MANNUM
WATERS
RIVERSIDE LIVING

Amendment

to the

Environmental Impact Statement

Mannum Waters
Holiday Village and Adventure Water Park

15th June 2020

Tallwood Pty Ltd
Suite 4, 166 Main South Road
Morphett Vale SA 5162

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SUMMARY

Construction began on Mannum Waters in April 2010 after Tallwood Pty Ltd (Tallwood) had received Provisional Development Authorisation on 30th October 2008 and satisfied Reserved Matters. Since that time, development has been progressing steadily with the project reaching important milestones, completing the houseboat marina and five stages of residential development.

Two additional projects, a Holiday Village and an Adventure Water Park, have now been proposed for Mannum Waters to enhance its destination and tourism appeal, extend its economic influence in the region, improve the project's long-term viability and provide employment opportunities. This Amended Environmental Impact Statement has been prepared to assess the environmental aspects presented by the new projects.

The primary objectives at this stage are to:

- Approve the inclusion of a Holiday Village and Adventure Water Park within the layout plan of the Mannum Waters development and to,
- Identify the sites so that a land division can be prepared for preparation of titles.

The proposals are currently in conceptual stages. These are sufficient to indicate the scope, content and impact of the future proposals. Once approved for inclusion within Mannum Waters site, the projects will move to the finalisation stages when design solutions will be more fully developed and presented for further land division, land use and building approval.

The following impacts have been examined through the engagement of specific consultancies. They are:

- Environment - Paul Manning
- Traffic - MFY Pty Ltd
- Noise - Sonus Pty Ltd
- Planning - Heynen Planning Consultants

In each case, the level of investigation has been undertaken to assess the specific implications of the proposals to the level required for the initial inclusion of the projects within the Mannum Waters' boundaries. These investigations show that the proposals are appropriate and can be developed without detrimental effects on the current development, neighbours and the wider community. The report is structured in the following parts:

1. Introduction
2. Development Plan Amendment
3. Critical Assessment
4. Medium Assessment
5. Standard Assessment
6. Appendices

With the inclusion of the two new projects, Tallwood will have a greater opportunity to complete the wetlands. The wetlands are not viable on their own and require considerable expenditure. This can only be derived from other Mannum Waters income sources or Government grants. Tallwood has reviewed the water usage from the River Murray at Mannum Waters and the development of the wetlands has been reassessed in order integrate them in the new design, to more closely monitor them in the future and to ensure that water usage is conserved as much as possible. It should be noted that the redesign for the Holiday Village, Adventure Water Park and revised wetlands actually decreases the ultimate water usage at Mannum Waters below that approved under the original Mannum Waters EIS.

1 INTRODUCTION

1.1 Background

The Mannum Waters Residential Marina proposal by Tallwood Pty Ltd was declared a Major Development in 2005 and was the subject of an Environmental Impact Statement (EIS) process. The EIS was released for public consultation in 2007. The proposal was granted a Provisional Development Authorisation by the Governor on 30 October 2008. Following consideration of Reserved Matters, approval to undertake construction was obtained on 1st April 2010.

Since that time, a number of modifications to the original development have been approved. These are reflected in the current Development Plan shown at Fig. 1.

Figure 1 - Development Plan.

Now a further modification is proposed to include a Holiday Village and an Adventure Water Park within the scope of the development. This requires an Amendment to the Environmental Impact Statement (EIS) which is the subject of this report. To assist this process Guidelines have been prepared for Tallwood by the State Planning Commission and endorsed on 5th December 2019. A copy of the Guidelines is attached to this report as **Appendix A**. In preparing the Amended EIS, Tallwood has engaged various consultants as well as using its own expertise to respond to the Guidelines in accordance with their presentation. Due to their location in this report the numbering of each assessment in this report differs from that used in the Guidelines, but the same sequence as the Guidelines is adhered to.

1.2 Mid-Murray Council and Letters of Support

To facilitate the Mannum Waters development, regular Working Group meetings have been maintained with the Mid-Murray Council and a Deed agreed with Council to establish the basis for the provision of infrastructure and on-going operation and maintenance activities.

Both proposed projects are supported by Mid-Murray Council, the Local Member for Hammond, Mr Adrian Pederick and Regional Development Australia, Murraylands & Riverland SA, each having supplied letters of support. The letters of support are included in this report as **Appendix B.**

1.3 Current Development

The works developed to date are shown in Fig 2.

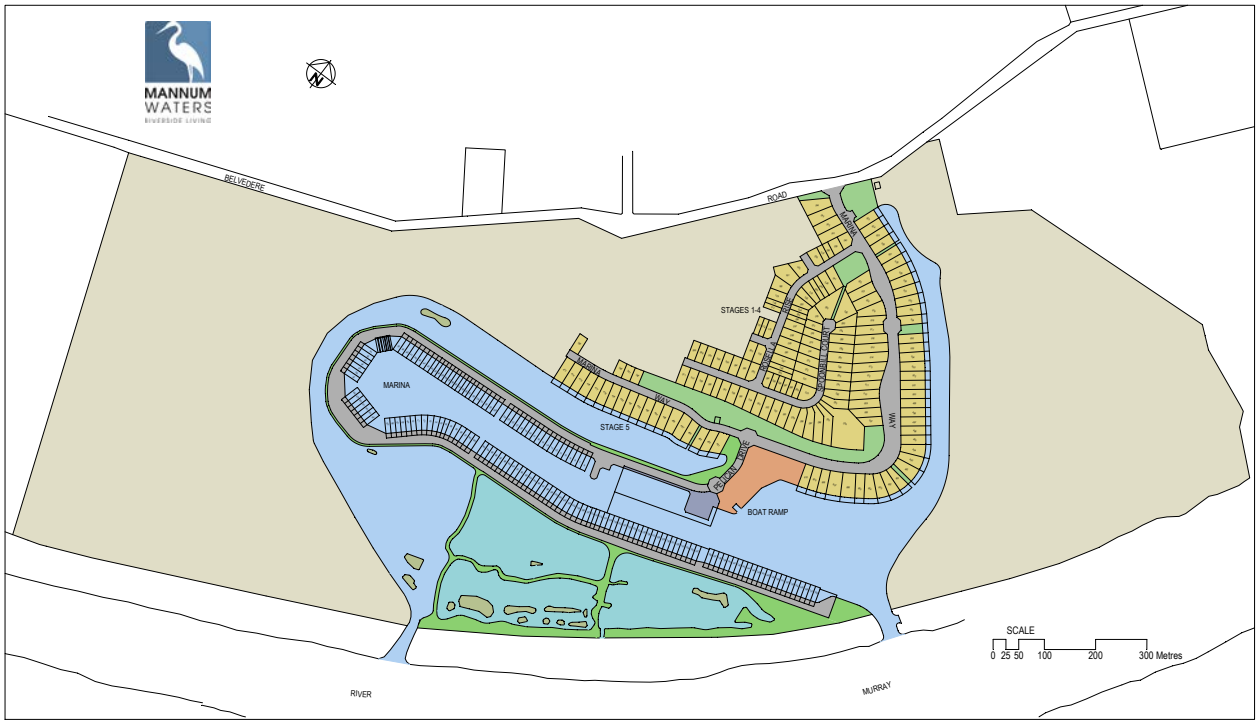


Figure 2 - Extent of current development

For the present, the following works have been completed at Mannum Waters:

- 148 houseboat-berth marina. All berths have been sold and the marina is near capacity. A Community Corporation has been formed and has been independently operating for approximately 6 years.
- 57 waterfront residential allotments of which all but five have been sold.
- 111 traditional residential allotments of which all but 17 have been sold.
- The first stage of the boat ramp.
- Land for commercial houseboats.
- Major waterways.
- Approximately 12 hectares of wetland.
- Areas of landscaping, stormwater retention basins and Aboriginal Heritage areas.

Over $25Million has been spent so far on the development and around $15Million on housing construction. The project has provided revenue to all levels of government and at this point can be regarded as a significant asset in the region.

Approximately 50 houses have been constructed or are undergoing construction and more than 30 houseboats are occupied as permanent residences in the Marina. A number of houses are being offered for holiday rental with good commercial results. Some Mannum shop owners have indicated that the growing population at Mannum Waters has assisted in the continuing viability of their businesses.

The central community precinct area is developing as a significant boating hub with an increasing number of boats utilizing the ramp and fuel outlet. The Four Knot cruise boat is operating from the main waterway and the Buena Vista Coffee boat operates at the central pontoon Friday to Monday. A number of houseboat hirers work from the marina and houseboat travelers utilize the casual berthing area and the nearby river frontage.

Stage 6 residential area, a community toilet block and further landscaping are proposed for 2021, all of which are sales dependent.

1.4 **Environmental Management**

Under the original approval various Management and Monitoring Plans were initiated to guide the development. They included the following Plans which are relevant and applicable to the current proposals:

- Construction Environmental Management and Monitoring Plan (CEMMP), which includes a Soil Erosion and Drainage Management Plan (SEDMP)

  This existing document can be used as the basis for a CEMMP prepared specifically for the proposed developments.

- Environmental Management Implementation Plan (EMIP)

  This was prepared by the contractor who undertook the construction work, outlining how environmental management would be undertaken and the requirements of the CEMMP achieved.

- Operational Environmental Management and Monitoring Plan (OEMMP), which includes:
  - Entrance Channel, Marina Basin and Waterways Management and Monitoring Plan
  - Flood Management Plan
  - Revegetation Management Plan
  - Wetland Management Plan
  - Site Preparation, Revegetation, Hydrology and Management Plan
  - Spill Contingency Plan
  - Stormwater Management Plan
  - Traffic Management Plan
  - Waste Management Procedures Plan

- Wastewater Management Plan
- Weed and Feral Animal Management Plan

The OEMMP will be updated to include the new developments.

1.5 **Mannum Waters – A destination**

As the work has progressed, Tallwood has understood it was desirable to enhance the area's appeal as an important recreational, tourist, retirement and general living destination. For some time, Tallwood has been considering the development of a Holiday Village and environmental school camping facility. When approached by a developer, LANDN Pty Ltd, for land for an Adventure Water Park, it became obvious that it was an ideal opportunity to create a very significant development for the region, increasing sales potential for Mannum Waters, enabling the completion of the important wetland and habitat developments, strengthening the tourism of the Region and bringing additional employment opportunities and greater prosperity to local businesses.

Tallwood has successfully pursued the Mannum Waters development with steadfastness and resolve over 20 years. It is a viable company and will continue to manage and/or provide oversight to any further development at Mannum Waters.

The Adventure Water Park will provide water activities of various levels of intensity. The developers and subsequent operators currently run flyboarding activities at Murray Bridge and Glenelg and have thoroughly researched operations in other localities such as Adventure World in Perth and Flyboarding and Water Worlds in Queensland. When the Guidelines for the Amended EIS were released, another water park project was publicised as a future project at Murray Bridge. Tallwood notes the following:

- The two projects differ in scope.
- The Adventure Water Park proposed at Mannum Waters will require water drawn from the River Murray. Nevertheless, the total water usage at Mannum Waters will not increase but actually decrease from that identified within the original Major Development approval.
- The Adventure Water Park proposed at Mannum Waters does not have any visual impact from the River Murray, being hidden from view by local vegetation.
- The Adventure Water Park will be supported by the adjacent Holiday Village for accommodation and the adjacent wetlands for its lake's water quality.

Tallwood has established a Memorandum of Understanding with LANDN Pty Ltd during the planning stages to identify the basis for a land division. Following the successful approval for inclusion of the Adventure Water Park at Mannum Waters, a Heads of Agreement will be established for the orderly development and the transfer of the land on the basis of performance targets.

At this stage Tallwood will be the proponent for the development of the Holiday Village and retain ownership of the land once the land division has been approved. The Holiday Village will have 100 plus cabins/caravan sites, a considerable camping area and associated

facilities. With direct access to the waterbodies and subsequently the River Murray, passive recreation such as canoeing, fishing, swimming and wetland walks will be available. The park should be similar to the very popular Renmark Riverfront Holiday Park with the advantage of being just over an hour from Adelaide CBD.
Based on the approved development plan and the change of land use, the Holiday Village and the Water Park will replace 52 residential allotments. The change will introduce other environmental impacts to those previously assessed. The purpose of this Amended EIS is to address those impacts in a logical way and to present them for public and Government agency consultation. Following receipt of any issues raised by the consultation process, Tallwood will provide appropriate responses which may lead to the revision of the Amended EIS prior to its presentation to the Minister for a decision to vary the existing Development Plan.

A suggested timing for the projects based on an anticipated approval is as follows:

- Minister's approval of variation — December 2020
- Adventure Water Park approval of detailed designs — October 2021
- Holiday Village approval of detailed designs — October 2021
- Holiday Village Stage 1 complete. See 2.1 for Staging — October 2022
- Adventure Water Park Stage 1 complete. See 2.2 for Staging — October 2022
- Holiday Village Stage 2 complete — October 2025
- Adventure Water Park Stage 2 complete — October 2025

A primary environmental impact is associated with the use of river water. Apart from the initial filling of any new waterbody, this mostly relates to evaporation. In the revised designs, Tallwood is making sure that this will not exceed the quantities already covered by current approvals. The Adventure Water Park will be wholly self-contained with no direct contact with the river while the Holiday Village waterbody replaces a longer narrower strip of water to the original residential waterfront allotments with a shorter and wider body of water adjacent to the park.

Some of the existing wetlands will be amended to remove them from direct contact with the River Murray and new wetlands will also be designed in the same way. Metered river water will be delivered to the wetlands in accordance with the river flows, climate and prescribed allowances and most of the wetlands will become ephemeral off-river areas with metered flow in and out for the required seasonal hydrological patterns and for salinity control.

At the present time, Tallwood is achieving approximately five waterfront allotment sales/year with total land sales less than 10 allotments. This is somewhat skewed as a number of allotments originally sold to investors have been offered for resale and total sales/annum for Mannum Waters is higher. With a further 440 allotments still approved for development it would be many years before the project can complete all sales. To maintain progress and increase the desirability of the destination, it is necessary to increase the attraction of the destination. The Adventure Water Park and Holiday Village are seen as viable options to achieve this. They will be particularly effective in bringing new visitors to

the area, an encouragement for others to establish holiday homes in the near vicinity and reinforce the infrastructure and services for permanent residents.

The rate of development, although consistent and forward progressing is insufficient to allow the extension of the ephemeral wetland areas, public infrastructure (e.g. playgrounds), restaurant, shops and offices. It is believed that the development of the Water Park and Holiday Village, viable in their own right, will facilitate additional residential, commercial and public construction activities and enable a more complete destination experience.

