it rains, water flows quickly through the gully, causing erosion and carrying sediment out of the gully.



Figure 6. Watercourse erosion.

There is an opportunity to improve the management of stormwater within the gully by implementing measures that slow the speed of water flow, reduce erosion and improve the quality of the water before it leaves the gully. These measures include rock stabilisation, and revegetation of eroded sections of the watercourse, with native species as well as reshaping of embankments to provide increased bank stability. Refer to Appendix A for further information on the identified stormwater improvements.

The viability of harvesting stormwater from Gilbertson Gully for re-use (such as irrigation) was evaluated – refer to Appendix B for details. The evaluation determined that the opportunity for stormwater harvesting and re-use is limited due to factors such as the steepness of the gully and lack of suitable areas for stormwater capture and storage.

LANDSCAPE

The steep nature of the gully restricts access in some areas and informal tracks have been created by people in other areas, sometimes causing additional erosion of the slopes. The steep slopes of the embankments may also cause difficulties in establishing revegetated areas because movement around the site is challenging, and because of the need to maintain bank stability. Plants suitable for the sloping site will help to maintain the integrity of the soil and mitigate further erosion. Maintaining ground cover while revegetating will also be important, to ensure that additional erosion does not occur before new plantings are established.

There is the opportunity to formalise existing sections of the trail network around key entry points into the gully. This is particularly important along the steeper sections of the gully, where informal paths have contributed to erosion. New trail alignments and linkages can be created that will allow safer access for visitors and provide a sustainable trail network that reduces annual maintenance.



Figure 7. Informal entry trail at the downstream end of the gully.

Creation of paths that follow the natural contours of the sloping site, together with a trail along the creekline, will also improve access and provide opportunities for views across the site. Formal crossing points, such as pedestrian footbridges across the watercourse, will allow visitors to gain improved visibility and maintain a higher level of safety.



Figure 8. Existing creek crossing point.

There is the opportunity to upgrade the northern steps (near Lamington Avenue) to provide safety and an improved alignment, linking to a new footbridge (as above comment). The degraded steps in the south of the gully (near the entry off Mann Street) could also be replaced with a trail that descends the embankment gently and links to a new footbridge (as above comment) across the watercourse.

Paths are proposed to be low-key unsealed trails constructed from natural materials such as stabilised sands or stabilised rubble to provide a firm surface. The paths would be typically 1.0 to 1.5 m wide. Where possible the paths will be designed so that they are accessible for all ambulant users. Small sections of path to vantage points will be prioritised for wheelchair access where possible.

The existing educational signage could be continued throughout the site to coincide with the restoration and revegetation works. Additional interpretative signage could include information about:

- Weed control
- Native grasses
- Water management and treatment
- Viewing areas
- Trail linkages
- The role of volunteers, providing the contact number to call to get involved.

The gully has been assessed for recreational use by BMX and mountain bikes and found that it is not an appropriate location for either of these uses. Use by cyclists on other trails within the gully is not recommended due to conflicts with pedestrians on the narrow pathways. As the trails along the creek in particular are quite tight, there is no safe area for a pedestrian to take evasive action from a cyclist using the path at speed. The educational signage could be updated to indicate appropriate use of the various trails.

VEGETATION

Gilbertson Gully has little remnant vegetation from pre-European times, with most of the revegetation occurring after a prolonged period of clearing. Successive plantings, with a variety of native and non-native species, have occurred over the past 50 years.

Control of weeds and establishment of new (appropriate) vegetation can be challenging due to the steep site and restricted access in some areas. A biodiversity management plan, including weed control and management recommendations, will be prepared and implemented, to protect the revegetated areas and reduce re-infestation by unwanted plants.

The control of any potential bushfires in the gully is also a consideration, given the limited access, steep slopes and close proximity of homes. The bushfire risk can be reduced through the following actions:

- Careful selection of appropriate plants for revegetation
- Removal of bushfire-prone plant species
- Removal of very fine (less than 6 mm) dead plant material
- Removal of shrubs around the base of trees to create a gap between the ground and the canopy.

Improved access and formalising existing trails within the gully will also improve bushfire control.

The opportunity to improve the existing biodiversity within the gully by removing unwanted plant species and continuing to revegetate areas will also increase the bank stability. In addition, this will enhance the natural beauty of the area and encourage native animal species.

VEGETATION ZONES



Figure 9. Vegetation zones.

