

Welcome to Gilbertson Gully

Marni naa pudni
Kaurna yarta-ana



GILBERTSON GULLY MASTERPLAN DRAFT

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.

CONTENTS

Summary	4
About the Masterplan	5
About Gilbertson Gully	7
Opportunities and Constraints	8
Vegetation Zones	12
Masterplan Recommendations.....	14
Implementation and Funding	16
Appendices	17
Appendix A - Identified Stormwater Improvements	18
Appendix B - Stormwater Reuse Assessment	20
Appendix C - Vegetation Zones Management Actions	21
Appendix D – Vegetation for Removal or Control	23
Appendix E - Vegetation for Revegetation and Biodiversity Improvement	24
Appendix F - Draft Implementation Plan	26

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. It has an area of around 3.3 hectares. Gilbertson Gully is immediately downstream of Gully Road North Reserve in the City of Marion.

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 with reducing erosion, improving safety and enhancing the visitor experience.

Stormwater harvesting and reuse opportunities have been considered for Gilbertson Gully, however the implementation of any reuse 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.

Gilbertson Gully is already a natural space that is enjoyed by the local community. 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, the gully would have supported local native wildlife and been vegetated with local species. 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 until 1929. 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, ground covers, wildflowers, climbers, shrubs and small trees were planted in the winter of 2020. The 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.