2 PROPOSED AMENDED DEVELOPMENT

The Holiday Village and Adventure water Park will be situated at the south-western end of Mannum Waters. The original anabranch outlet was excavated to provide soil for the large levee at the end of the property. This provides flood protection to the neighbouring property. The anabranch has been superseded by the revised outlet to the River Murray and the extensive excavation has become an ideal location for the Adventure Water Park development's lake area.

The original Mannum Waters Environmental Impact Statement dealt with all aspects of Aboriginal Heritage, native vegetation, groundwater and soil contamination.
The following comments address specific aspects of the change:

- Water usage – Overall water usage from the River Murray remains essentially the same as that under the original approval. Care has been taken to ensure there is no new demand on the river by maintaining water surface areas within the original scope and redesigning significant areas of wetlands from permanent water to ephemeral areas with control structures and procedures.

- Wetlands –The remaining wetland areas will be developed as ephemeral areas to minimize the impact of water evaporation but will perform environmental assistance to the through-flow from the marina and also filtration and water quality control in the Adventure Water Park. An assessment of the impacts and effects of these changes are discussed within this report.

- Aboriginal Heritage – The discovery of Aboriginal remains during the development of Stage 5 necessitated an archaeological review of the area. The limits to the burial grounds have been identified and future monitoring protocols agreed. Both the Holiday Village site and the Adventure Water Park site have been cleared of any specific heritage areas.

- Noise – Separation distances of the two new proposals is such that noise impacts are low and below levels of nuisance. This is discussed within the report.

- Services – Both projects will be fully serviced by the extension of services from Mannum Waters in the same way that the currently approved residential areas would have received services. Belvedere Road, upgraded to a 100km/hr fully bituminized road during the early part of the Mannum Waters development, has ample capacity to cater for the anticipated traffic volumes as discussed within the report.

- Separation – The location of the Holiday village and Adventure Water Park are such that they are largely separated by access, water and distance from the existing Mannum Waters development and present little environmental, visual and aesthetic impact on existing land uses. This is discussed within the report also.

2.1 **Holiday Village**

A concept of the proposed Holiday village is shown in Fig. 3.

Staging Plan

Figure 3 - Holiday Village Concept Plan

The concept plan provides an understanding of the scope of the proposal and following planning approval, will be subject to final design and a formal development application. It is currently anticipated that the fully completed Holiday Village will comprise the following:

1. Reception Office, small store and Manager's residence
2. Recreation Hall
3. Amenities and Laundry
4. Camp Kitchens
5. Open-air Classrooms
6. Fire-pit
7. Powered Campsites
8. Community BBQ
9. Shelters
10. Boat Ramp
11. Boat Trailer Park
12. Boat and Caravan Storage
13. Fishing Jetty
14. Hire-craft Dock
15. Canoe Launcher
16. Board Walk
17. Private Cabins
18. Communal Cabins
19. Ensuite Powered Sites
20. Powered Sites
21. Play Equipment and Jumping Balloon
22. Wetland Access

The Holiday village will occupy approximately 5 hectares, be open all year and employ various staff. This is discussed in the body of the report.

2.2 **Adventure Water Park**

A Memorandum of Understanding has been agreed between Tallwood Pty Ltd and LANDN Parks Pty Ltd to work towards the establishment of the Adventure Water Park at the south-western end of the Mannum Waters site.

The Adventure Water Park, in its completion, will occupy approximately 11 hectares. It will comprise a variety of low to high intensity activities and is estimated to operate for 102 full open days during each calendar year. In addition, it will be open on other occasions for school groups, other community group bookings and special events. Its operation will require significant levels of staffing and these are discussed within the body of the report.

The Adventure Water Park will have two standards of pool water, the main lake and more intensive use public swimming pool water. These also are discussed in detail later in this report.

Figure 4 - Water Park Proposed Layout

The completed park will comprise the following:

1. Reception and ticket booth
2. Shops
3. Toilets and changerooms
4. Café
5. Deck areas
6. Parking
7. General landscaping

8. Low to high intensity activities including
9. Zorb balls
10. Launch slides
11. Tarzan swing and cliff jump pools
12. Cable ski and wakeboarding
13. Flyboard/Jetpack area
14. Inflatable obstacle course
15. Beach areas
16. Wild rapids
17. Walking paths
18. Private Islands
19. Zero depth pool
20. Water slides
21. Grass tube slide
22. Flow rider
23. Zip lines

The revised development Plan, which includes the Holiday Village and Adventure Water Park areas, is shown in Fig. 5.

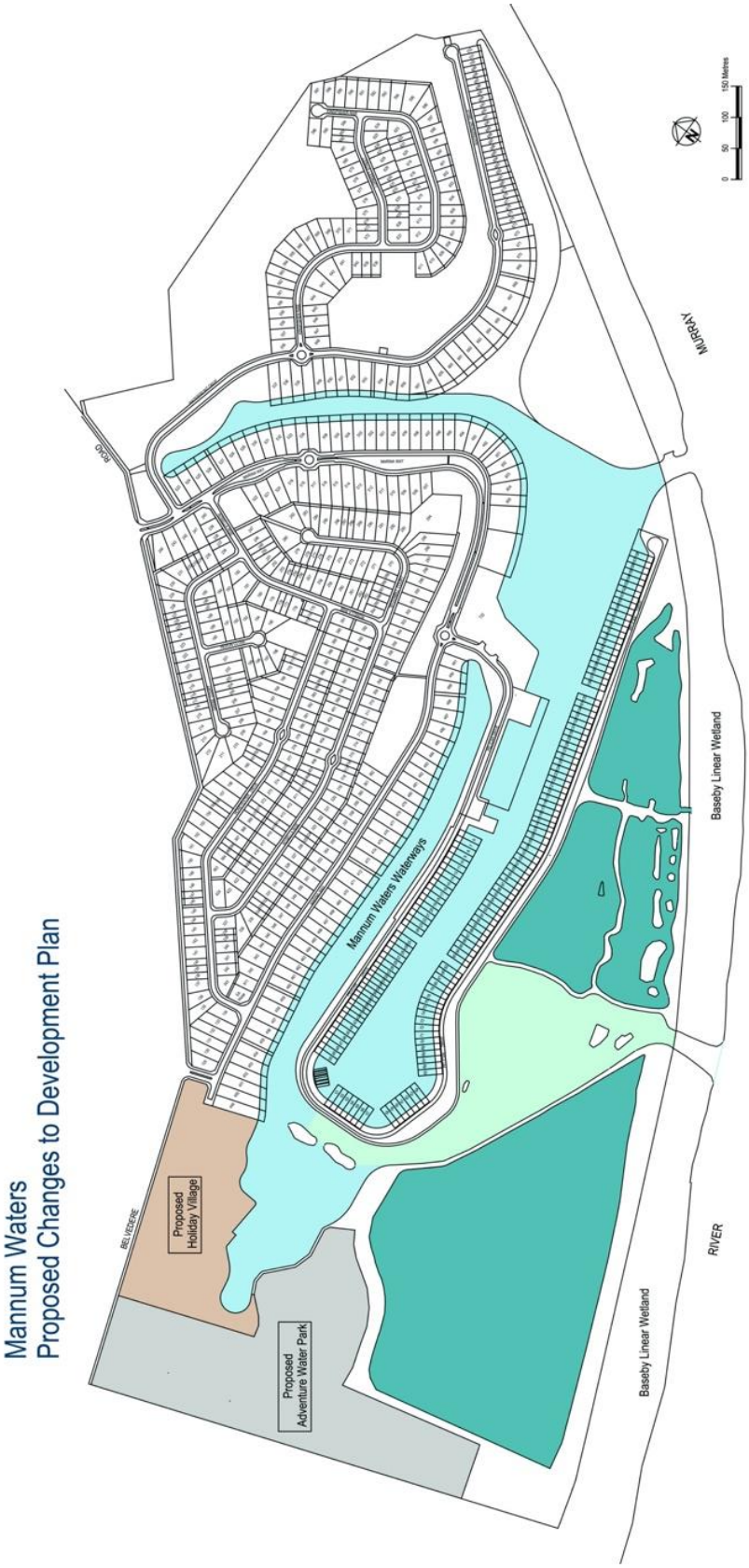


Figure 5 - Revised Development Plan

3 ASSESSMENT OF CRITICAL ISSUES

The Guidelines have established the Critical Assessment requirements, see **Appendix A**. Tallwood has prepared the various assessments strictly in accordance with the outline suggested and addressed each item in turn. Individual consultant reports have been prepared in specialist areas. The Noise, Traffic and Planning consultants' reports have been attached unabridged within the Appendices and referenced within the various assessments as considered appropriate.

3.1 Land Use and Economic Effects

Assessment Requirement 1: The proposal will have an impact on the local and regional economy during construction and operation and may result in immediate and long-term effects on marina residents and surrounding uses.

3.1.1 Identify the main land uses in the area and the level of impact on residents / landowners and land uses in the immediate and surrounding environs during construction and operation.

Fig. 6 shows the principal land uses surrounding the proposed projects. The River Murray and wetlands lie to the south of the two sites with dairy farming occupying the immediate west of the proposed Adventure Water Park. Belvedere Road with dairy farming, horticulture and other farming lie to the north west and the Mannum Waters residential development and marina to the east.

Figure 6- Land uses around the Holiday Village and Adventure Water Park Sites

The two projects will occupy land previously approved for residential and waterway development. They will replace 24 waterfront allotments, 18 standard allotments and 10 affordable allotments. The level of construction required for both the Holiday Village and the Adventure Water Park is similar to that required for residential areas as previously approved.

Based on current experience, waterfront allotments are being used for permanent residence, private holiday homes and holiday rental homes. The occupancy of the residences is estimated at 2.5 per household (an average of 130 residents). As all waterfront homes would have private pontoons, based on current experience, some 20 craft would have operated in the southern waterway from the waterfront houses, with additional jet skis and craft when under rental. The Holiday Village will operate with fewer small powered craft but with an increase in non-powered craft such as canoes, kayaks, pedal boats and small quiet electric driven craft. The majority of boat movement within Mannum Waters including the marina is isolated from the southern waterway and therefore will be prevented from any direct conflict with the Holiday Village boat movement. As further control, all off-river movement is covered by a 4Knot speed limit.

Sonus consultants were engaged to review the noise impacts of the two projects on the existing residential areas and marina at Mannum Waters. The report is included as **Appendix D**. The report's conclusion is as follows:

"An environmental noise assessment has been made of the water park proposed to be located at the south-western end of the Mannum Waters Site.
The noise at the sensitive receivers has been predicted for the proposed water park operation. Based on the predictions, the requirements of the Environment Protection (Noise) Policy 2007 will be achieved at the closest sensitive receivers without any specific acoustic treatment measures.
In addition, the noise from construction will achieve the requirements of the Environment Protection (Noise) Policy 2007 where it is restricted to the hours between 7:00am and 7:00pm, does not occur on a Sunday or public holiday. The development of a Construction Environmental Management Plan will ensure that and all reasonable and practicable measures are taken to minimise noise.
Based on the above, it is considered that the development has been designed and sited to minimise negative impact on existing and potential future land uses and will not detrimentally affect the amenity of the locality, thereby achieving the provisions of the Mid Murray Council Development Plan related to environmental noise. "

All road traffic movement to the proposed projects is via Belvedere Road. No traffic movement is proposed between the two projects and internal roads of Mannum Waters. MFY Consultants were engaged to consider the traffic implications of the two projects. The traffic report is included as **Appendix E**. The report's summary is as follows":

"This assessment has confirmed that the proposed amendments to the Mannum Waters development land uses will have a minimal impact on the adjacent road network.
While additional traffic volumes will be generated when compared to the current zoning of the land, these volumes will not result in capacity or amenity impacts on the adjacent road network. The changes to Belvedere Road that have been implemented since the Mannum Waters development was initially assessed would have reduced the overall traffic demand generated to/from the Mannum township from the subject site. This small volume of

additional traffic that is forecast to be generated as a result of the subject amendment would be more than offset by this previously realised reduction in traffic demand within the township.
The traffic volumes generated to/from Murray Bridge and beyond will be increased, but the existing road network will be able to safely accommodate the forecast movements.
Access to the sites will be able to be safely accommodated in accordance with relevant Standards and guidelines, and consideration of pedestrian connectivity will ensure that appropriate pedestrian facilities can also be provided for the higher demand routes, including between the subject development sites.
Parking associated with the development should be subject to review at the DA stage and should not include provision for parking on Belvedere Road given the high posted speed limit."

3.1.2 Describe the proximity of the proposal to existing and future dwellings and any potential impacts of the proposal on quality of lifestyle

Fig. 7 shows the proximity of residential areas and marina houseboats within Mannum Waters and also the nearest neighbour external to Mannum Waters. No residence is closer than 400m to the major activities within the Adventure Water Park. The separation distances are significant, and the physical barriers are such that there are no visual or other effects that will impact on residential areas and the marina berths.

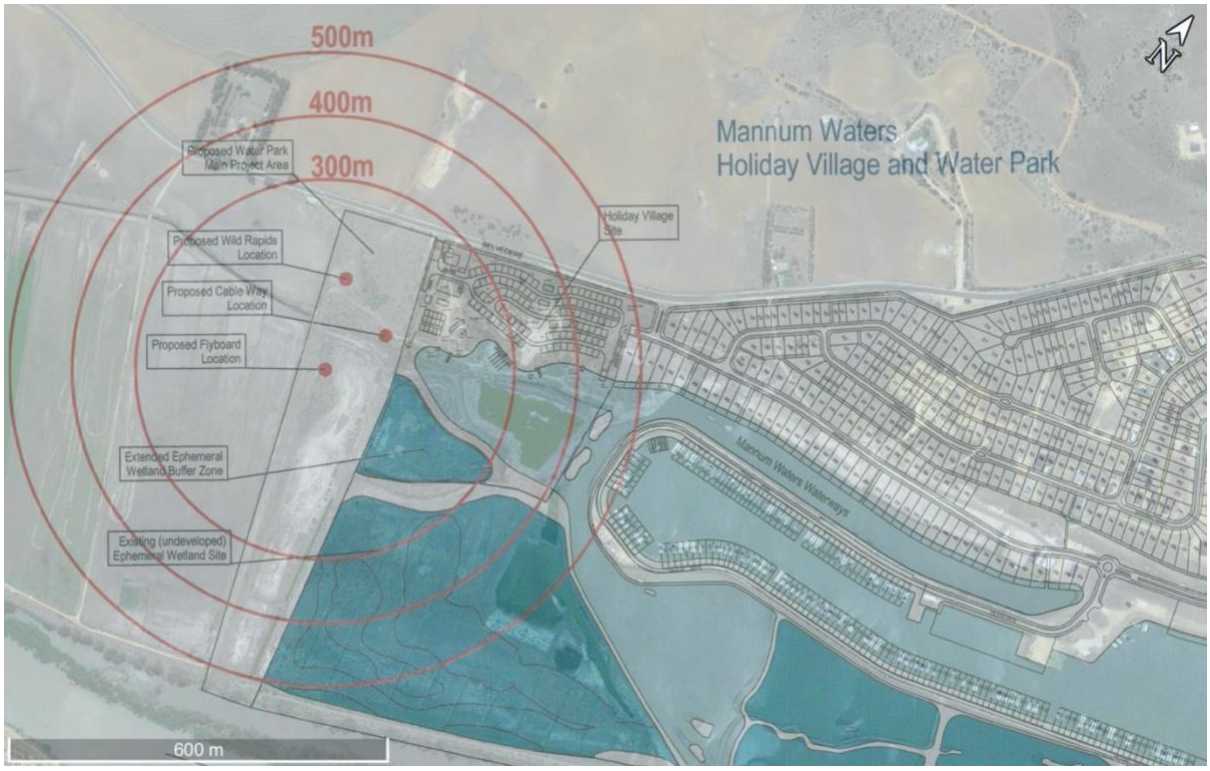


Figure 7 - Distances to Mannum Waters Residential Areas, Marina and Neighbours

3.1.3 Outline any mitigation measures to alleviate or avoid impacts on surrounding residents / landowners and land uses.

This has been addressed in Section 3.1.1 and 3.1.2 above and in the noise and traffic reports, **Appendix D and E** respectively.