KEY

ZONE A – REVEGETATION SITE AT HIGHLY VISIBLE ROAD CORNER

Planting will provide an entry statement into the gully.

- Weed control followed by revegetation with higher density to enhance existing revegetation and prevent more weeds
- Monitor success of mulching

ZONE B - EAST-FACING EMBANKMENT ABOVE THE WATERCOURSE

- Monitor revegetation for success and infill as required
- Review treatments for soursob (*Oxalis pes-caprae*) and implement as appropriate
- Christmas bush is especially recommended for this zone. It provides valuable food for nectar-feeding insects in early summer

ZONE C – WATERCOURSE (IDENTIFIED AS A SINGLE UNIT)

- Reduce biomass of soursobs
- Staged removal of non-indigenous shrubs that are spreading (*Melaleuca* spp., *Acacia saligna*), and replace with indigenous alternatives
- Control priority woody weeds: *Olea europaea*, *Fraxinus angustifolia*, *Arundo donax*
- Control weed grasses such as kikuyu
- To further stabilise the watercourse after the stormwater works, mass plantings of *Carex bichenoviana*, *Cyperus gymnocaulos*, *C. vaginatus* and *Juncus pallidus* are recommended

ZONE D – WEST FACING EMBANKMENT ABOVE THE WATERCOURSE

- Monitor revegetation and infill as required, aiming for an open woodland with a grass and lily understorey
- Staged removal of non-indigenous species that are spreading (*Melaleuca nesophila*), replacing with indigenous alternatives
- Review treatments for soursob (*Oxalis pes-caprae*) and implement as appropriate

ZONE E – ANOTHER SECTION OF THE WEST-FACING EMBANKMENT

- Revegetate, aiming for an open woodland with a grass and lily understorey
- Staged removal of non-indigenous species that are spreading (*Melaleuca nesophila*), replacing with indigenous alternatives
- Control the *Fumaria* sp.
- Review treatments for soursob (*Oxalis pes-caprae*) and implement as appropriate

ZONE F – ROCKY OUTCROP AND THE TOP OF THE RISE

- Remnant are of native pine, native apricot and mallee box with good density of native grasses, sedges and lilies
- Control *Acacia saligna*
- Consider sensitive bushcare weeding approach in this area

ZONE G – RIDGETOP ON THE EASTERN SIDE OF THE GULLY

- Remnant vegetation in moderate to good condition
- Monitor revegetation and infill as required, aiming for an open woodland with a grass and lily understorey
- Scattered small tree and shrub plantings
- Consider sensitive bushcare weeding approach around the large eucalypt in the northern corner
- Control and staged removal of non-indigenous species that are spreading (*Melaleuca nesophila*, *Acacia iteaphylla*)
- Control high threat woody weeds (olive and buckthorn)

ZONE H – FLAT AREA AT NORTH-WESTERN END

- A dry area with overstorey of introduced species and depauperate in structural layers
- Revegetate with the aim of achieving an open woodland with a grass and lily understorey

Gilbertson Gully has been divided into eight distinct vegetation zones, based on the existing vegetation and landscape features. These vegetation zones will be used to assist with revegetation and weed control, which will be guided by a detailed biodiversity action plan. The following vegetation zones are shown in Figure 9:

- Zone A: Revegetation site highly visible road corner
- Zone B: East-facing embankment above the watercourse
- Zone C: Watercourse (identified as a single unit)
- Zone D: West-facing embankment above the watercourse
- Zone E: Another section of the west-facing embankment
- Zone F: Rocky outcrop and the top of the rise
- Zone G: Ridgetop on the eastern side of the gully
- Zone H: Flat area at north-western end

In the past the gully was planted with a range of non-local species, some of which have become weeds and others are nearing the end of their useful lives. A description of each zone and proposed management actions for each of the zones are provided in Appendix C. The list of plant species to be removed or controlled is provided in Appendix D, and plants to be used for revegetation are provided in Appendix E.

MASTERPLAN RECOMMENDATIONS



Figure 10. Gilbertson Gully masterplan recommendations.