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

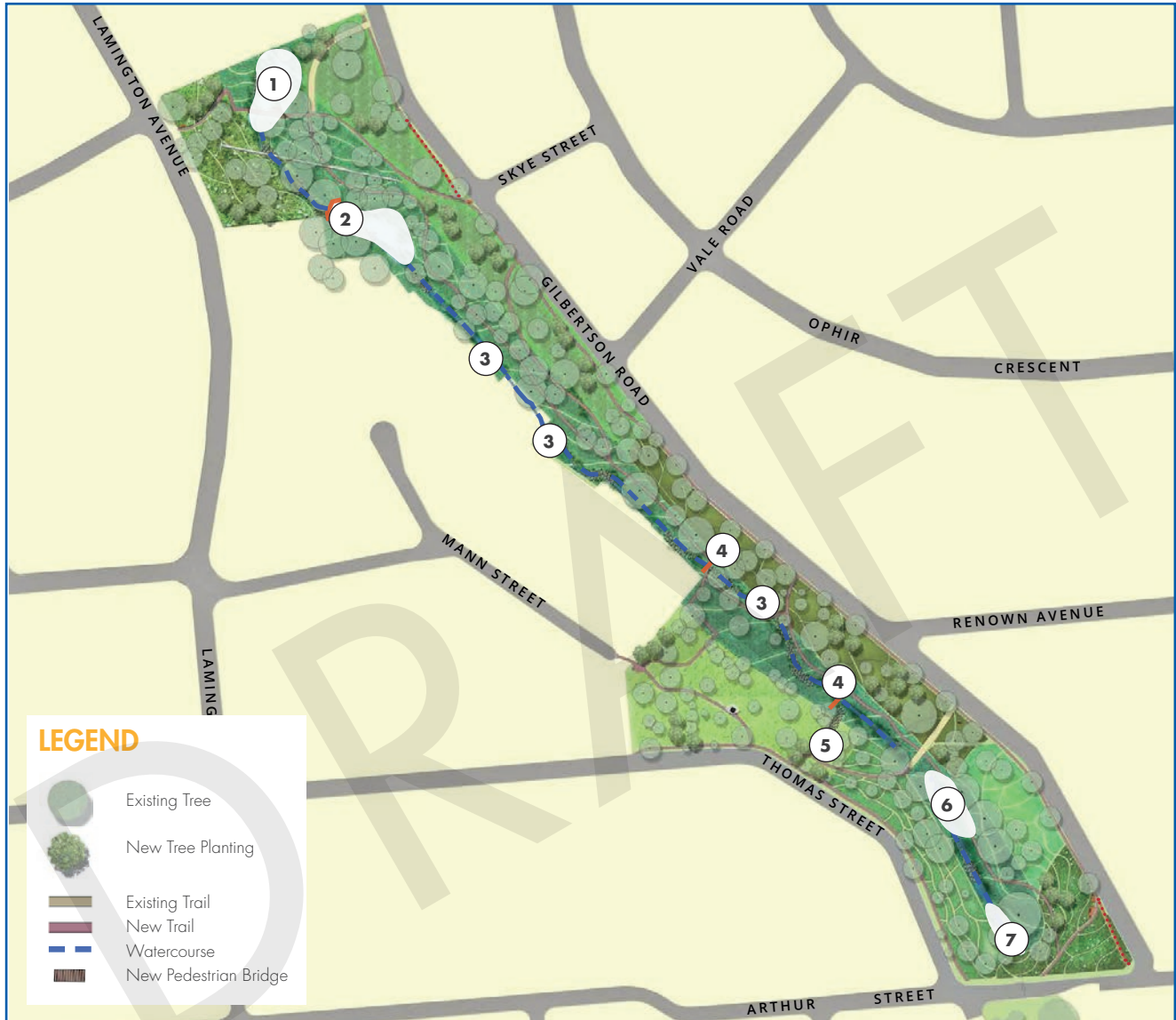


Figure 5. Opportunities and constraints.

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).

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 reuse 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 provide safer access to visitors and create a sustainable trail network that reduces annual maintenance.



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

Creation of paths that follow the natural contours of the sloping site together with a trail along the creek line 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 trails. As the trails along the creek in particular are quite narrow, 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. In the last 50 years, there have been successive replantings that have occurred, with a variety of native and non-native species.

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 more formal 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 AT HIGHLY VISIBLE ROAD CORNER

This planting will provide an entry statement into the precinct.

- Weed control followed by revegetation with higher density to enhance existing revegetation and prevent weeds.
- Control infestation of weeds before further revegetation planting.
- Test nutrient levels
- Ameliorate soil in order to deal with high levels of nitrogen and phosphorus which is currently responsible for the increase in weeds in this area.
- Encourage slash/weed/spray prior to seed set.

ZONE B - EAST-FACING EMBANKMENT ABOVE THE WATERCOURSE

- Control weed species (soursob) with spray to control
- Slow release fertiliser and organic mulch to assist replanting
- Planting of *Bursaria spinosa*, *Calytrix tetragona* and *Pomaderris paniculata*
- Christmas bush in clumps of 10, at 1.5m spacings.

ZONE C - WATERCOURSE

- Removal of woody weeds and weed tree species
- Control of weed grasses such as kikuyu and annual veldt grass
- New planting of *Cyperus sp.*, *Juncus pallidus* in areas of inundation at 300mm spacings to assist with erosion control
- New planting of *Dianella revoluta* var. *revoluta* and *Aurolistia elegantissima* in ephemeral areas

ZONE D - WEST-FACING EMBANKMENT ABOVE THE WATERCOURSE

- Removal of weed species
- Selected planting of low shrubs, grasses and sedges such as *Acacia acinacea*, *Maireana enchylaenoides*, *Atriplex semibaccata*, *Kennedia prostrata*

ZONE E - SECTION OF THE WEST-FACING EMBANKMENT

- Infested with *Fumaria sp.* Bank is dry,
- Planting of the following species: *Maireana enchylaenoides*, *Atriplex semibaccata*, *Austrodanthonia caespitosa*, *Kennedia prostrata* and *Lomandra multiflora*.
- Selected removal of *Allocasuarina sp.*

ZONE F - ROCKY OUTCROP AND TOP OF THE RISE

- Remnant vegetation of native pine, peppermint box, native apricot, along with and understorey of native grasses, sedges, lilies.
- Priority area for selective weed control to encourage natural regeneration.

ZONE G - RIDGETOP EASTERN SIDE OF GULLY

- Remnant vegetation in moderate-good condition.
- Open woodland with an understorey of grasses, sedges, low herbs and lilies.
- Maintain grassland and brushcut at appropriate times.
- Additional planting limited to native grasses, sedges and lilies to enhance native vegetation.

ZONE H - NORTH-WESTERN END STEEP SLOPE SHADED BY PLANTED TREES.

- A dry area where current vegetation not well-suited to the site.
- Removal of specific weed species including *Fumaria* and *Boxthorn*.
- Leave for 1 year before revegetation
- Plant with species such as *Maireana sp.*, *Atriplex sp.*, *Austrodanthonia sp.*, *Kennedia sp.*, *Lomandra sp.*, and larger shrubs such as *Acacia pycnantha*, *Pittosporum angustifolium* and *Melaleuca lanceolata*.