As indicated in Section 1.4 above, for construction, amendments to the Mannum Waters CEMMP and an EMIP will be prepared which include measures to minimise impacts.
It is also to be noted that each of the proposed projects will be:

- landscaped effectively
- have boundary screen planting
- be subject to good design
- be isolated from other areas by appropriate distances
- be separated from the marina by a body of water
- be subject to 4Knots limit on waterways
- be no closer to residences than 400m from the major activities within the Adventure Water Park.

3.1.4 Provide a full economic analysis of the proposal including details on the economic effects in terms of the benefits to the existing marina development, the Mannum township and the broader region during the construction and operational phases of the proposed development (including the 'multiplier effect').

The principal economic effects are related to both the construction of the two projects and their on-going operation. Though they replace the development of residential land accompanied by the purchase of allotments and the construction of homes, these are off-set by the construction of various structures and a significant number of cabins and other buildings, together with a much greater attraction of visitors to the area.

The economic principles and employment effects of Mannum Waters were outlined in the original EIS for Mannum Waters. The overall capital expenditure is likely to be similar to that which would have occurred had the original residential area been completed. However, the number of visitors to the two projects and hence to the town and region will be significant. Capital expenditure for the Holiday Village over a construction period of five years is anticipated to be $7m. On-going employment once the Holiday Village is fully functional is estimated at 7 full time equivalent persons.

The Adventure Water Park construction costs are estimated to be $2.6M and providing employment to the equivalent of 15,000 hours during construction over several stages. Once operational, a full day will require 18 persons (team members) for 7 hours per day and 102 days per year. It is anticipated that a smaller number of persons will be required for special events, school outings and corporate hire at other times. The full scope will become more obvious in time.

The projects are each expected to gross between $2M and $4M/annum.

Assuming that capital expenditure of the current residential area is comparable with the construction of the two projects replacing it, the additional economic activity that results from the two projects is a function of increased visitor numbers and the operational employment numbers for the two projects. The bulk of the tourism activity will come from intrastate visitors but the growing overall tourist base at Mannum and that afforded by the nearby Monarto Zoo, The Bend Motorsport Park, and the River Murray Dark Sky project indicates that an expanding interstate client base is likely.

At this stage it is difficult to accurately assess the level of the tourist activity. Conservative assessments for each of the two projects are:

- Holiday Village – 54,000 visitors per annum
- Adventure Water Park – 50,000 visitors per annum

This represents an additional 79,000 visitors to Mannum assuming that 25,000 visitors to the Holiday Village are numbered among the visitors to the Adventure Water Park. This represents a total annual spend of $2.4M on accommodation once the Holiday Village is fully operational and an annual retail expenditure of $5.0M.

Expenditure in the local economy has economic multipliers and represent Value Added and additional jobs. This report adopts the same multipliers as recorded in the original EIS

Sector	Employment multiplier	Value added multiplier ($)
Retail	0.009676	0.738

Table 2 - Murraylands Economic Multipliers

Item	Employment (FTE/y)	Value added ($/y)
Tourist expenditure of $7.4M per year	71	$5.4M

Table 3 - Estimated operational economic impacts

3.1.5 Describe potential employment opportunities and the expected impacts on communities.

The two projects will provide a number of on-going employment opportunities viz:

Operational

Holiday Village (Fully developed)

- Manager
- Assistant Manager
- Relief Manager
- Relief Assistant Manager
- 6 Cleaners – Part time
- Groundsman

Adventure Water Park (Fully developed)

- Manager
- 18 operators – 7hrs/day for 102 days plus special events and corporate bookings.

Community multiplier effects (see 3.1.4 above)

Construction
Each of the two projects are expected to be delivered in stages over a five-year period. During that time the Holiday village is expected to generate 26 full-time one-year equivalent jobs and the Adventure Water Park equivalent to 8 full-time one-year equivalent jobs.

3.1.6 Identify potential economic effects on tourism and recreation.

With the provision of the Adventure Water Park and Holiday Village, Mannum will receive a considerable boost to visitor numbers to the region. This coupled with the already iconic river tour boats, annual events and river water recreational pursuits at Mannum will provide an excellent opportunity to develop Mannum as a prime tourist hub with other significant activities. Visitor numbers and employment predictions have already been expressed in sections 3.1.4 and 3.1.5 and do not need to be expanded here. Suffice to say that expressions of support have been received from the Mid-Murray Council, the local Member of Parliament for Hammond and the Regional Development Australia Murraylands and Riverland.

3.1.7 Identify any economic implications for the region if the proposal does not proceed.

Mannum Waters is becoming a popular destination for water recreation activities. The natural environment enhanced by additional created elements are good foundations for extending the tourist potential of the area. Tallwood has been seeking development opportunities to achieve this outcome. Residential sales have been consistent and steady, but of themselves, will not contribute to a variety of recreational opportunities. There is opportunity at the south-western end of the Mannum Waters site to establish further prospects for recreational activities.

At the present time, Tallwood is achieving approximately five waterfront allotments /year with total land sales less than 10 allotments. This is somewhat skewed as a number of allotments originally sold to investors have been offered for resale and total sales/annum for Mannum Waters is a little higher. With a further 440 allotments still approved for development it would be many, many years before the project can complete all sales. To maintain progress and increase the desirability of the destination, it is necessary to increase the draw of the destination. The Water Park and Holiday Village are seen as viable options to achieve this. They will be particularly effective in bringing new visitors to the area, an encouragement for others to establish holiday homes in the near vicinity and reinforce the infrastructure and services for permanent residents.

The rate of development so far, although consistent and forward progressing is insufficient to allow the extension of the ephemeral wetland areas, public infrastructure (e.g playgrounds), restaurant, shops and offices. It is believed that the development of the Water Park and Holiday Village, viable in their own right, will facilitate additional residential,

commercial and public construction activities and enable a more complete and satisfying destination.

Mannum is a community which needs all the assistance that it can obtain to increase its rate base and local incomes. The two proposed projects will provide a significant boost to employment opportunities through the anticipated construction and commercial activities. The additional economic benefits would be an unfortunate loss to the local community if the projects do not proceed. Many local businesses already testify to the benefits gained from Mannum Waters, with some indicating they would not be still operating without its presence. There is no doubt every activity which increases Mannum Waters and the wider Mannum township as a desirable destination will have a beneficial effect on the region.

As the tourism grows other enterprises will more easily build on the base that is established and growth can be expected to blossom more quickly than could otherwise be anticipated.

3.1.8 Describe the visual effect on the amenity of the local communities, tourism values/experiences and landscape quality (especially the River Murray).

Neither project will have significant visual effect on the landscape quality of the River Murray. Both projects are separated from the river by the Baseby Linear wetland and in the future substantial areas of constructed ephemeral wetlands. At this point in the river, no view of either project will be visible from the river.

Significant landscape design and planting will be included within the proposed Holiday Village and Adventure Water Park.

The Adventure Water Park will occupy an area which includes an old dairy and a large section which was excavated for the originally proposed anabranch. The excavated material from the anabranch area was also used to create the large western boundary levee to protect the adjacent neighbors' dairy flats during extreme flooding. This excavation is now superseded by the second completed outlet to the River Murray which in turn separates the two proposed projects from the rest of Mannum Waters.

At present, the anabranch area is a large extended excavation to approximately minus 1.5m below sea level (see Photo 2) and is ideal for the Water Park activities, wake board circuit etc. If not used in this way it will simply be abandoned, as water allocations will be unaffordable if not supported by commercial opportunities.

The Reception building, other operational buildings and car parks associated with the Adventure Water Park will be situated on land zoned for residential use under the original development approval. It is currently undeveloped with the ruins of the old dairy buildings still in place (see Photo 3). This is currently and eyesore. The surrounding immediately adjacent land was previously under irrigation for agricultural purposes.

Photo 2 - Existing view into the anabranch excavation.

Photo 3 - Old Dairy Ruins

Revegetation is proposed along the Mannum Waters southern boundary, the large created protective levee and throughout the Adventure Water Park area to enhance all of its activities. The Adventure Water Park at its completion will provide a new variety of water activity experiences for South Australia. These will be at all levels of capability providing challenge and enjoyment for all participants.

The Holiday Village will also occupy portion of the old dairy ruins site, the old irrigation area and land zoned residential under the current approval (see Photo 4). It will see the final removal of the old saline drainage channel (see Photo 5).

Photo 4 - Proposed Holiday Village site looking towards the old dairy

Photo 5 - The old saline drainage channel (now isolated)

3.2 Effect on the River Murray

Assessment Requirement 2: The proposed development is located on the floodplain within close proximity of the River Murray, which is an important water resource.

3.2.1 Calculate the amount of water that would be taken from the river to initially fill the constructed waterbodies and on an annual basis to maintain them (i.e. due to evaporation).

3.2.1.1 Final Configuration and Areas

The final configuration of all major water bodies, including the existing and proposed marina waterways, wetlands and the recreational lake is shown on Figure 8. Flow paths, operating levels, water volumes and annual use for the new development and wetlands are outlined in the following sections.

Under Mannum Waters current approval Table 4 shows the combined sizes of the various development areas that were originally proposed. The key water surface areas are highlighted in red. Permanent water surfaces for waterways and wetlands under the original approval amounted to 42.48ha plus riparian areas which were not separately identified. Under the current proposal and redesign of the wetland areas, also shown in Table 4, permanent water surfaces are proposed to be 37.93ha plus riparian areas. By redesigning, reconstructing wetlands and constructing new wetlands which mimic seasonal water level variation, it is possible to reduce permanent water surfaces and manage evaporation water use within the original site approvals.

Fig. 8 – Water Flow Distribution

Table 4 – Summary of Development Area

Items	Area - Original EIS (ha)	Area - New Proposal (ha)
Marina		
Water body	8.28	8.28
Road reserve	3.23	3.23
Residential		
Standard allotments	31.19	29.15
Waterfront allotments	12.52	9.48
Waterfront villa allotments	0.92	0.92
Waterways	15.10	14.95
Road reserves	10.85	10.15
Commercial area	0.68	0.68
Reserves		
Parks	7.91	9.02
Aboriginal heritage areas	1.38	2.85
Golf Course extension	7.01	7.01
Revegetation areas	23.15	16.16
Landscaped embankments	6.53	6.53
Constructed wetlands		
Water bodies	19.10	6.98(1)
Islands and riparian areas	24.55	27.00
Holiday Village		5.33
Holiday Village Water Body		3.60
Adventure Water Park Main Area		6.96
Adventure Water Park Lake		4.12
Total Area	172.40	172.40
Total Permanent Water Surfaces	42.48	37.93

(1) Permanent water within a larger ephemeral wetland area

3.2.1.2 Water exchange and Hydrodynamic Model Results

The Hydrodynamic Model set up for the Mannum Waters Marina Waterways, outlined in the EIS (Appendix I, Vol 2) determined that pumping would be required in addition to natural forcing from river water level variation to ensure a high volume exchange. The modelling determined that the 2 main water transfer stations proposed (WST 1, WST 2, refer Figure 8) would be more than adequate to turn over the 520,000 m^3 of the waterways, requiring a pumping capacity of 690 L/sec.

In addition a third pumping station (WST 3) is also included to circulate water in the creek waterway, requiring a capacity of 60 L/sec.

The configuration of the modelled waterways including the northern waterway, creek waterway, main basin and houseboat marina basin, has not changed and the results of the model remain valid, particularly as turnover is provided by mechanical pumping.

3.2.1.3 Flows to Northern Waterway including Holiday Village Waterbody

After filling, the northern waterways will largely have a unidirectional through flow exchange via water transfer pumping at WSTs 1 and 2. They will all operate at the same level as the River Murray, same as the main basin and marina basin. The River Murray pool level at Mannum is regarded as RL 0.75. Over the last century, the river surface level has normally fluctuated between RL 0.40 and RL 1.20. On three occasions, the level has exceeded RL 2.00 and on only six occasions has it exceeded RL 1.45. This level has been chosen as top of bank for embankments surrounding the waterways to prevent river water entering off-river waterbodies. Above RL 1.45, the River can be assumed to be in flood and as normal movement of the water.

More specifically, details of the Holiday Village Waterbody are shown in Fig. 9. This waterbody replaces a longer but narrower waterbody which served waterfront allotments in the original Major Development approval.

The surface of the revised waterbody is 3.6ha at the pool level of RL 0.75. Based on an evaporation rate of 800mm per year this equates to an annual volume of 28.8ML. The initial fill volume based on a depth of 1.5 m and side slopes of 1 in 5 is 73.8ML. These figures will be verified by certified survey on completion of construction.