KEY

1. Repair headwall apron, remediate and revegetate. Consideration of upstream gross pollutant trap (GPT) possible
2. Stabilise embankment
3. Upgrade and consider possible/minor realignment of steps for improved access and reduced grades and erosion
4. Realign existing trail higher on bank, away from watercourse (as well as maintaining path along watercourse)
5. Formalised and enhanced trail network
6. Installation of new trash rack or VWSUD treatment to reduce blockages
7. Undertake watercourse improvements: clean-out of existing basin and create new low flow channel, various locations
8. Vehicle access for basin/ trash rack maintenance
9. Remediation of channel
10. Rocky outcrop maintained
11. Improve stormwater outlet
12. Creekline on private property. Assess options
13. Location of new water quality basin
14. Improve vehicle access for maintenance to water quality improvement basins
15. Liaise with SA Water to repair pipe headwalls
16. New informal seating
17. New watercourse crossing - location to be determined on site
18. Existing monuments and signage retained
19. Existing revegetation
20. New watercourse crossing and informal seating
21. Lookout point at edge of basin
22. Improve downstream outlet arrangement

The masterplan for Gilbertson Gully has been based on findings from assessment of the opportunities and constraints, existing environment, landscape, and infrastructure.

The recommendations outlined in this section provide direction to enhance the existing biodiversity, reduce erosion, and improve access and amenity for the community to enjoy the natural environment of the gully. Figure 10 shows the location for each of the recommendations.

STORMWATER MANAGEMENT

Stormwater management within the gully will focus on stabilising embankments, reducing erosion, and improving water quality. Landscaping elements and vegetation will be used to assist with achieving these goals, in addition to the repair/remediation and installation of new stormwater infrastructure. An assessment of stormwater capture and re-use opportunities has indicated that based on economics, aesthetics, and low water demand for revegetation species, it is not viable to capture water for re-use within the gully.

LANDSCAPE

Access points to the gully, watercourse crossings and trails will be improved and formalised, to reduce erosion and improve safety for the local community. Informal seating and viewing areas will also be installed, providing the opportunity for the community to enjoy the natural surrounds and views across the gully. Additional interpretive signage will be installed to highlight the key features of the area, such as local volunteering and trail linkages.

Treatments to discourage inappropriate and damaging activities, including mountain bike/BMX usage, will be implemented.

VEGETATION

A biodiversity management plan will be developed and implemented, including removal and treatment of priority weeds. Revegetation will continue in the identified vegetation zones with appropriate plant species as described in Appendix E. Bushfire risk will be managed through the careful pruning and/or removal of selected shrubs and fine dead material, while still maintaining sufficient ground cover to reduce erosion and also provide food sources and habitat for the local wildlife.

CONCLUSION

Gilbertson Gully is a natural space that is enjoyed by the local community. Implementing the masterplan recommendations will increase the area's appeal, improve biodiversity, and contribute to enhancing the enjoyment that residents and others gain from using the gully. The masterplan provides direction to ensure the sustainable use of Gilbertson Gully for future generations.

IMPLEMENTATION AND FUNDING

The proposed works are planned to be coordinated and funded by Council with work completed by contractors with support of local volunteers. External grant funding would be actively sought as available.

Major works, such as watercourse rehabilitation, would be implemented initially, and other works undertaken in stages over a number of years.

It is expected that the capital works within the Gilbertson Gully will cost in the order of \$400,000, excluding any gross pollutant traps.

A draft implementation plan is included in Appendix F.

APPENDICES

Appendix A – Identified stormwater improvements

Appendix B – Stormwater re-use assessment

Appendix C – Vegetation zone management actions

Appendix D – Vegetation for removal or control

Appendix E – Vegetation to be used for revegetation and biodiversity improvement

Appendix F – Draft implementation plan

APPENDIX A

IDENTIFIED STORMWATER IMPROVEMENTS



Figure 11. Upstream drainage infrastructure.

UPSTREAM INLET

The 825 mm diameter outlet headwall currently looks unsightly and whilst the concrete benching is crumbling away, the structure currently appears stable. Generally, at outlet headwalls, scour protection is required immediately downstream, and a concrete toe on the headwall structure also helps stabilise to prevent undermining. Such works may be considered in a longer-term plan if erosion increases in this area.

DETENTION AREA

An embankment currently crosses the gully, with low-flow culverts projecting through it, effectively forming a detention basin in large stormwater events. Whilst the detention has no significant impact on downstream flood flows, it provides an opportunity to create a small wetland. The culvert entry has trash screens installed, however, these are observed to be regularly clogged with debris, and significantly restrict drainage into the culverts. This should be reviewed and an alternative solution developed that does not require

significant maintenance and can retain small amounts of water to create a small wetland. The installation of an upstream GPT near Arthur Street could also help to reduce loadings of leaf litter.

There is also an opportunity to excavate in front of the embankment, within this detention area, to allow for additional ponding, water retention and sedimentation, which will improve water quality and assist in mitigating culvert blockages.