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. The following vegetation zones are shown in Figure 9:

- Zone A: Revegetation site located at 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: Section of the west facing embankment
- Zone F: Rocky outcrop on and the top of the rise
- Zone G: Ridgetop on the eastern side of the gully
- Zone H: Steep slope at north-western end shaded by planted trees.

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 GPT possible in future years.
2. Stabilise embankment.
3. Consider upgrade and possible/minor realignment of steps for improved access and reduced grades and erosion.
4. New 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 WSUD 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 in 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 reuse opportunities has indicated that based on economics, aesthetics, and low water demand for revegetation species, it is not viable to capture water for reuse 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.

DRAFT

APPENDICES

Appendix A – Identified stormwater improvements

Appendix B – Stormwater reuse 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

DRAFT

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 to 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 REUSE 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 reuse 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, including:

- Total catchment runoff, and importantly the flow profile (ie 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 re-vegetation 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 a longer-term storage would be in fractured rock, which traditionally are 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 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 6, 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 reuse within the gully.

APPENDIX C – VEGETATION ZONES MANAGEMENT ACTIONS

ZONE A – REVEGETATION SITE LOCATED AT A HIGHLY VISIBLE ROAD CORNER

The most significant management issue here is weed infestation. A wood chip mulch has previously been used that has probably raised soil nitrogen and phosphorous levels, resulting in prolific weed growth. The condition of the site suggests the following:

- Inadequate weed control was undertaken prior to planting
- Most of the species selected have not competed well with the weeds
- Planting density has not been high enough to compete with the weeds
- Soil introduced for use in the raised zone on the South-East corner has introduced weeds, notably soursob and sow thistle
- Inadequate maintenance, particularly relating to weed control in late winter-early spring resulting in plants setting seed and proliferating over ensuing seasons.

Recommended management actions:

- Test nutrient levels in the soil/mulch – may need to be ameliorated by application of other materials or by growing a cereal grain to use up excessive nutrients.
- Engage contractors to slash/weed/spray the site prior to seed set each growing season.
- Once weeds are better controlled, replace poorly performing plants (e.g. *Enchylaena tomentosa*) and plant open spaces at a density of 2 plants/m².
- Re-evaluate the use of herbicides as part of the management program. The whole of the gully is weed infested and this is negating the revegetation efforts. A controlled use of herbicides to control the weeds is suggested as the present attempts to control weeds are not efficient. The herbicide use should be able to be tailored off after 3-5 seasons.

ZONE B – EAST-FACING EMBANKMENT ABOVE THE WATERCOURSE

The site is weed infested, especially by soursobs and grasses. Also, it is too shady for shrubs such as *Olearia ramulosa* and *Dodonaea viscosa*. Other species, such as Christmas bush (*Bursaria spinosa*), common fringe-myrtle (*Calytrix tetragona*) and mallee Pomaderris (*Pomaderris paniculata*), are more appropriate to the site and should be included.

Recommended management actions:

- Although chemicals have not been used on this site recently, spraying soursob with herbicide to control it should be undertaken. Two years of weed control by spraying will significantly reduce the growth of this species, enabling plantings to take place.
- Christmas bush is especially recommended for the site and provides valuable food for nectar-feeding birds and insects in early summer. Planting this species in clumps of 10 at 1.5 m spacing will also assist to reduce weed infestations.
- The use of organic mulch will assist with successful replanting.

ZONE C – WATERCOURSE (IDENTIFIED AS A SINGLE UNIT)

The condition varies very little along its length. Various woody weeds occur and should be removed. Various Eucalypts currently grow in the watercourse.

The watercourse is also infested with grasses (couch, kikuyu, rice millet, annual veldt grass) and bulb species (e.g. three-cornered garlic), some of which will be very difficult to eradicate. Some other weed species occur in small, discreet patches and should be controlled. These include giant reed (*Arundo donax*), African cornflag (*Chasmanthe*), periwinkle (*Vinca major*), and chives (*Allium schoenoprasum*).