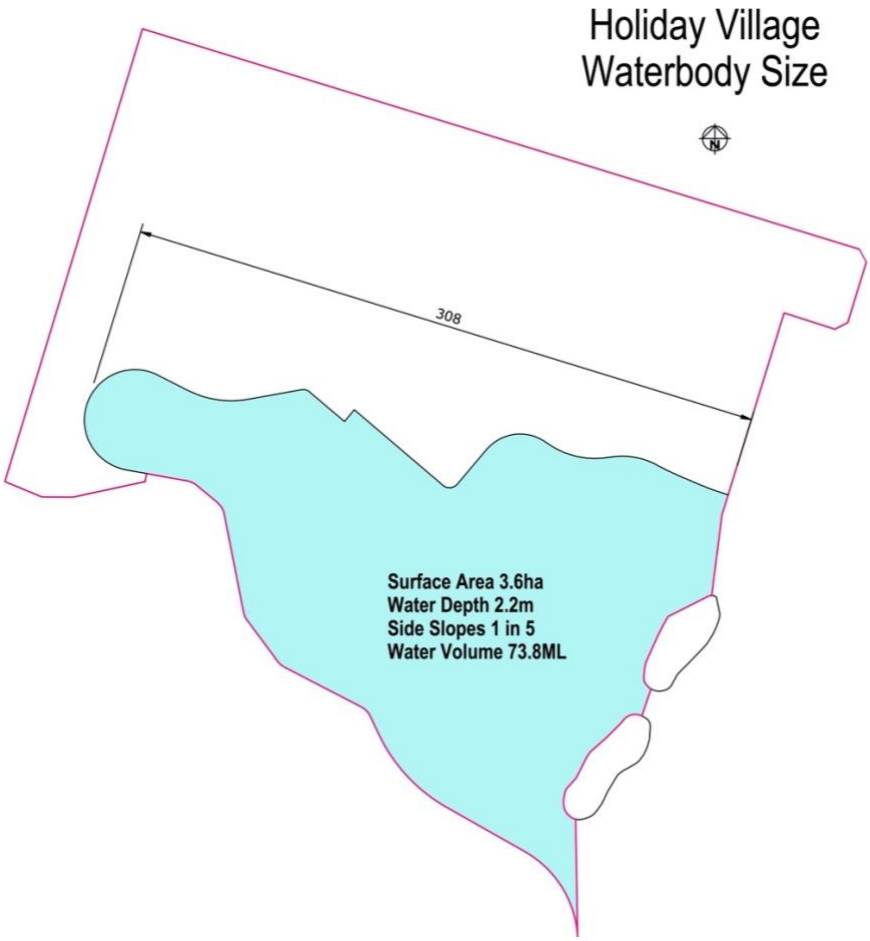


Figure 6 – Holiday Village Waterbody Water Use Details

3.2.1.4 Adventure Water Park Lake

Details of the Adventure Water Park Lake are shown in Fig. 10. This waterbody occupies an area which originally was constructed as an anabranch. The anabranch was superseded by a previous amendment which permitted an alternative outlet to the River Murray. As such the proposed lake actually occupies less area than that originally approved.

Operating Level and Flow Path

The lake will not be connected to the river but will be isolated by embankments. Its surface level will operate at RL 0.20. The Lake will be developed in two stages. At Stage 1 the surface area will be 1.63hectares. Based on an evaporation rate of 800mm per year this equates to an annual volume of 13ML. The initial fill volume based on a depth of 1.5m and side slopes of 1 in 5 is 21.5ML. At Stage 2 the surface area will be an additional 2.49ha and an annual evaporation of 19.9ML for a total of Stages 1 and 2 of 32.9ML. The initial volume of fill for Stage 2 will be 55.4ML. These figures will be verified by certified survey on completion of construction.

Water from the western waterway will be diverted for the lake filling and ongoing water use requirements. This water could be delivered to the lake by either gravity flow, or by

pumping. The preferred option is still to be decided but will likely be pumping. If by gravity flow, the operating level of the lake will need to be always below that of the western waterways, and operate with a surface level at RL 0.20. This is a minimum level of 200mm below the western waterbody and will allow transfer of water from the waterbody to the lake by gravity or by pumping through a culvert (C on Figure 8). If by pumping there is greater flexibility in the operating levels, above 0.2 m AHD. This would also provide greater flexibility with the operating levels of the downstream western wetland basin ponds.

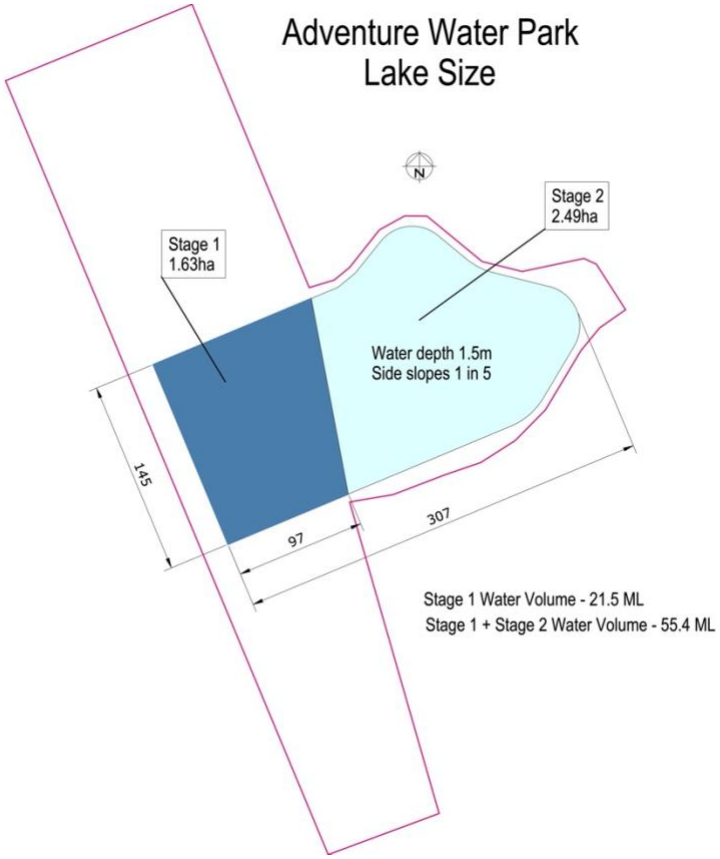


Figure 7 – Adventure Water Park Lake Details

Water Volumes

The basic requirement for the operation of the lake for its intended use is compensate for losses due to evaporation and some seepage to maintain a constant full level, with an average depth of 1.5 m. In addition another basic requirement is to prevent salinity levels in the lake gradually increasing over time. For the Stage 1 and combined Stages 1 and 2 Lakes, the annual water volume pumped into the lake has been modelled and is included in Table 5 below. For this model run an arbitrary 500 mg/L TDS was selected as a maximum desirable salinity increase, which is double that of the input concentration. In reality many aquatic fauna and flora would tolerate much higher concentrations.

As described in Section 6.3 of the EIS, the flats are underlain by clays of the Blanchetown Formation, being described as clays, silts and some light sand. On site they are sediments of

high plasticity of firm to stiff consistency. At around -0.6m AHD, the groundwater under the flats is between -1.6 to - 2.1 m AHD. Seepage rates are very low, and <1 mm/day is assumed.

For the purpose of determining actual water use, both the inflows and outflows will be metered to determine the actual volume lost, mostly to evaporation, which the proponent is liable for.

In practice, a much larger volume would flow through the lake, in order to maintain the western wetland system, which is discussed in Section 3.2.1.5 below. Even without water being diverted to the wetland, increased flows through the lake may be required to maintain general water quality, which is discussed further in Section 3.3

Table 5 : Water Park Lake Water Use

Input Data		
Seepage 1 mm/day	Average river salinity 250 mg/L	Average rainfall salinity 5 mg/L
Stage 1 Lake		
Area 1.63 ha	Depth 1.5 m (1:5 slopes)	Volume 24.5 ML
Stages 1 and 2		
Area 4.12 ha	Depth 1.5 m (1:5 slopes)	Volume 55.4 ML
Modelled output		
Stage 1 Lake (to maintain a full depth of 1.5 m, and to maintain salinities below an arbitrary 500 mg/L)		
Average Annual Input Volume 29.46 ML	Average salinity 488 mg/L	
Stages 1 and 2 Lake (to maintain a full depth of 1.5 m, and to maintain salinities below an arbitrary 500 mg/L)		
Average Annual Input Volume 74.47 ML	Average salinity 483 mg/L	

3.2.1.5 Flows to the Western Wetland Basin

Operating Level and Flow Path

With gravity inflows, the wetland ponds in the western wetland basin will operate at a maximum surface level of RL 0.0. This provides a minimum of 200mm below the Adventure Water Park lake surface and, allowing discharge from the lake to the wetland by gravity (D on Figure 8). Water can also be transferred from the village lake to the wetland (B on Figure 8). During final design, if the option of pumping from the western waterway to the Adventure Water Park lake and from the waterway to the wetland is adopted the operating level of the wetland can be increased.

Within the wetland there are three flow paths through various ponds. At the interior control points, operating water levels in any particular year/season can be varied for the various ponds.

All of the ponds drain to a single sump and outflow from the wetland will be by metered pumping from the sump to the River Murray near the entrance to the western waterway, or to the Baseby Linear Wetland.

Usage within the Western Ephemeral Wetland will be the difference of inflow minus outflow. This will be determined by metering for the inlets (D and B) and outlet.

This wetland and the eastern wetland, while constructed with operating levels between 0.0 – 0.2 m AHD and with deeper areas up to -1.2 m AHD still do not intercept the groundwater table, which is between -1.5 to -2.1 m AHD . Separated by the levee, prior to the wetland development these areas were only wet after rainfall and dried out with evaporation. The rates of seepage are very low (< 1mm/d) and the wetlands will not be partially maintained by River Murray water seepage.

Water Volumes

Both would be generally described as shallow, partly ephemeral system with permanent deeper water areas. Hydrologically, the intent is to mimic the natural water level variations for wetlands enabling the development of a relatively diverse habitat structure and aquatic fauna and flora. Wetlands which have large shallow macrophyte beds, as proposed, as well as deeper pools, generally referred to as marsh pond systems in water quality management, are particularly effective in reducing pollutant loads. The current wetland concept for the western and eastern wetland basins has been developed so that the volume of water required each year for ecological maintenance is within the ELMA water allocation for the site. At this point, the actual volume of ELMA water that is available for the ephemeral wetlands is assumed to be 75ML/annum. For each of the two wetlands combined this is a rolling 5 year average, with alternating relatively wet and dry periods for each of the two wetlands.To assist in the design, a water balance model was constructed to determine, wetland size, configuration and water use. The model takes into account the areas and depths of the individual ponds, rainfall, evaporation and seepage. It allows for the desired hydrological behaviour of the ponds to be an input and determines the water volumes that

have to be pumped to the wetland. For the western wetland the volume when full is approximately 30ML and approximately 40 ML is required on average annually to compensate for evaporation and seepage losses, refer Table 6. However, a flow through is required to prevent increased salinization over time. A flow through of approximately 12 ML results in a salinity increase of between 1000-1100 mg/L TDS, which would be well within the tolerance range of most aquatic species. Salinity measurement will be included in monitoring. As required, flow through rates can be increased by increasing pumping volumes. Increased flow though will not affect water use as this is the volume lost largely by evaporation, and water use is the metered difference between inflows and outflows.

Table 6: Modelled Annual Water Requirement for Western Wetland

Depth (m)	Incr. Area	Cum. Area	Volume (ML)
1.20	3.46	6.92	30.43
0.90	2.08	3.46	14.86
0.50	0.69	1.38	5.18
0.00	0.69	0.69	0.00
(m)	(ha)	(ha)	(ML)

Target Depth (m)	Month
0.4	January
0.4	February
0.4	March
0.4	April
0.6	May
1.2	June
1.2	July
1.2	August
1.0	September
0.8	October
0.6	November
0.4	December

Cell 2 Annual River Draw ML	Average Annual Dilution Flows (Through Flow) ML	Average Annual Salinity (mg/L) With Dilution Flows
51.14	11.83	1064

3.2.1.6 Eastern Wetland Basin

Operating Level and Flow Path

At the present time, in the eastern wetland basin, pond A operates at River Murray pool level, the same as the marina and waterways. Ponds B and C have currently been isolated from river and River Murray water no longer has access to these two ponds.

As originally intended in the EIS, the operating level of all Ponds A, B and C will be readjusted to below river level, in this case RL 0.2. This will enable the wetland to have more efficient water use to be within the ELMA allocation, increase habitat diversity and develop those wetland characteristics which facilitate more effective and sustainable water quality improvement, which is discussed further in section 3.2.6 below. Water will be diverted to the eastern wetlands by gravity flow from the outflow culvert for the houseboat marina basin by pipe (A on Figure 6, also WST 2 location) and also can receive water direct from the western waterway (E on Figure 6). Inlet flows will be metered. Outflow from the wetland will be by metered pumping from the wetland to the River Murray near the entrance to the western waterway, or to the Baseby Linear Wetland.

The wetlands will be isolated from the river by embankments at RL 1.45.

Water Volumes

For the eastern wetland, the volume of the wetland when full is approximately 23.2 ML and approximately 36.5 ML is required on average annually to compensate for evaporation and seepage losses, refer Table 7.

Table 7: Modelled Annual Water Requirement for Eastern Wetland

Depth (m)	Incr. Area	Cum. Area	Volume (ML)
0.00	0.00	0.00	0.00
1.20	2.68	5.29	23.19
0.90	1.49	2.61	11.34
0.50	0.69	1.12	3.88
0.00	0.43	0.43	0.00
(m)	(ha)	(ha)	(ML)

Target Depth (m)	Month
0.4	January
0.4	February
0.4	March
0.4	April
0.6	May
1.2	June
1.2	July
1.2	August
1.0	September
0.8	October
0.6	November
0.4	December

Annual River Draw ML	Average Annual Dilution Flows (Through Flow) ML	Average Annual Salinity (mg/L) With Dilution Flows
44.09	10.37	1059

Similarly to the western wetland, average annual water use requirement is approximately 34 ML with a flow through of approximately 10 ML.

3.2.1.7 Flows to Baseby Linear Wetland

As part of the Mannum Waters project there is no requirement for water flows to the Baseby Linear Wetland. However, as indicated in Section 2.2.6 below, the provision of water during times of drought or very low river flows will help sustain the wetland. As indicated above, the average annual volume could be approximately 12 ML to the Western section of the Baseby Linear Wetland and approximately 10.4 ML to the eastern section. During restrictions when wetland requirements are reduced, the need for flow through for the recreational lake remains. Water for the Baseby would still be available. Decisions to direct flow through water to the Baseby would be made at the time in consultation with relevant agencies.

3.2.2 Outline the arrangements for securing a water allocation for the filling and maintenance of water levels in the waterbodies, including the location where the allocation could be sourced from.

During the construction of Mannum Waters, water has been secured on the open market for waterbodies and through ELMA allocations for the control of salinity by flood irrigation to wetland areas. Tallwood Pty Ltd holds the following Water Licence approvals:

- Site Use approval – No.189156
- Water Resource Works Approval – No.189155
- Water Account No. SA195814-0-10009 (original), now SA195814-0-170018
- ELMA Water Account No. SA131297-1-10012 (original), now SA131297-1-170020

Water on the open market can be bought as temporary water or permanent water all year through water brokerage. To date, Tallwood has purchased all its requirements through the temporary market. Under its Deed with the Mid-Murray Council all waterways presently constructed are no longer under Tallwood's obligations and are being attended to in accordance with the Deed. The additional permanent water Adventure Water Park Lake will be the responsibility of the developer. Filling will be undertaken through the purchase of temporary water and on-going evaporation by the purchase of a combination of temporary and permanent water.