Figure 12. Downstream outlet detention basin.



Figure 13. Upstream of existing detention basin.

LOCAL DRAINAGE PIPE OUTLET

A 300 mm pipe outlet currently discharges into the reserve from Thomas Street. The area immediately downstream of the outlet is showing signs of scour. It is recommended that a headwall be fitted to the existing pipe outlet, and scour protection be provided at the outlet.

GULLY DRAINAGE LINE EROSION

The main drainage line along the gully shows sign of erosion at several locations and it is recommended that any eroded areas be remediated, and erosion protection measures deployed to minimise future ongoing erosion. There are several options that may be considered for erosion protection, including:

- Rock lining along incised sections of the gully invert
- Rock “leaky” check-dams
- Turf reinforcement mat with vegetation.



Figure 14. Erosion along drainage line.

GROSS POLLUTANT TRAP

A gross pollutant trap (GPT) upstream of Gilbertson Gully could reduce the gross pollutant load entering the reserve from the upstream drainage network. The installation of a GPT at the upstream Arthur Street embankment would reduce the gross pollutant load to the reserve, mitigate the entry of general rubbish and the quantity of leaf litter from the urban catchment upstream, whilst recognising that the reserve itself will also generate a sediment and vegetation load. A GPT would also assist with reducing the maintenance interval to the downstream detention area and water quality basins, and remove general litter from a semi-natural environment.

It should be noted that the location of a proposed GPT would be in the adjoining Council area of the City of Marion. It is not currently identified in their stormwater management plan and would be subject to a cost-benefit assessment.

ABOVE GROUND WATER SUPPLY PIPELINE HEADWALL

The headwall surrounds and the exposed structure to the above ground water supply pipeline crossing near Gilbertson Road has deteriorated and it is recommended that Council liaise with SA Water to assess and remedy if required.



Figure 15. Water supply crossing.

APPENDIX B – STORMWATER RE-USE ASSESSMENT

CATCHMENT SIZE

Approximately 145 hectares.

CATCHMENT TYPE

- 100 hectares rural, relatively steep with rainfall runoff discharging quickly once catchment is wet
- 45 hectares urban, relatively steep, with rainfall runoff discharging quickly
- Potential runoff for capture
- 130ML total
- Approximately 60ML from rural type area and 70ML from urban type area

PEAK FLOW

Location	5 Year ARI	100 Year ARI
Arthur Street	1.6 m ³ /s	6.8 m ³ /s
Seacombe Road	1.7 m ³ /s	6.9 m ³ /s

Implementing a viable stormwater harvesting and re-use scheme requires a balance between engineering feasibility and the economics of the scheme.

The determination of harvestable volumes of stormwater for re-use schemes, includes an engineering assessment of a range of implementation and practicality factors, such as:

- Total catchment runoff and, importantly, the flow profile (i.e. proportion of low base flows versus peak flows)
- Size and capacity of wetlands/retardation basins to capture and treat runoff (land availability considering site constraints)
- Diversion weir capacity
- Wetland abstraction rates (i.e. diversion from the wetland to either storage or directly to demand)
- Storage of the harvested volumes for a time when demand requires
- Overall demand.

Based on these factors of assessment of the Gilbertson Gully site, a range of factors were identified that would limit the potential for stormwater harvesting, including:

- Catchments are generally steep and responsive, meaning runoff will pass through the site quickly and over a short period, limiting opportunities for harvesting.
- Site constraints such as topography and shape, and existing and desired aesthetic appeal of the site, including revegetation during community programs, mean that provision of retardation/storage of surface water and wetland treatment will be substantially constrained without wholesale landscape changes and/or increased risk of flooding impacts on adjacent properties.

Geological profiles in these locations would mean any managed aquifer recharge (MAR) schemes to provide longer-term storage would be in fractured rock, which traditionally, is less suited to MAR schemes. Furthermore, hydrogeological investigations would be costly relative to the relatively small volumes of water that could be captured.

SITE CONSTRAINTS AND OPPORTUNITIES

- Long narrow site with an approximate grade of 5% and existing native vegetation and aesthetic appeal.
- Multiple small storages/retardation basins could be constructed along the reserve, however this would have significant construction, environmental and aesthetic impacts and storage volume would be limited to approximately 2ML in total (assuming six, 2.5m high with 0.5m freeboard embankments that would store water over a length upstream of approximately 40m).
- Harvestable volume would be limited (estimated max of 30ML/annum, based on 15 fill events per year), and heavily dependent on potential to divert stored water to MAR (not likely to be feasible) or direct demand (not required after rainfall).