Recommended management actions:

- The level of erosion control will depend on the actions required to deliver a successful outcome. If the erosion control strategy is implemented there is likely to be disturbance of the site, an ideal time to treat woody and perennial weeds.
- To further stabilize the site, after stormwater works, mass planting of *Cyperus gymnocaulos*, *Cyperus vaginatus*, *Juncus pallidus* in the wetter locations, where water flows and *Dianella revoluta* var. *revoluta* and *Austrostipa elegantissima* where there is slightly less water flow should be undertaken. These plantings should be at 30 cm spacings to assist to control further erosion, to improve water quality and reduce weed impacts.
- Follow-up hand weeding will be required.

ZONE D - WEST FACING EMBANKMENT ABOVE THE WATERCOURSE

This Zone is weed infested, though species do vary from the opposite side of the gully, but management considerations are the same.

Recommended management actions:

- The embankment is a dry site and should be planted with low shrubs, grasses and sedges, not more trees and large shrubs.
- Plants such as *Acacia acinacea*, *Maireana enchylaenoides*, *Atriplex semibaccata*, *Rhytidosperra caespitosa*, *Kennedia prostrata*, *Acacia pycnantha* and *Lomandra multiflora* var *dura* should be considered.
- Mulching at time of planting is essential.
- Follow-up summer watering is required here.

ZONE E – ANOTHER SECTION OF THE WEST FACING EMBANKMENT

Much of this site is infested by *Fumaria* sp., an annual scrambling species that smothers other plants. Replanting these zones should be deferred until the *Fumaria* sp. is controlled. African cornflag (*Chasmanthe*) also occurs in this zone.

Recommended management actions:

- The embankment is a dry site and should be planted with low shrubs, grasses and sedges, not more trees and large shrubs.
- Plants such as *Maireana enchylaenoides*, *Atriplex semibaccata*, *Rhytidosperra caespitosa*, *Kennedia prostrata*, and *Lomandra multiflora* var *dura* should be considered away from the roots of the trees.
- Mulching at time of planting is essential.
- Follow-up summer watering is required here.

ZONE F – ROCKY OUTCROP AND THE TOP OF THE RISE

Remnant vegetation comprises native pine, peppermint box, native apricot (*Pittosporum angustifolium*) with an understorey of native grasses, sedges and lilies. The remnant native vegetation is in reasonable condition.

Recommended management actions:

- This is a priority zone for selective weed control to encourage natural regeneration.

ZONE G – RIDGETOP ON THE EASTERN SIDE OF THE GULLY

This zone also has remnant native vegetation in moderate-good condition. The vegetation was originally an open woodland with an understorey dominated by grasses, sedges, low herbs and lilies (similar to Zone F).

Recommended management actions:

- This grassland should be maintained and managed by appropriately timed brush cutting (that is, avoiding the period of flowering and seed set, i.e. spring into early summer).
- Plantings should be restricted to grassland species, that is, native grasses, sedges and lilies, and exclude any further planting of shrubs.
- It may be possible to establish some orchid species in this zone, such as the pink fairy orchid (*Caladenia latifolia*)

ZONE H – STEEP SLOPE AT NORTH-WESTERN END SHADED BY PLANTED TREES

This is a dry zone and current plantings are not well-suited to the site. The zone has established plants of Eucalyptus platypus, athel pine and Aleppo pines. There is a dense area of Fumitory (*Fumaria* sp.) at the southern end of the zone.

Recommended management actions:

- Some of the trees, Eucalyptus platypus and athel pine, should be selectively removed prior to replanting.
- Aleppo pines on Lamington Avenue should be removed.
- Once removal has taken place the site should be left for 1 year prior to replanting
- Plants such as *Maireana enchylaenoides*, *Atriplex semibaccata*, *Rhytidosperra caespitosa*, *Kennedia prostrata*, *Austrostipa nodosa*, *Grevillea ilicifolia*, *Lomandra multiflora* ssp. *dura*, *L. densiflora*, *Olearia ramulosa* and *Dodonaea viscosa* as the understorey layer. Overstorey species such as *Eucalyptus odorata*, *E. leucoxylon*, *E. porosa*, *Callitris graciis*, *Acacia pycnantha*, *Pittosporum angustifolium* and *Melaleuca lanceolata* should be considered.
- Mulching at time of planting is essential.
- Follow-up summer watering will be required here.