The basis for calculation of filling and evaporation losses is well understood by the proponent. To date this has been covered by Tallwood's purchase of temporary water for newly excavated areas, all within the original floodplain. On-going evaporation losses have been met by Tallwood's purchase of temporary water for waterbodies until the ownership of the waterbodies passed into the responsibility of Mid Murray Council. The details of this arrangement are covered by the Council Deed and outlined below. This is an area of dispute between Tallwood and DEW over the last ten years and is not unique to the current Amended EIS.

At the time of the original EIS (2008), Fig 11.3 – Water balance post-development (average year), the annual evaporation losses from the marina and waterways was 400.16ML of which 69.03ML was estimated as ephemeral. Hence under the original proposal, permanent water losses were approved at 331.13ML, which is some 27.69ML more than required under the current amendment. The proposed water usage quantity should not therefore be an issue in this current approval.

The Council Deed was established by joint agreement between the Mid Murray Council and Tallwood Pty Ltd (see attached), negotiated over the period 2009-2012. It was prepared by Council lawyers and signed by the Mayor and CEO and Tallwood Directors in 2012. The relevant clauses (Sections 18 and 19) are as follows:

> *18. DECLARATION OF SEPARATE RATE*
>
> *18.1 Tallwood acknowledges that it is intended that the Council will impose one or more separate rates pursuant to section 154 of the Local Government Act 1999 (SA) for the purposes of recovering the cost of the ongoing operation, repair and replacement of the Additional Infrastructure for which the Council has accepted responsibility. The rate will also cover the internal costs incurred by the Council in operating, repairing and monitoring the Additional Infrastructure and water quality and quantity. It will also include the cost of acquiring the necessary water to maintain the appropriate level of water within the Waterbody.*
>
> *18.2 The Council will base its rate on the expected costs and expenses as identified in the Capital Works plan and Operational Cost Schedule together with such other information as the Council may have regarding the expected costs of carrying out the operations and maintenance as described in this clause. The level of the rate may vary between Commercial Waterfront Allotments, Waterfront Allotments, other residential Allotments, Community Titles and Allotments on which there is constructed affordable housing.*

18.3 During the Maintenance Period Tallwood shall be entitled to be reimbursed 105% of the costs incurred by Tallwood in providing for the operation and maintenance of the Additional Infrastructure that is to ultimately vest in the Council subject to:

18.3.1 the cost being limited to the agreed amount allocated in the Operational Cost Schedule for the provision of the operation and maintenance of such Additional Infrastructure; and

18.3.2 that Tallwood has submitted a claim for reimbursement to the Council in writing and that such claim shall include evidence of the incurring of the cost claimed including copies of receipts and such other information as the Council may reasonably require in order to enable the Council to verify Tallwood's claim.

19. WATER LICENCES AND ALLOCATIONS

19.1 The Council will, prior to the expiry of the Maintenance Period, use reasonable endeavours to obtain its own water licence pursuant to section 124 of the National Resources Management Act 2004 (SA).

19.2 Upon expiry of the Maintenance Period, Tallwood shall take all necessary steps to enable the water allocations held by it to be transferred to the Council at no cost to the Council.

19.3 The costs of preparation of all necessary documents and other costs incurred in transferring such allocation to the Council shall be borne by Tallwood.

Regarding the Adventure Water Park, the filling and maintaining of water levels within the Lake are an integral part of the operations of the park which could not operate successfully without them. A letter of acknowledgement that LANDN Pty Ltd understands its obligation to purchase water if the park proceeds is attached.

In regard to the use of ELMA water, Tallwood's allocation was originally 127.356ML. Distributed evenly over an area, on the basis of a loss of 800mm/year, meant that it could cover an area of 15.92ha (flood irrigation). Tallwood has assumed that this covered the water use for wetland development because it counteracted saline groundwater below the floodplain, extended the wetlands with all their usefulness and enhanced the habitat over the old site and used it accordingly. The department has known of this use since 2013. Knowing that the ELMA quantities were under review, Tallwood's new wetland designs opted for a revised allocation nearer its best guess of the likely outcome viz. 75ML. This situation is not unique to the Amended EIS and applies to the current Mannum Water approval also. It should be treated independently of the Amended EIS.

3.2.3 Describe how the development could affect the water resource values and users of the River Murray, particularly downstream water supply intakes.

The Holiday Village waterbody replaces a similar waterbody previously approved. It lies over half a kilometre from the river entrance and although the Holiday Village will likely have more human interaction than the waterfront homes it replaces, boating traffic will be less of power craft and more passive craft (canoes etc). The holiday village will have no greater effect on the water resource values and users of the River Murray than that already approved. As discussed previously in Section 2.4.1, particular points to note are:

- The domestic toilet and other liquid waste are treated in the Mannum WWTP.
- Water sensitive urban design features are to be incorporated in the detailed design, including rainwater tanks, swales etc. From a sanitary perspective the risk to water quality is low and importantly the large permanent wetland provides a substantial safeguard.

The Adventure Water Park lake is situated off-river with controlled flows to and from it. Also as outlined previously in Section 2.4.1, the risk of water quality impairment is very low from a sanitary perspective, again because:

- The domestic toilet and other liquid waste are treated in the Mannum WWTP.
- Water sensitive urban design features are to be incorporated in the detailed design, including rainwater tanks, swales etc. minimising any stormwater runoff.
- Outward flow will be to the western ephemeral wetland which in turn is also situated off-river, with controlled outflow to the Baseby Linear wetland before return to the river.

This level of protection will ensure that Lake discharges will have no detrimental effect on the water resources values and users of the River Murray.

3.2.4 Outline the visual effects from the River Murray and environs of the proposed development in this locality, especially the appearance and built form of buildings and structures.

Structures associated with each proposed project are low key, mostly single storey, and approximately three quarters of a kilometre from the river. Each site is completely obscured from the river by the existing vegetation in the intervening Baseby Linear Wetland and Crown Land. Photo 6 gives a sense of the density of screening. It is looking towards the River Murray from the constructed Eastern Wetlands. This is typical along the entire boundary of Mannum Waters where it adjoins the Crown Land along the River Murray.

Photo 6 – View towards the River Murray along the Mannum Waters boundary

3.2.5 Describe the effect of the proposed development on riverine environment, especially as a result of any discharges from the waterbodies and by increased human activity.

As discussed in 2.3 above, the developments will not adversely affect water quality. It is not anticipated to have any detrimental effect on the riverine environment. There will, however, be an increase in human activity from the Holiday Village whereas the Adventure Water Park activities will be wholly contained within its site. The area adjacent to Mannum Waters has already been accepted as an area particularly suited to water recreation and wetland areas are being established to ultimately provide walking trails of significant environmental value. Activities from the Holiday Village will include the opportunities for passive recreation through canoeing, walking, fishing etc. Powered craft will be limited to 4 knots while travelling to the river and only at the river will higher speeds be legal. These activities are already occurring and are considered appropriate recreational pursuits in this location.

3.2.6 Describe any effects of the proposed development on the biological diversity and conservation significance of the Baseby Levee Wetland system.

The proposed developments should not have any adverse effect on the Baseby linear Wetland, which was described in the previous Mannum Waters EIS volume 1, as having a moderate to high conservation status because of its habitat diversity. The design layout of the Mannum Waters Development assisted in protecting the linear wetland and the OEMMP included a wetland management plan which defines measures for the protection of the linear wetland. The constructed wetlands have already been recognised and approved as a significant addition to the Baseby Linear Wetland System. With the new proposed developments, the level of protection remains essentially the same.

In this regard it is important to note that:

- The developments are physically separated from the linear wetland, by approximately 500m (refer Figure 6) and barrier provided by the waterways, ephemeral wetland and revegetation areas.
- Public access is controlled through:
  - Providing pathways for directed passive recreation within the ephemeral wetland areas.
  - Using prickly vegetation, for example *Lignin,* as a barrier to control access, particularly along the linear wetland landward boundary. The old existing levee at the boundary to the Crown Land will be modified as some of the material will be used in the wetland development for landscaping, but this will be followed by extensive planting of endemic species as already undertaken along the Eastern Wetlands.
  - The use of fencing and signage.
  - There will be no public vehicular access.

An important aspect of the management plan is weed control. Although it is crown land, Tallwood has been involved in weed control in the Baseby Linear Wetland, as well as on the land to be developed for the ephemeral wetland. There were previously extensive infestations of mature African Boxthorn plants along the levee and throughout the linear Wetland and there had been no previous control activities undertaken. In some locations, boxthorn was the dominant understorey shrub. A Boxthorn Control and Management Plan was prepared, in association with the SA MDBNRM Board. Control activities started in April/May 2009 and have continued since, refer Photo 7.

Photo 7 - Boxthorn eradication program

The ephemeral wetlands, as indicated in 2.3.4, will enhance the Baseby Linear Wetland by increasing the extent of wetland habitat and through the various depths, wetland configuration seasonal inundation patterns (including wet-dry year cycles) and the range of aquatic, riparian and terrestrial flora increase habitat diversity.

An important environmental benefit is the intent to pump ephemeral wetland flow-through water into the Baseby Linear Wetland. This will provide water for the Baseby during times of drought, helping to maintain flora and being a refugia for some native fauna. The benefit is illustrated by the impact of a drought which caused the wetland to completely dry out over 2007-2009. During this period there was significant deterioration. Virtually all of the aquatic vegetation disappeared. Some of the tall old redgums died and the wetland undergrowth was dominated by weeds, such as Spear Thistle.

Spear thistle formed thickets in some of the ponds but were successfully sprayed, refer Photos 8 and 9. In addition throughout the linear wetland extensive thickets of River Red Gum saplings germinated, refer Photo 10. These all died once river levels increased and are gradually decaying. It is only in recent years that the wetland is recovering to be similar to its previous condition. The water from the Mannum Waters wetlands will assist in preventing this extreme condition, but the Baseby will still be subject to the more typical range in river levels.

As described in Section 3.2.1, the operating levels of both the western and eastern wetlands will be below river level, and will not intersect the groundwater table, refer Section 3.4.1. Also as described earlier, the western wetland will receive flow inputs from the recreational lake and may also receive flows from the Holiday Village water body. Due to the adoption of WSUD measures as proposed, pollution risk is small. There are no other inputs into the waterbodies, and quality will be generally the same as that of the River Murray. The wetland will have a long residence time, measured in months in the winter, depending on flow through. With the extent of marshland swathes, and high water sediment interaction, high rates of nutrient removal, reductions in turbidities and suspended solids etc., will occur through various biological and physico-chemical processes. Wetlands with relatively extensive marsh (shallow emergent macrophyte areas, 30-50% of total wet area) can have removal rates of >80 for nutrients and metals and suspended solids. As most pollutants in stormwater are associated with particulate matter, the vegetation and the associated filamentous algal mats attached to stems and leaves, greatly accelerates removal from the water column by acting as a filter, through coagulation and absorption on biofilms, and by nutrient plant uptake. Particularly with the longer residence times, even the finer colloidal materials can be reduced. Because of the large plant biomass in wetlands with large marsh areas, particularly algal mats, algal blooms of planktonic species are also much less likely to occur.

Photo 8 - Spear Thistle growing in the drying Baseby Linear Wetland (October 2007)

Photo 9 - Dead Spear Thistle within the Baseby Linear Wetland (August 2008)

Photo 10 - River Red Gum saplings within the Baseby Linear Wetland (May 2009)

3.2.7 Describe the general impact of increased recreational activities, including pollutant loads and noise.

The impact of recreational activities on noise has been researched by Sonus as outlined in Section 3.1.1. They have stated:

"Based on the above, it is considered that the development has been designed and sited to minimise negative impact on existing and potential future land uses and will not detrimentally affect the amenity of the locality, thereby achieving the provisions of the Mid Murray Council Development Plan related to environmental noise. "

Monitoring of Mannum Waters waterways, to be discussed later, shows a remarkable consistency in the quality of water within Mannum Waters as measured by salinity and pH with that compared to that in the River Murray as measured by SA Water. Fluctuations due to wind, river level manipulations and boating yield this consistency. It is anticipated that this will continue in regard to the Holiday Village waterbody. As discussed in Section 3.3, activities in the proposed developments will have a low risk of any pollution impacts. Similar practices of stormwater discharge control, riparian edges, building distance from the water's edge as already employed at Mannum Waters will be implemented.

3.2.8 Describe how the constructed water bodies would be managed during times of manipulated high and low river levels.

The Adventure Park Lake and constructed wetlands are separated by levee banks at 1.45 m AHD, so are above the normal operating levels of the r, which the Department of the Environment have indicated in their publication "Barrage and Water Level Management

Policy" Version 17 June 2019, will be +0.5 metres to +0.85 metres AHD (which is 0.95 m AHD at Mannum) as managed at the Lower Lakes Barrages. As outlined in 3.2.1 the operating levels of these waterbodies being below these levels and can be supplied by gravity flow through adjustable inlets or by pumping. Variable water levels in the river will not affect the operation of these waterbodies.

The main marina waterways, village lake and permanent wetland will operate at river level, but because of their design depths, 2-2.5 m, they will always have water for recreational activities and navigation.

3.2.9 Detail the measures to protect the river and wetlands during and after construction.

Both for the Adventure Water Park and the Holiday Village a Construction Environmental Management and Monitoring Plan (CEMMP) will be prepared at the development Application stage as an amendment to the Mannum Waters CEMMP.

It is important to note that for construction a major safeguard already exists. Tallwood has created a temporary embankment which separates the two proposed sites from direct contact with river water. All work on the Holiday Village and its waterway will be constructed behind the barrier. Once the waterway has been completed the temporary embankment will be removed from behind a silt curtain. This is a similar practice to that already undertaken successfully within the Mannum Waters waterways and at the entranceways to the river. Once constructed, the Holiday Village Lake will behave similarly to other waterways already existing at Mannum Waters. An Operational Environmental Management and Monitoring Plan (OEMMP) was prepared, which included the management and protection of all waterways and wetlands. This will be amended to include the Holiday Village Lake at the time of the Development Application.

Similarly, the Adventure Water Park Lake will have no direct contact with the river. It will be constructed within the old anabranch embankments which are already in place.

Section 3.2.6 above has outlined some of the measures that will help protect the Baseby Linear Wetland.