CONCLUSION

As the gully is currently not irrigated and revegetation is proposed with drought-tolerant native species, the conclusion from this high-level assessment is that based on economics, aesthetics and water for irrigation, it is not viable to capture water for re-use within the gully.

APPENDIX C – VEGETATION ZONES MANAGEMENT ACTIONS

ZONE A – REVEGETATION SITE AT HIGHLY VISIBLE ROAD CORNER

An area of relatively recent revegetation with coastal shrub species under an overstorey of *Allocasuarina verticillata* – the species planted are generally doing well. There has been recent mulching of the area to help suppress abundant introduced grassy and herbaceous weeds. The condition of the site suggests the following:

- Planting density has not been high enough to compete with the weeds.
- Inadequate maintenance, particularly relating to weed control in late winter-early spring resulting in plants setting seed and proliferating.

Recommended management actions:

- Brushcut for grass and herbaceous weed control.
- Monitor success of mulching.
- Monitor and infill plant as required.
- Re-evaluate the use of herbicides as part of the management program. The whole of the gully has a high biomass of weeds, which is negating the revegetation efforts. A controlled use of herbicides to control the weeds is suggested as the present attempts to control weeds are insufficient. Herbicide use can be tapered off after 3-5 years.

ZONE B – EAST-FACING EMBANKMENT ABOVE THE WATERCOURSE

The understorey in this zone is mostly grassy and herbaceous weeds. The steep slopes adjacent have been the focus of recent revegetation works. Native grasses are patchy, estimated at 1-5% cover overall. Planted non-indigenous eucalypts and drooping she-oaks (*Allocasuarina verticillata*) are the dominant overstorey species.

Recommended management actions:

- Brushcutting regime to focus on a late winter brushcut for annual grassy weeds and forbs, but in areas with dense native grasses no slashing again until after grasses have set seed in summer.
- Monitor revegetation for success and infill as required.
- Review treatments for soursob (*Oxalis pes-caprae*) and implement as appropriate.
- Christmas bush is especially recommended for this zone. It provides valuable food for nectar-feeding insects in early summer.

ZONE C – WATERCOURSE (IDENTIFIED AS A SINGLE UNIT)

The watercourse vegetation has patchy woody weeds, especially at the northern end, and the understorey is dominated by introduced grasses and bulbs. Some plantings to date, and remnant vegetation, contribute to a moderate plant species count. Adjacent slopes have over-abundant soursob (*Oxalis pes-caprae*), which would likely suppress native regeneration and survival of plantings due to underground biomass, and shading and competition at the surface. When this species dies back in summer it leaves bare, open ground prone to erosion in high rainfall events. At the northern end there is a proliferation of non-indigenous tea-trees (*Melaleuca* spp.) and *Eucalyptus platypus*, which form significant shade and may prevent regeneration of native species, or reduce success of revegetation efforts. Other weeds occur in discrete patches and should be controlled. These include giant reed (*Arundo donax*), African cornflag (*Chasmanthe*), periwinkle (*Vinca major*), olives (*Olea europaea*) and desert ash (*Fraxinus angustifolia*). There is a significant lack of native rush and sedge species along the watercourse.

Recommended management actions:

- Reduce biomass of soursobs.
- Staged removal of non-indigenous shrubs that are spreading (*Melaleuca* spp., *Acacia saligna*), and replace with indigenous alternatives.
- Control priority woody weeds: *Olea europaea*, *Fraxinus angustifolia*, *Arundo donax*.
- Control weed grasses such as kikuyu.
- To further stabilise the watercourse after the stormwater works, mass plantings of *Carex bichenoviana*, *Cyperus gymnocaulos*, *C. vaginatus* and *Juncus pallidus* are recommended for locations where water flows. Plant at 10 plants per m2.

ZONE D – WEST-FACING EMBANKMENT ABOVE THE WATERCOURSE

This gentle to moderate west facing slope is relatively dry and exposed. There are scattered native grasses and significant patches of recent revegetation. The overstorey is principally planted non-indigenous eucalypts, along with *Casuarina glauca* along the roadside. Most non-indigenous planted native trees do not appear to be recruiting, and so are not a priority for removal.