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	Golden wattle	<i>Acacia pycnantha</i>
	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>
	Blue gum	<i>Eucalyptus leucoxylon</i>
	Peppermint box	<i>Eucalyptus odorata</i>
	Mallee box	<i>Eucalyptus porosa</i>
Large to medium shrubs	Dryland tea tree	<i>Melaleuca lanceolata</i>
	Wreath wattle	<i>Acacia acinacea</i>
	Umbrella bush	<i>Acacia ligulata</i>
	Sweet Bursaria	<i>Bursaria spinosa</i>
	Common fringe-myrtle	<i>Calytrix tetragona</i>
Small shrubs	Sticky hop-bush	<i>Dodonaea viscosa</i> ssp <i>spatulata</i>
	Ruby saltbush	<i>Enchylaena tomentosa</i>
	Mallee bush-pea	<i>Eutaxia microphylla</i>
	White goodenia	<i>Goodenia albiflora</i>
	Clasping goodenia	<i>Goodenia amplexans</i>
	Holly Grevillea	<i>Grevillea ilicifolia</i>
	Lavender Grevillea	<i>Grevillea lavandulacea</i>
	Small-leaf bluebush	<i>Maireana brevifolia</i>
	Wingless bluebush	<i>Maireana enchylaenoides</i>
	Twiggy daisy-bush	<i>Olearia ramulosa</i>
	White fan-flower	<i>Scaevola albida</i>

TYPE	COMMON NAME	BOTANICAL NAME
Groundcovers/climbers/ sedges/grasses/forbs	Chocolate 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>
	Sweet apple-berry	<i>Billardiera cymosa</i>
	Bulbine-lily	<i>Bulbine bulbosa</i>
	Lemon beauty-heads	<i>Calocephalus citreus</i>
	Pink garland-lily	<i>Calostemma purpureum</i>
	Clammy goosefoot	<i>Chenopodium pumilio</i>
	Grassland everlasting	<i>Chrysocephalum semipapposum</i>
	Small-leaved clematis	<i>Clematis microphylla</i>
	Australian bindweed	<i>Convolvulus erubescens</i>
	Tall scurf pea	<i>Cullen australasicum</i>
	Spiny flat-sedge	<i>Cyperus gymnocaulos</i>
	Stiff flat-sedge	<i>Cyperus vaginatus</i>
	Black-anther flax-lily	<i>Dianella revoluta</i> var. <i>revoluta</i>
	Climbing saltbush	<i>Einadia nutans</i> spp. <i>nutans</i>
	Scrambled eggs	<i>Goodenia pinnatifida</i>
	Native lilac	<i>Hardenbergia violacea</i>
	Pale rush	<i>Juncus pallidus</i>
	Running postman	<i>Kennedia prostrata</i>
	Native flax	<i>Linum marginale</i>
	Soft tussock mat-rush	<i>Lomandra densiflora</i>
	Scented mat-rush	<i>Lomandra effusa</i>
	Hard mat-rush	<i>Lomandra multiflora</i> var. <i>dura</i>
	Austral trefoil	<i>Lotus australia</i>
	Creeping boobialla	<i>Myoporum parvifolium</i>
	Native soursob/sorrel	<i>Oxalis perennans</i>
	Slender bush-pea	<i>Pultenaea tenuifolia</i>
	Variable plantain	<i>Plantago varia</i>
	Wallaby grass	<i>Rhytidosperma caespitosa</i>
	Creamy candles	<i>Stackhousia monogyna</i>
	Kangaroo grass	<i>Themeda triandra</i>
	Rush fringe-lily	<i>Thysanotus juncifolius</i>
	Toothed velleia	<i>Velleia arguta</i>
	Narrow-leaf new Holland daisy	<i>Vittadinia blackii</i>
	Wedge new Holland daisy	<i>Vittadinia cuneata</i> var. <i>cuneata</i>
	Coastal bluebell	<i>Wahlenbergia gracilentia</i>
	Early Nancy	<i>Wurmbea dioica</i>
	Pale twinleaf	<i>Zygophyllum glaucum</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.

DRAFT



CITY OF
HOLDFAST BAY

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