3.2.10 Describe how public access to the river front would be managed.

The river front will be separated from the Holiday Village site by Crown land, newly constructed ephemeral wetlands and enclosing embankments. Access by land from the Holiday Village will be by walking trail only and no vehicular access other than for maintenance vehicles will be available to the public. Boating access to the river front will be via waterways which will have the same accessibility as normal river traffic to the Crown Land.

Entry to the wetlands will be via the Holiday Village and controlled by the Holiday Village operator together with appropriate environmental signage. Recreational activities on the land will be passive recreation. The Baseby Linear Wetland provides a barrier for the entire length of the Mannum Waters site for pedestrian access to the river front apart from the

two river entries to Mannum Waters waterways. Also, as mentioned in 3.2.6 above, access into the Baseby Linear Wetland will be controlled by dense plantings of prickly vegetation, fencing and signage as appropriate. There will be no vehicular or pedestrian access available from the Adventure Water Park to the river front.

3.3 Water Quality

Assessment Requirement 3: Suitable water quality maintained within the constructed waterbodies for recreational uses and to protect the environment.

3.3.1 Outline measures to protect and maintain suitable water quality in the proposed water bodies, particularly the management of run-off and salinity and the control of sediment, micro-organism and pollutant sources (including nutrients, herbicides, pesticides and any chemical treatments).

As outlined in Section 3.2.1, for the Holiday Village waterbody and Adventure Water Park Lake, water quality will initially be that of the River Murray. Consistent with the NHMRC (2008) guidelines, for the Holiday Village and Adventure Water Park, a preventative approach is adopted. Potential water quality impairment is prevented or greatly minimised as a result of:

- **Holiday Village**

  - The treatment of all wastewaters in Mannum WWTP
  - Although still subject to detailed design, the same standard of stormwater treatment will be required as for the existing Mannum Waters development, which adopted the recommendations of the Stormwater Industry Association (Argue 2004). The developments will include water sensitive urban design measures, both to minimise mains water use and stormwater runoff, including:
    - Rainwater tanks on all buildings to harvest and reuse water;
    - Incorporating drainage grass swales, reducing flow rate, and increase infiltration, which will aid landscaping by reducing watering requirements, and
    - The use of GPTs, which can treat up to 90% of flows, reducing gross pollutants and suspended solids. These will be used to treat runoff from hard surfaces.

    The Holiday Village replaces residential development and will not result in an increase in the volume of stormwater runoff. Building setbacks from the waterbody will be maintained at 19metres as for waterfront properties and riparian edges will be provided wherever possible along the frontage of the Holiday Village waterbody.

- The development will be subject to the OEMMP to ensure longer-term adequate environmental management, which also includes:
  - Stormwater Management Plan;
  - Waste Management Plan, and
  - Spill Management Plan.

As a result of these measures, from a sanitary perspective, as there are no effluent or untreated stormwater discharges, the risk of contamination is very low.

- **Recreational Water Park**

- The treatment of all wastewaters in Mannum WWTP
- Similar to the Holiday Village, the project will include WSUD measures, and as per the recommendations of the Stormwater Industry Association (Argue 2004), there will be no untreated discharges to the recreational lake. Water for the lake comes from pumping from the western waterways.

  Within the Water Park, only a relatively small area (approx. 5%) is sealed, so the volume of any runoff will be small. The car park may be porous, such as using quarry rubble. The majority of the sealed areas or relatively impervious areas will be the pathways, largely for pedestrians and maintenance vehicles. Potential pollution loads will be relatively low, compared to runoff from typical urban areas with larger volumes of traffic and commercial and industrial areas. Except in infrequent larger events, most runoff will not reach any waterbodies. All open areas in the adventure park will be extensively vegetated and landscaped so there will be no bare areas.

  Except for the lake, all water used for the various water activities in the Adventure Water Park will be mains water. The proponent will adhere to the requirements of the Australian Public Health (general) Regulations 2013. All pools and waterslide pool water quality will be monitored and maintained by a trained Aquatic Technical Operator that will be employed and on call with the relevant qualifications, who will:

  - SISCAQU001 - Test pool water quality
  - SISCAQU005 - Develop and implement Aquatic Facility maintenance Procedures
  - SISCAQU003 - Develop and implement Pool Water Maintenance procedures
  - BSBRSK401 - Identify Risk and Apply Risk Management Processes

  Pool water quality will be monitored and kept at the standard set out in Standards for the Operation of Swimming Pools and Spa Pools 2013 as shown in Tables extracted from the Standard and will be Mains Water that will be treated and disinfected with chlorine.

  Water quality regulating systems will be adjusted and updated as the Adventure Water Park attendees grow. All water in the pools will pass through the filter as often as necessary to ensure that the water is maintained in a clean and clear condition and in any event a volume equivalent to the total volume of the pool at least once in every six hours for a swimming pool, once every hour for a waterslide pool and once every two hours for a wading pool as mentioned below.

10. Tables

Table 1

Swimming pools, wading pools and waterslides disinfected with chlorine

Pool water temperature	pH	Total alkalinity mg/L	Unstabilised pool water mg/L		Stabilised pool water mg/L		
	Min – Max	Min – Max	Minimum free chlorine *	Maximum total chlorine *	Minimum free chlorine *	Maximum total chlorine *	Min – Max cyanuric acid
≤ 26° C	7.2 – 7.6	60 – 200**	1.0	Free chlorine as measured +1.0	2.0	Free chlorine as measured +1.0	30 – 50
> 26° C	7.2 – 7.6	60 – 200**	2.0	Free chlorine as measured +1.0	4.0	Free chlorine as measured +1.0	30 – 50
* Disinfection values							
** If gaseous chlorine is used the total alkalinity value should be in the range 150 – 200 mg/L							
NOTE: Stabilisers must not be used in indoor swimming pools, wading pools or waterslides							

Table 8

Swimming pool, spa pool, hydrotherapy pool and waterslide characteristics

Characteristics	Range: Min – Max	Comments	
pH	7.2 – 7.6	If pH is below 7.2, there is the possibility of: - eye discomfort due to accelerated formation of chloramines - rapid loss of chlorine - etching of exposed cement finished pools, and - corrosion of metals	If pH is above 7.6, there is the possibility of: - reduction of chlorine disinfection efficiency - increased chlorine requirement - eye discomfort - drying of skin - cloudy water - scale formation
Total alkalinity when disinfected with: - calcium hypochlorite - sodium hypochlorite - salt chlorinator - gaseous chlorine - BCDMH bromine	 60 – 200mg/L 60 – 200mg/L 60 – 200mg/L 150 – 200mg/L 150 – 200mg/L	If total alkalinity is below 60, there is the possibility of: - pH fluctuation due to weak buffering effect - corrosion of metals	If total alkalinity is above 200 there is the possibility of: - high pH - cloudy water - scale formation
Stabiliser (outdoor pools only) cyanuric acid	30 – 50mg/L	If stabiliser value is below 30 the chlorine residual is rapidly destroyed by sunlight	If stabiliser value is above 50 the time to destroy pathogenic organisms becomes unacceptably long
Pool water turnover rate	≤ 6 hours for swimming pools ≤ 1/2 hour for spa pools ≤ 1 hour for waterslides ≤ 2 hours for wading pools or hydrotherapy pools		
Temperature	Swimming pools and waterslides – 28° C max Spa pools – 40° C max Ideal 35° - 37° C Hydrotherapy pools – Ideal 28° - 35° C	If the temperature is too low, bathers may experience discomfort	If the temperature is too high there is the possibility of: - increased use of chlorine - bather discomfort - increased evaporation - increased scaling potential
NOTE: Stabilisers must not be used in indoor swimming pools, hydrotherapy pools, spa pools or waterslides			

All pools and lakes will be designed with water conservation and the protection water quality at the forefront of planning, to minimise loss of water and restrict external water contaminants from entering the waterways. This is clearly in the interests of the development to ensure its success and viability. The capturing of water splash and water transfer from pool users will also be integrated into design.

The Guideline for the Inspection and Maintenance of Swimming Pools and Spa Pools will be used in conjunction with professionals when designing the operating systems to monitor water quality.

All water activities will be supervised by trained Pool Lifeguards employed and onsite daily with the below qualifications as minimum:

- SISCAQU002 - Perform basic Water rescues
- SISCAQU006 - Supervise Clients in Aquatic Locations
- SISCAQU007 - Perform Advanced Water Rescues
- PUAEME001B - Provide Emergency Care
- PUAEME003C - Administer Oxygen in an emergency Situation

3.3.2 Detail how sufficient water turn-over rates and flushing will be achieved for the waterbodies, especially through the use of modelling for the main recreational lake. Integration with the current management of waterbodies and wetlands should also be detailed.

For the Adventure Park Lake and western wetland all flows will be by gravitation or pumping into them and by pumping from the outflow sump as outlined earlier in 3.2.1.5. The volume of flow through is determined by the pumping rate. The volume of the lake is approximately 55.4 ML when full. To maintain these levels and to compensate for some seepage (assume 1mm/day) and evaporation would require, after initial filling, a maintenance annual inflow of approximately 33 ML/annum. However, an additional flow through is also required to maintain salinity levels. Assuming an inflow concentration of 250 mg/L TDS (approximately the current River Murray concentration), to maintain average annual concentrations in outflows to <500 mg/L TDS, requires a modelled flow through of approximately 74.5 ML/annum as indicated in Section 3.1.2.4. This will result in an approximate 150% lake water exchange. Most of this flow through will likely be in the wetter winter months. This water comes from the waterbody adjacent the Holiday Village, pumped through culvert C. This culvert is located at the western end of the waterbody, and its volume being approximately 73.8 ML, which has about the same volume as the Lake, provides a regular flushing by this mechanism alone, without the additional exchange by natural forcing (particularly river water level variation) and pumping at WST 1.

Flow though can be increased and for the recreational lake will not affect water use, which is determined by evaporation. It is intended that water quality in the lake be monitored, the analyses, sample locations, frequency and reporting determined in consultation with relevant agencies. The need for increased flows will be based on monitoring results.

Outflows from the lake will flow into the Western Wetland. This wetland also requires an inflow and flow through compensating for some seepage and evaporation, and to prevent salinization, will require a constant inflow each year. The required water use of the wetland is approximately 40 ML/annum. This together with that of the eastern wetland totals the target 75ML/annum.

The flow though from the recreational lake provides inflow to the wetland. The wetland can also receive additional water through culvert B, direct from the holiday Village waterbody. Again this does not affect wetland water use as inputs and output is metered. Any additional flows would be used in wetland management and for reducing salinity levels for flows into the Baseby Linear Wetland. As indicated in section 3.1.2.5, the annual water

requirement is for approximately 40 ML, but to maintain salinity between 1000-100 mg/L TDS requires a total inflow of approximately 52 ML. With a volume of 30 ML when full, this annual flow will provide a flushing flow, but with a very long residence time measured in months for water quality improvement. Flows could be increased, and would depend on monitoring.

3.3.3 Outline measures to protect and maintain suitable water quality in the existing waterways and constructed wetlands (including current management and monitoring).

Water quality in the Mannum Waters waterways is essentially that of the River Murray. A major design objective of the Mannum Waters development was to ensure that there was no impairment of this water quality in the waterways and that water quality in the River Murray was protected from any activities in the developments. An objective of the longer-term Operational Environmental Management and Monitoring Plan (OEMMP) was to ensure that this remains the case. With the proposed Adventure Water Park and Holiday Village, in regard to water quality, the requirements would be:

Adventure Water Park:

- No adverse impact on water quality in the marina waterways.
- No adverse impact on water quality in the River Murray.
- Water quality in the Adventure Water Park, including the main lake is suitable for contact recreation.
- Water quality in the main lake is protected from any adverse impact from activities within the marina waterways.

Holiday Village:

- No adverse impact on water quality in the marina waterways.
- No adverse impact on water quality in the river Murray

With regard to recreational use, the main water quality issues would be;

- Because of the high turbidities of River Murray water, the protection of users from submerged hazards, such as logs, rocks etc.
- The potential for contamination by faecal pathogenic microorganisms.
- Nutrient enrichment and the potential for algal blooms, particularly of blue-green algae.
- The general aesthetic appearance of the water bodies, being free of debris, oils etc.

Photo 1 - View of Mannum Waters Waterbodies and Wetlands

The NHMRC (2008) Guidelines for Managing Risk in Recreational Waters outlines the approach in classifying suitability of waters for recreational use, and with regard to the above issues, the recommended water quality guidelines are summarised in Table 8.

Characteristic	**Guideline**
Physical hazards	Recreational water bodies and adjacent areas should be free of physical hazards, such as floating or submerged objects that may lead to injury. Signage should warn of shallow water and be clearly displayed.
Characteristic	**Guideline**
Microbial quality	Preventive risk management practices should be adopted to ensure that designated recreational waters are protected against direct contamination with fresh faecal material, particularly of human or domesticated animal origin.
Cyanobacteria and algae in fresh waters	Fresh recreational water bodies should not contain: • ≥10 µg/L total microcystins; • ≥50 000 cells/mL toxic Microcystis aeruginosa; • or biovolume equivalent of ≥4 mm3/L for the combined total of all cyanobacteria where a known toxin producer is dominant in the total biovolume; • or ≥10 mm3/L for total biovolume of all cyanobacterial material where known toxins are

	not present; • or cyanobacterial scums consistently present.
ph	6.5–8.5
Dissolved oxygen	> 80%
Aesthetic aspects	Recreational water bodies should be aesthetically acceptable to recreational users. The water should be free from visible materials that may settle to form objectionable deposits: • floating debris; • oil, scum and other matter; • substances producing objectionable colour, odour, taste or turbidity; and • substances and conditions that produce undesirable aquatic life.

Table 8 - Summary of water quality guidelines (NHMRC, 2008)

Measures to protect and maintain water quality in the existing waterways, as identified in the EIS have included:

- The configuration of the waterways, so that houseboat facilities are off-river, which includes all liquid waste (sewage and greywater) collection and disposal, solid waste collection and disposal.
- Collection and treatment of stormwater, using a range of measures including:
    - GPTs,
    - grass swales,
    - riparian buffers,
    - retention basins and
    - porous surfaces.
- Bunding of the recently established fuel supply location.
- The use of rainwater tanks
- A long-term OEMMP was prepared, which includes a Waste management Plan, a stormwater management Plan and a Spill Management Plan.

Constructed wetlands are usually designed to receive contaminated inputs such as stormwater, and there is now a considerable literature on their efficacy. Within the existing development stormwater runoff from roads and allotments is diverted into GPTs and then into retention basins located in open space areas. Planted swales are used to divert water into the basin. All stormwater runoff passing through these systems is treated for a one year return interval. First flush flows for larger events are also treated. The GPTs are designed to treat up to 90% of the theoretical total annual flow. Typically, the retention basins would be expected to remove 80% of suspended solids and associated pollutants such as heavy metals. High rates of nutrient removal also occur and high levels of microbial decay, up to

99%. In this instance, the large permanent wetland and the constructed western wetland provide an additional safeguard to protect the river.