Recommended management actions:

- Monitor revegetation and infill as required, aiming for an open woodland with a grass and lily understorey. If maintenance of current plantings is difficult, consider planting dense patches with open areas (that are easy to slash) in between.
- Brushcutting regime should focus on a late winter slash for annual grassy weeds and forbs, but in areas with dense native grasses no slashing again until after grasses have set seed in summer.
- Staged removal of non-indigenous species that are spreading (*Melaleuca nesophila*), replacing with indigenous alternatives.
- Review treatments for soursob (*Oxalis pes-caprae*) and implement as appropriate.

ZONE E – ANOTHER SECTION OF THE WEST-FACING EMBANKMENT

This area is quite similar to zone D. There are scattered native grasses and significant areas of bare ground, indicating a high level of annual herbs, with soursob likely to be prominent. This area has not had a focus on revegetation as per zone D. The overstorey vegetation is mostly non-indigenous native species, although there are some planted Mallee Box (*Eucalyptus porosa*) that would likely have been an overstorey species in the original vegetation of the area. There is a heavy infestation of *Fumaria* sp., an annual scrambling species that smothers other plants. Replanting this zone should be deferred until the *Fumaria* is controlled.

Recommended management actions:

- Revegetation, aiming for an open woodland with a grass and lily understorey. Consider planting dense patches with open areas (that are easy to slash) in between.
- Brush cutting regime to focus upon a late winter slash for annual grassy weeds and forbs, but in areas with dense native grasses no slashing again until after grasses have set seed in summer.
- Staged removal of non-indigenous species that are spreading (*Melaleuca nesophila*), replacing with indigenous alternatives.
- Control the *Fumaria* sp.
- Review treatments for soursob (*Oxalis pes-caprae*) and implement as appropriate.

ZONE F – ROCKY OUTCROP AND THE TOP OF THE RISE

This area has a good foundation for biodiversity, being a potential remnant patch, with a layer of low trees composing native pine (*Callitris gracilis*), mallee box (*Eucalyptus porosa*) and native apricot (*Pittosporum angustifolium*), along with a good density of native grasses, garland lily (*Calostemma purpurea*) and pale twinleaf (*Zygophyllum glaucum*) in the understorey. There are some non-indigenous plantings, with some, notably golden wreath wattle (*Acacia saligna*), spreading.

Recommended management actions:

- Control *Acacia saligna*.
- Consider sensitive bushcare weeding approach in this area – focussing on grassy and herbaceous weeds, to allow the remnant understorey to survive and proliferate.

ZONE G – RIDGETOP ON THE EASTERN SIDE OF THE GULLY

This area is similar to zones D and E, and was revegetated several years ago with appropriate local tree and shrub species. In winter there are heavy loads of introduced grassy and herbaceous weeds, with soursob (*Oxalis pes-caprae*) dominating. At the northern end of this zone there is an area with better remnant understorey including native sedges, herbs and forbs. There is one large eucalypt in the northern corner, which is possibly an old remnant mallee box (*Eucalyptus porosa*). Non-indigenous native plantings are proliferating (e.g. *Acacia iteaphylla*).

Recommended management actions:

- Monitor revegetation and infill as required, aiming for an open woodland with a grass and lily understorey. If maintenance of current plantings is difficult, consider planting dense patches with open areas (that are easy to slash) in between.
- Scattered small tree and shrub plantings.
- Consider sensitive bushcare weeding approach around the large eucalypt in the northern corner.
- Brush cutting regime to focus upon a late winter slash for annual grassy weeds and forbs, but in areas with dense native grasses no slashing again until after grasses have set seed in summer.
- Control and staged removal of non-indigenous species that are spreading (*Melaleuca nesophila*, *Acacia iteaphylla*).
- Control high threat woody weeds (olive and buckthorn).
- Review treatments for soursob (*Oxalis pes-caprae*) and implement as appropriate.

ZONE H – FLAT AREA AT NORTH-WESTERN END

This flat, dry area has an established overstorey of introduced plants. There are very scattered native plants in the understorey, especially spear grasses (*Austrostipa* sp.). There have been some appropriate native shrub plantings (*Acacia acinacea*, *Dodonaea viscosa* ssp., *Enchylaena tomentosa*), but overall the area is generally depauperate in all structural layers of remnant vegetation. Large athel pines (*Tamarix aphylla*) have recently been removed from this area, but Aleppo pines (*Pinus halepensis*) remain.

Recommended management actions:

- Revegetate with the aim of achieving an open woodland with a grass and lily understorey. Consider planting dense patches with open areas (that are easy to slash) in between.
- Brush cutting regime to focus upon a late winter slash for annual grassy weeds and forbs, but in areas with dense native grasses no slashing again until after grasses have set seed in summer.

APPENDIX D – VEGETATION FOR REMOVAL OR CONTROL

The following trees and shrubs are invasive and/or non-native. They will be gradually replaced with more appropriate species (refer Appendix E).

COMMON NAME	BOTANICAL NAME	COMMENT	STATUS
Western coastal wattle	<i>Acacia cyclops</i>	Sleeper woody weed of coastal area. Becomes dominant. Needs checking for new seedlings	
Flinders Ranges wattle	<i>Acacia iteaphylla</i>	Spreads by seeds in dry environs	
Golden wreath wattle	<i>Acacia saligna</i>	Sleeper woody weed. Becomes dominant. Needs checking for new seedlings	
Giant reed	<i>Arundo donax</i>	Spreads by runners	SA declared weed
Bridal creeper and bridal veil	<i>Asparagus asparagoides</i> and <i>A. declinatus</i>		WONS*
SA declared weed			
Swamp casuarina	<i>Casuarina cunninghamiana</i>	Spreads easily by seed in wet environs to become dominant	
Platypus gum	<i>Eucalyptus platypus</i>	Little value, easily blows over	
False caper	<i>Euphorbia terracina</i>	Spreads by seed	SA declared weed
Fumitory	<i>Fumaria</i> sp.	Smothers other plants	
Common (or desert) ash	<i>Fraxinus angustifolia</i>	Spreads easily by seed in wet environs to become dominant. Needs checking for new seedlings	SA declared weed
Unknown large melaleuca species	<i>Melaleuca</i> sp.	Presents fire hazard	
Olive	<i>Olea europaea</i>	Spreads by seed	SA declared weed
Sour sobs	<i>Oxalis pes-caprae</i>	Spreads by bulbs	
Aleppo pine+	<i>Pinus halapensis</i>	Spreads by seed to become dominant overstorey blocking out light. Presents fire hazard	SA declared weed
Rice millet	<i>Piptatherum milliaceum</i>	Spreads in clumps across moist soils	
Rhamnus (Italian buckthorn)	<i>Rhamnus alaternus</i>	Sleeper woody weed of coastal Southern Australia. Becomes dominant	SA declared weed
Castor oil plant	<i>Ricinus communis</i>	Toxic to humans. Spreads via prolific seeding	
Athel pine	<i>Tamarix aphylla</i>	Spreads by suckers and seeds. Uses huge amounts of water, drying areas around it	WONS SA declared weed
Watsonia	<i>Watsonia meriana</i> var. <i>bulbillifera</i>		SA declared weed

* WONS = Weed of National Significance

+ It should be noted that the three large Aleppo pines behind 31 Lamington Avenue cannot be removed due to logistical difficulties.

APPENDIX E – VEGETATION FOR REVEGETATION AND BIODIVERSITY IMPROVEMENT

The following plant species present a mix of trees, shrubs and groundcovers that are suitable for use in revegetating Gilbertson Gully.

TYPE	COMMON NAME	BOTANICAL NAME
Trees	Drooping she-oak	<i>Allocasuarina verticillata</i>
	Silver banksia	<i>Banksia marginata</i>
	Southern cypress pine	<i>Callitris gracilis</i>
	River red gum	<i>Eucalyptus camaldulensis</i> var. <i>camaldulensis</i>
	Mallee box	<i>Eucalyptus porosa</i>
	Dryland tea tree	<i>Melaleuca lanceolata</i>
	Native apricot	<i>Pittosporum angustifolium</i>
Large to medium shrubs	Wreath wattle	<i>Acacia acinacea</i>
	Coast umbrella bush	<i>Acacia cupularis</i>
	Umbrella bush	<i>Acacia ligulata</i>
	Elegant wattle	<i>Acacia victoriae</i> ssp. <i>victoriae</i>
	Christmas bush	<i>Bursaria spinosa</i>
	Common fringe-myrtle	<i>Calytrix tetragona</i>
	Dwarf hakea	<i>Hakea rugosa</i>
	Twiggy daisy-bush	<i>Olearia ramulosa</i>
Small shrubs	Prickly ground-berry	<i>Acrotriche patula</i>
	Ruby saltbush	<i>Enchylaena tomentosa</i>
	Mallee bush-pea	<i>Eutaxia microphylla</i>
	Rohrlach's bluebush	<i>Maireana rohrlachii</i>
	Mallee pomaderris	<i>Pomaderris paniculosa</i> ssp. <i>paniculosa</i>
	Seaberry saltbush	<i>Rhagodia candolleana</i> ssp. <i>candolleana</i>
	Pale twinleaf	<i>Zygophyllum glaucum</i>