Periodic monitoring of salinity and pH has been carried out throughout the waterways as the development has proceeded. In the main waterways the results have been consistent with the values obtained within the River Murray.

Table 9 shows results, over time, of monitoring taken at the locations shown in Fig. 11. These are also compared to salinity results observed by SA Water at Mannum on the same day and noted in Fig 12 as Location J which is actually located 2km upriver. The value of the salinity readings is that they indicate that there is water exchange throughout the waterways with the river by wind, barrage manipulation, boat movements, rainfall and catchment inflows, otherwise salinities would gradually increase.

Advantages with this arrangement:

- Water entering the Adventure Water Park lake will be free of materials such as floating logs as water has to flow through the water diversion control pipes. Any such materials coming from the River Murray or from the northern watercourse will be intercepted. To date no incident has occurred where floating debris has entered the Mannum Waters waterways.
- The inlets to the Adventure Water Park lake also provide opportunity to prevent any spill materials from reaching the lake and will be included in the updated Spill Management Plan. As part of the OEMMP, the spill management plan outlines the procedures to contain and clean-up in the event of spills.
- The western wetland and the permanent wetland area of the western waterways are important and effective safeguards, protecting downstream water quality. The efficacy of constructed wetlands in improving water quality is well documented.
- The Adventure Water Park lake through-flow will assist in maintaining a satisfactory water quality in the lake. Without exchange, but with inputs to compensate for evaporation losses, salinity would gradually increase.

Mannum Waters - Broad Water Monitoring (BWM) - Salinity (ppm) and pH

Locations	A		B		C		D		E		F		G		H		I		J
Date	Salinity (ppm)	pH	Salinity (ppm)	pH	Salinity (ppm)	pH	Salinity (ppm)	pH	Salinity (ppm)	pH	Salinity (ppm)	pH	Salinity (ppm)	pH	Salinity (ppm)	pH	Salinity (ppm)	pH	SAWater Salinity (ppm)
30/1/14	195		186		188		192		562		171								184
10/2/14	201		188		195		198		502		177								198
27/2/14	202		193		203		212		456		185								215
20/5/14	271	8.5	243	8.1	258	8.2	266	8.3	332	7.8	242	8.2							239
3/9/14	235	8.0	237	8.1	244	8.6	231	8.1	257	8.2	178	8.1							186
13/1/15	231	8.5					225	8.2	232	7.9	196	8.1							223
8/6/15	205	8.3	204	8.2			208	8.2	428	8.0	183	8.5							203
22/9/15	227	8.4	219	8.3	221	8.7	225	8.4	286	8.1	204	8.0							218
28/6/16	196	8.6	185	8.5	188	8.3	190	8.3	455	8.7	182	8.1							196
7/1/20	152	7.1	149	7.1			151	6.9	276	7.0		7.5	147	7.4	225	7.2			148
14/1/20	156	7.4	148	7.7			146	7.7	266	7.5	146	7.7	144	7.5	213	7.5	213	7.7	160

Table 5 - Salinity and pH Monitoring

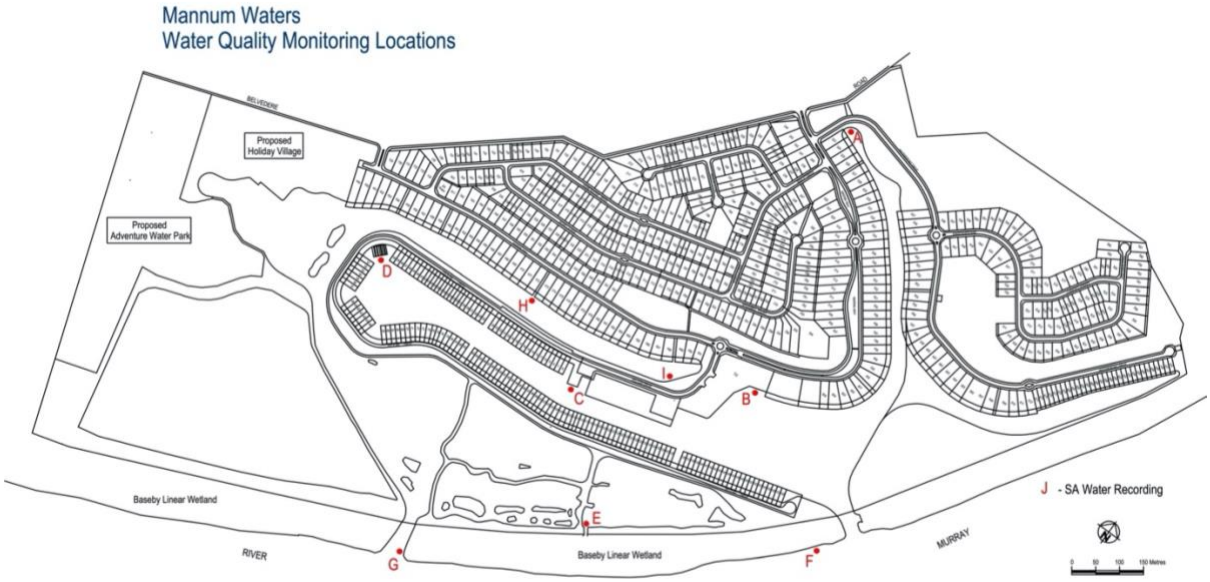


Figure 8 - Salinity Monitoring Locations

3.3.4 Describe the impact that water discharged from the waterbodies may have on water quality and the health of the river.

As described in Section 2.3, there will be no adverse impacts on the health of the river, principally as a result of:

- The adoption of water sensitive urban design measures and generally preventative approach in design.
- The extent of constructed wetlands, particularly permanent wetland and the Western Ephemeral Wetland, which then flows into the Baseby Linear Wetland before reaching the main channel of the river.
- The OEMMP prepared for the Mannum waters, which includes specific management plans for waste management, wetlands and vegetation and a spill management plan refer Section 1.4. This will be updated to accommodate recent changes and the new developments.

3.3.5 Describe water sensitive urban design measures that could be adopted.

As discussed in Sections 3.3.1 and 3.3.3 above, it is intended to include water sensitive urban design measures, both to minimise mains water use and stormwater runoff. These will be developed and described in detail in the final design. Measures that would be beneficial include such as:

- Rainwater tanks on all buildings to harvest and reuse water
- Incorporating drainage grass swales, reducing flow rate, and increase infiltration, which will aid landscaping by reducing watering requirements.
- The use of porous surfaces, in carpark areas, footpaths etc.

- The use of GPTs, which can treat up to 90% of flows, reducing gross pollutants and suspended solids. These will be used to treat runoff from hard surfaces.
- riparian buffers,
- retention basins

3.3.6 Describe the approach to water sustainability, including ways in which mains water supply use can be minimised or supplemented and opportunities for recycling water (particularly stormwater).

As outlined above in Section 3.3.5, it is the intention to fully utilise rainwater as much as is practical, both to minimise domestic mains water use by using rainwater tanks (plumbed in), and to minimise any irrigation requirements through the incorporation of WSUD measures. Any rainwater that cannot be used is not considered to be a lost resource as treated water (through GPTs) or surplus overflows of clean roof water which enters the waterways reduces the draw on the River Murray and may be better quality than river water.

4 ASSESSMENT OF MEDIUM ISSUES

4.1 Effect on the Physical Environment

Assessment Requirement 4: The proposed development has the potential to disturb landforms, soils, groundwater and to affect surface water run-off.

4.1.1 Describe the existing groundwater and land related environmental conditions, especially salinity.

Existing groundwater characteristics were fully investigated in the development of the original EIS. Two monitoring wells were installed in the vicinity of the Holiday Village and the Adventure Water Park viz. MW14 and MW15. MW 14 is located near Belvedere Road. Groundwater at this location was 4,300ppm at a depth of 7.2m. This is representative of the building locations for each project.

MW15 is located near the proposed Adventure Water Park Lake. Groundwater at this location was 31,000ppm at a depth of 2.4m below the flood plain at RL-2.6. Both the Holliday Village waterbody and the Adventure Water Park lake will be excavated to RL -1.5 which is approximately 1.1m above the groundwater level. The introduction of river water in both the waterbody and the Lake will create a positive head of more than 2.6m on the groundwater with no environmental impacts on the developments.

Soils on the old flood plain are high in salts. This is a condition that has been encountered throughout the Mannum Waters development. Plantings have been mindful of this and topsoils have been used prudently. Soils on the hill slopes above the flood plain areas and where most of the commercial buildings, management residences, cabins, caravan parks and camping will be located have previously been used for agricultural purposes. These areas have been fully audited and approved previously for human habitation.

The water table across the site is generally between -1.6 m AHD to 12.1 m AHD, below the surface of around -0.6 m AHD. Prior to the existing wetland development this site, which was separated from the river by the levee, only had surface water after rainfall, which then

evaporated over summer. Seepage rates are very low, As the reconfiguration of the existing wetland to operate at a lower level will not intercept the groundwater and the deeper areas will have permanent water, inflows of groundwater are not expected to occur.

4.1.2 Describe the short and long term effects of fill placement and the construction of waterbodies on land and/or groundwater quality and movement, including measures to manage salinity.

Most of the excavation for the waterbodies and Lake has already been completed in forming embankments for the major levee at the western boundary with the dairy, the temporary embankment preventing water from filling areas west of the current development and for the anabranch wetland which has been superseded. These have now been in place for at least four years and are performing well. Groundwater has not been exposed and monitoring within the waterways has shown that waterway salinity is maintained at similar levels to that in the River Murray.

4.1.3 Identify any risks and implications of causing or exacerbating land degradation (especially soil erosion) and the impacts of dust emissions during construction.

The practices and principles for soil erosion and dust control are outlined in the current Construction Environmental Management and Monitoring Plan. This will be followed during the development of the two proposed projects. As most of the excavation work has been already completed, land improvement rather than land degradation will be the result. A small quantity of earthworks remains to be done at the junction of the Holiday Village site with its waterbody to achieve the uniform depths within the waterbody. Material removed from the new waterbody area will be placed on the Holiday Village site to achieve working levels on the site after removing and stockpiling good topsoil. After completion of the fill placement, the topsoil will be replaced.

4.1.4 Describe potential changes to hydrology (e.g. drainage patterns or groundwater characteristics), including the implications of these changes on aquatic and terrestrial environments.

In this instance, there are no changes to existing hydrology which will have any impact on aquatic and terrestrial environments.

4.1.5 Outline mitigation measures and their likely effectiveness in minimising or avoiding disturbance to the physical environment (including surface waters and groundwater) during construction and operation.

In this instance, there are no disturbances to the physical environment which are likely to affect surface waters or groundwater during construction other than the final opening of the Holiday Village waterway which has been discussed in Section 3.2.9.

4.1.6 Describe stormwater and wastewater management and the potential impact on land and/or groundwater.

The groundwater is highly saline in the upgradient limestone aquifer underling the developments, between 8000-20000 mg/L TDS, and would not be regarded as a water resource for domestic supply of agriculture. Even so, contamination is to be avoided, as

eventually groundwater movement is towards the waterways and river. In this regard, it is to be noted:

- There is no onsite wastewater disposal, either through reclaimed water reuse or soakage trenches, as all wastewater is taken to the Mannum WWTP.
- Rainfall is relatively low, approximately 300 mm/annum, although this will change to a small extent with climate change. The WSUD measures previously referred, particularly the use of rainwater tanks, collection and treatment in swales, retention basins and GPTs will reduce any potential for contamination and will not increase the rates of infiltration over the current rates.

4.2 Effect on Native Vegetation and Fauna (Terrestrial and Aquatic)

Assessment Requirement 5: Construction would require limited clearance of native vegetation (and reduction of fauna habitat) and disturbance to fauna species.

4.2.1 Describe the location, extent, condition, habitat value and significance of native vegetation species and communities that may need to be cleared or affected during construction.

There are no significant areas of native habitat and vegetation species that will need to be cleared by the development of the two projects. Both project areas have already been substantially cleared, excavated, farmed or otherwise subject to human occupation. In the vicinity of the Western Wetland, there are areas of samphire which have been avoided in developing the wetland concept. These areas will become part of the vegetation mosaic referred to in section 2.3.4. A boxthorn eradication program has been carried out over the areas. These areas have previously been approved for residential development and waterways.

4.2.2 Describe the location, extent, condition and significance of native fauna species and populations that may be affected during both construction and operation (especially disturbance due to noise or human activities).

Within the proposed development areas there is no natural habitat remaining, and much of it is bare ground. Consequently, its value for native fauna is minimal. These areas have been approved previously for residential development and waterways. As noted earlier, areas of samphire near the western wetland have been avoided and will be retained.

4.2.3 Outline measures to mitigate the effects on native vegetation and fauna.

The development of each of the proposed projects replaces previously approved residential development. The current proposals do not differ in scale from the previous approval and no new mitigation processes are necessary or proposed. Accompanying the new proposed projects is a redesign of the large western ephemeral wetland. One significant change in its design is the retention of areas of samphire, as referred to above.

An important management objective of the Mannum Waters development is the protection of the adjacent Baseby Linear Wetland. The current OEMMP includes a range of individual plans which also protect the wetland as outlined in Section 1.4. The OEMMP will be updated to accommodate the new developments at the Development Application stage.

As previously indicated an amended CEMMP will be prepared which will also define measures to protect the Baseby Linear Wetland and waterways.

4.2.4 Describe the establishment and management of aquatic and fringing vegetation (natural, planted or introduced) associated with the constructed waterbodies.

Vegetation establishment of aquatic and fringing species will be undertaken after the construction of the ephemeral wetlands, Adventure Water Park lake and completion of the Holiday Village waterbody and the reconfiguration of the existing anabranch embankment. As indicated previously in Section 2.3.4, the selection of species for all of the plant associations is of plants endemic to the region, although many aquatics are cosmopolitan. Although subject to final design of the wetland, the aquatic and marsh species likely to be used are indicated below.

The terrestrial and riparian landscaping will be undertaken for general habitat and amenity purposes. The intended planting plan consists of six associations, which are based on vegetation associations observed by Hyde (2000) in "*Biodiversity Study: Mannum to Wellington Local Action Planning Region, River Murray, South Australia*" as occurring on the Murray River floodplain. Other suitable species to supplement the list have been added from the Mid Murray LAP and Mannum to Wellington LAP revegetation lists. Species recorded during a survey of the Baseby Linear Wetland or species native to the Murray Botanical region have also been added.

The associations recorded by Hyde (2000) and their link to the vegetation associations for the Mannum Waters project are as follows:

- Open Woodland – *E. camaldulensis*
  A combination of two associations observed by Hyde – *E. camaldulensis* woodland over chenopod shrubland with lignum + *E. camaldulensis* open forest over reedbed.