TYPE	COMMON NAME	BOTANICAL NAME
Ground covers/climbers/ sedges/grasses/forbs	Common vanilla-lily	<i>Arthropodium strictum</i>
	Berry saltbush	<i>Atriplex semibaccata</i>
	Feather spear-grass	<i>Austrostipa elegantissima</i>
	Rusty spear-grass	<i>Austrostipa eremophila</i>
	Tall spear-grass	<i>Austrostipa nodosa</i>
	Slender spear-grass	<i>Austrostipa scabra ssp. falcata</i>
	Bulbine-lily	<i>Bulbine bulbosa</i>
	Pink fairies	<i>Caladenia latifolia</i>
	Lemon beauty-heads	<i>Calocephalus citreus</i>
	Pink garland-lily	<i>Calostemma purpureum</i>
	Notched sedge	<i>Carex bichenoviana</i>
	Grassland everlasting	<i>Chrysocephalum semipapposum</i>
	Spiny flat-sedge	<i>Cyperus gymnocaulos</i>
	Stiff flat-sedge	<i>Cyperus vaginatus</i>
	Black-anther flax-lily	<i>Dianella revoluta var. revoluta</i>
	Climbing saltbush	<i>Einadia nutans ssp. nutans</i>
	White goodenia	<i>Goodenia albiflora</i>
	Native lilac	<i>Hardenbergia violacea</i>
	Satin everlasting	<i>Helichrysum leucopsidium</i>
	Pale rush	<i>Juncus pallidus</i>
	Running postman	<i>Kennedia prostrata</i>
	Clustered sword-sedge	<i>Lepidosperma congestum</i>
	Sticky sword-sedge	<i>Lepidosperma viscidum</i>
	Native flax	<i>Linum marginale</i>
	Soft tussock mat-rush	<i>Lomandra densiflora</i>
	Scented mat-rush	<i>Lomandra effusa</i>
	Small-flower mat-rush	<i>Lomandra micrantha ssp. micrantha</i>
	Austral trefoil	<i>Lotus australis</i>
	Wingless fissure-plant	<i>Maireana enchylaenoides</i>
	Minnie daisy	<i>Minuria leptophylla</i>
	Coastal climbing ligum	<i>Muehlenbeckia gunnii</i>
	Creeping boobialla	<i>Myoporum parvifolium</i>
	Common wallaby grass	<i>Rytidosperma caespitosa</i>
	Pale fanflower	<i>Scaevola albida</i>
	Kangaroo grass	<i>Themeda triandra</i>
	Narrow-leaf New Holland daisy	<i>Vittadinia blackii</i>
	Fuzzy New Holland daisy	<i>Vittadinia cuneata var. cuneata</i>
	Woolly New Holland daisy	<i>Vittadinia gracilis</i>
	Tall bluebell	<i>Wahlenbergia stricta ssp. stricta</i>

APPENDIX F – DRAFT IMPLEMENTATION PLAN

ITEM	SCOPE	PROGRAM	BUDGET ESTIMATE
Watercourse rehabilitation	<i>Complete rehabilitation of the watercourse, including scour protection</i>	2020/2021 and 2021/2022 FY	\$100,000 - \$125,000
Revegetation, woody weed removal and fire prevention	<i>Revegetation of the gully based on the zones and removal of fire hazards</i>	2020/2021 and ongoing	\$150,000
Interpretative signage	<i>Supply and Install signage</i>	2021/2022 and ongoing	\$50,000
Paths	<i>Construct improved trails within the gully and two bridges</i>	2021/2022 and ongoing	\$75,000-\$100,000
Ongoing maintenance	<i>Weed management, revegetation</i>	2022/2023 ongoing	Operational budget

Note:

- Budget is subject to annual Council approval and is a total budget exclusive of any grant or other external funding.
- The above costs are capital costs for new works. Existing assets will be renewed as part of Council's asset management planning.



24 Jetty Road, Brighton SA 5048

PO Box 19 Brighton SA 5048

P 08 8229 9999

E mail@holdfast.sa.gov.au

holdfast.sa.gov.au

yourholdfast.com