- Open Woodland – *E. largiflorens*
  E. largiflorens open woodland over chenopods and lignum.

- Closed Woodland – *E. camaldulensis*
  A combination of two associations observed by Hyde – *E. camaldulensis* woodland over chenopod shrubland with lignum + *E. camaldulensis* open forest over reedbed.

- Shrubland
  A combination of two associations observed by Hyde – *E. camaldulensis* woodland over chenopod shrubland with lignum + *E. camaldulensis* open forest over reedbed with tall trees and some large shrubs removed.

- Riparian
  A combination of two associations observed by Hyde – Reedbeds and Swamps + Riverbanks and Floodplains. Only species recommended for revegetation projects have been used. Some rush species have been added.

- Marsh
  Reedbeds and Swamps

The vegetation associations will be used to create a mosaic across the site. This will increase the visual amenity and diversity of habitats. Strategic locations will have higher density plantings, so that view scapes across areas are created for visitors. Screens of vegetation will also be used to block visitor views of particular scenes and direct their view to certain points. The species chosen for screens are tall to medium shrubs with bushy vegetation and will be planted as a dense line of plants.

Aquatic

- Sedges and rushes

Species	Habit	Depth	Height	Growth
Baumea articulata	tall thickets	<600	2200	green all year, perennial
Bolboschoenus caldwellii	reed bed	<700	1200	spring to autumn, perennial
Cyperus gymnocaulos	reed bed	<400	800	perennial
Eleocharis acuta	reed bed	<400	400	spring to autumn, perennial
Phragmites australis	tall thickets	<1000	2000	winter to summer
Schoenoplectus validus	tall thickets	<800	2000	green all year, perennial
Triglochin procerum		<1000	300	Winter to summer

Marsh

- Small and medium herbs
- Sedges and rushes

Shallow water areas associated with the Closed Woodland Association.

Species	Form
Cyperus gymnocaulos	Sedge
Ficinia nodosa	Sedge
Eleocharis acuta	Sedge
Juncus pallidus	Sedge
Juncus usitatus	Sedge
Lycopus australis	Tall herb

With regard to placement and timing:

- For the ephemeral wetland areas, during construction the placement of soils will have regard to their salinity, with low salinity topsoil being used. Even so, soil salinity will be monitored for a season prior to planting. Many species have a salinity tolerance, but it is important that propagules come from similar conditions as in the wetlands.
- Plants will be placed in various depth zones with water level seasonal and annual variation managed to meet their habitat requirements.

- Selection and placement will also be based on their:
    - Seasonal growth, pattern for habitat and visual diversity.
    - Growth habit and effectiveness in forming dense reed beds for water filtration and/or form thickets which could be used to control access.

4.3 Effect on Cultural Heritage

Assessment Requirement 6: The proposed development has the potential to impact on sites / locations of Aboriginal heritage through disturbance during construction.

4.3.1 Identify any effects on Aboriginal sites of archaeological or anthropological significance (including but not limited to those listed in the Register of the National Estate and the SA Register of Aboriginal Sites and Objects). Indicate any consultation with local Aboriginal organisations that have an in interest in the area.

The whole of the Mannum Waters site was thoroughly investigated during the original EIS. Since that time Tallwood Pty Ltd has liaised with representatives of Mannum Aboriginal Community Association Inc (MACAI) in accordance with agreed protocols. During the construction of Stage 5, aboriginal remains were located and subject to detailed investigation and report by and approved archaeologist. In that report, actions were outlined to identify the extent of the burial ground, to secure the remains and further assess the remaining areas of land to the west which include Stage 6 residential Area, the Holiday Village and the Adventure Water Park. All identified actions have been completed and a final walk-over of the areas has been completed by MACAI. Correspondence in relation to these matters is included in **Appendix F**

The original protocols for construction still stand. MACAI will monitor all excavations below ground level during construction activities excluding areas of floodplain.

4.3.2 Outline measures adopted to avoid or minimise impacts on Aboriginal sites of archaeological or anthropological significance.

No Aboriginal sites of archaeological or anthropological significance have been identified through comprehensive reporting in either of the two sites proposed for the Holiday Village and Adventure Water Park. Tallwood has received MACAI clearance to proceed with development over the two sites following agreed monitoring protocols.

4.4 Hazard risk

Assessment Requirement 7: The construction and operation of the proposal involves a range general and specific risks.

4.4.1 Detail procedures to be adopted to identify whether acid sulphate soils are present and management measures that would be required during construction and operation.

As described in the CEMMP prepared for the current development, the clays on site are not expected to develop acid sulphate soils.

For the natural grey clays recovered from boreholes within the Coonambidgal formation at the site, Coffey completed an acid sulphate soil assessment using the POCAS analytical method in 2007. The results from this assessment indicate that the clays are not expected to develop acid sulphate soil conditions upon exposure to oxygen. As such Coffey do not envisage any remedial measures being required. The materials encountered by Coffey were consistent with those encountered later by Soil & Groundwater Consulting in 2008/2009 during the comprehensive environmental investigation of Stage 1-4 of the current development.

Subsequently, the anabranch area has been excavated to approximately RL -1.5 metres. Further tests have been undertaken to determine whether acid sulphate soils are present following exposure of soils at this depth. Testing on twelve soil samples was undertaken through Envirolab Adelaide. The hole locations are shown in Fig. 12 The results have been included as **Appendix G.** Little evidence of acid sulphate soils was apparent.

Whilst acid sulphate soils are not expected, it is proposed to adopt the field Indicators and tests for soil and water recommended in the EPA document "Site contamination - Acid Sulphate Soil Materials" during construction works. Should these screening tests indicate the potential for acid sulphate soils, then a management plan will be developed in consultation with EPA.

In the development of the Adventure Water Park the lake will be filled with water to a depth of 1.5m. As indicated in section 2.3.1, the lake will be operated with a constant full water level of RL 0.2, which will prevent further exposure. For a period of time Stage 2 of the lake will remain excavated and the area south of the lake will also remain exposed. It is now approximately seven years that the anabranch area has been exposed at its current depth. As no evidence of acid sulphate deterioration currently exists it can be assumed that it will not be present in the future. The exposed areas will remain without public access until developed in the future.

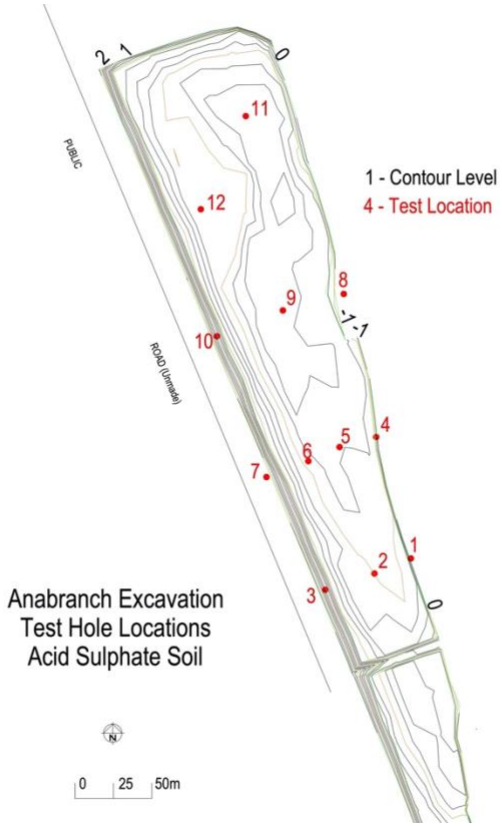


Figure 9 – Location of Acid Sampling soils

4.4.2 Detail procedures to be adopted to identify whether the land is contaminated and management measures that would be required during construction and operation.

Land to be occupied by the Holiday Village and the Adventure Water Park were included in the original Environmental Site Assessment, prepared by Soil and Groundwater to characterise any soil and/or groundwater contamination that may present a risk to human and environmental health and thus impact on the development/use of the site.

Soil and Groundwater concluded that there are no soil or groundwater contamination issues that are considered likely to preclude the proposed development of the site for residential and public open space.

The land has been approved for residential development and is appropriate for the use of a Holiday Village and Adventure Water Park.

4.4.3 Describe strategies for ensuring public safety during construction and operation, including the management of boats and jet skis.

For the construction phase, the CEMMP will be prepared before any construction activities commence and submitted for approval. Public safety is an important element of the plan, and includes:

- Restricted public access, with site access controls including fencing, signage and procedural controls. Dedicated access points will be established.
- A secure site compound will be established for equipment and material storage and fuel, with 24 hr security

- Construction machinery to remain on site, which reduces risk.

There is also a Traffic Management Plan, refer Section 3.1.1.

In this instance it is important to note that both the Adventure Water Park and the Holiday Village can be constructed quite independently of any existing waterway. They are currently separated from the rest of Mannum Waters by a temporary embankment. Filling of the Holiday Village waterbody can occur inside the temporary embankment. Once levels on either side of the embankment are equalised sections of the temporary embankment can be removed within the protection of a silt sock without disturbance to boat traffic. Some sections of the temporary embankment will be converted to islands for isolated habitats.

4.4.4 Describe any hazardous materials, with reference to storage, use, handling and disposal of these materials during construction and operation.

There are no hazardous materials other than fuel which are required on site during construction. Fuel will be handled in accordance with the protocols already applied on site.

4.4.5 Describe procedures and strategies to prevent, manage and mitigate pollutant spills, sewage leaks or algal blooms, including the ability to isolate the water bodies from the river and constructed wetlands.

A spill contingency plan is detailed in the current OEMMP for Mannum Waters. This will be amended to include the new developments. However, the risk to the Holiday Village waterbody or Adventure Water Park lakes is small. The main spill risk is of a fuel spill into the marina basin, as no hazardous materials of any quantity will be kept at either of the new developments. Spills into the houseboat marina can be prevented from reaching the Holiday Village waterbody by closing culvert A and by closing culvert C and E additional protection is provided to the Adventure Water Park Lake.

4.4.6 Detail the relevant requirements of the flood protection policies in the Development Plan and how compliance would be achieved.

The Residential Marina Zone requires:

- Dwellings, buildings and structures should be designed to:
    - (a) take into account the 1956 River Murray flood level by limiting enclosed structures on the floodplain; and
    - (b) provide a minimum floor level for living areas of 5.3 metres Australian Height Datum.
- No dwelling, building, outbuilding or other structure (excluding side boundary fencing) on an allotment fronting the waterbody should be built within 14 metres of the boundary with the water easement.
- The underneath area of an elevated dwelling should only be enclosed in accordance with the following:
    - (a) the floor area enclosed by any method of enclosure does not exceed 54 square metres in total floor area;
    - (b) provided the method of and design of the enclosure includes materials or panels that allow easy removal and transportation to a site above the 1956

River Murray flood level, without requiring demolition, destruction or engineering assistance to achieve removal.

The Holiday Village and adventure Water Park will adhere to the policies of the Mid Murray Development Plan for all permanent dwellings, buildings and structures. In regard to holiday cabins which are temporarily occupied, a lower minimum floor level may be adopted. A level of RL 2.5 is proposed which is some 300mm above the marina road surface. Over the last century only three floods exceeded RL 2.0 at Mannum. They were 1931, 1956 and 1974 floods. The 1956 flood is generally regarded as in excess of a 1 in 160 return frequency and the 1974 flood is a very high return frequency.

The DEWNR Technical Report 2015-57 indicates that at a level of RL 2.5 the flow in the river at Mannum would be approximately 145,000 ML/day. These days with river management a flow of this magnitude would be extremely rare.

The River Murray in the Mannum Region is not subject to flash flooding. High river levels occur due to high rainfalls and snow melts in the upper catchments of the eastern states. As a consequence, levels rise and fall over a lengthy period and can be predicted at Mannum more than a month before their occurrence. This allows occupants to take protective action if necessary.

The cabins at the Holiday Village will be located on an off-river waterway some 800m away from the centre of the main river stream. This will behave like a backwater without destructive erosive flow.

4.4.7 Describe strategies to ensure public safety on and around the water bodies, especially the recreational use of water bodies in accordance with relevant health standards.

In the longer-term operational phase, key points to note are:

- For the Holiday Village waterbody, unsupervised access at the water's edge will only be available in the Holiday Village site. This will be similar to the development of waterfront residential allotments and at the commercial area of Mannum Waters. Soil slopes will be a maximum of 1 in 5 (slope stability obtained at 1in 3), with both grassed approaches and riparian edges. Signage will also be employed as required for boating and cautionary effects. Board walks and Jetties will be constructed in accordance with the Mid-Murray Development Plan.
- The houseboat marina is managed through a Marina Owners Charter, which provides a comprehensive list of conditions for occupancy of the houseboat marina, many of which are intended to protect the marina waters from any contamination. A community manager ensures compliance.
- For the remainder of the waterways, until handover to Council, Tallwood is responsible. A key requirement for safety is a 4knot speed limit for all users.
- For the Adventure Water Park lake, at this stage it is proposed to have 1:5 sloped banks with some areas being stepped. There will be some decked areas at main entry points to allow extra support for patrons to exit the water. The lake will be cordoned off in a way that each area can be supervised and provide restricted access

to areas not being used. Team members will be at each open area to offer support to all users of the area. Each attraction will have rules and desired behaviour signage and also around the entire lake there will be depth markers and warning signs.

- Generally, the Adventure Water Park Lake is a fully contained and fully supervised facility.
- As discussed previously in Section 2.3.3, maintaining water quality in accordance with the national NHMRC (2008) guidelines for recreational use is essential and, in this regard, a preventative approach is taken. There are no discharges and most stormwater is intercepted and treated. The risk of contamination is low. It is intended to monitor water quality, and this will be scoped in consultation with the SA EPA at the Development Application stage.

5 ASSESSMENT OF STANDARD ISSUES

5.1 Traffic Effects

Assessment Requirement 8: The proposal requires access for the transportation of construction materials and infrastructure to site and a permanent access point for ongoing operation.

5.1.1 Describe all traffic types and volumes during the construction and operational phases (especially during peak periods) and traffic management measures.

MFY Consultants have prepared a planning report on the traffic implications of both proposals, see **Appendix E**.

In section 5.1.4 of the consultant's report, Table 1 presents a summary of the forecast daily traffic volumes for the proposed amendment. The total increase in daily traffic volumes is assessed at 970 with 775 to/from the west and 195 to/from the east. To which was made the following comment:
"The traffic generation associated with the proposed developments will not occur simultaneously. For example, traffic demands entering the Water Park will be greatest in the morning, whereas this would equate to the peak demands for traffic exiting the Holiday Village. Therefore, while a factor of 10% could be applied to the above daily volumes to forecast the peak hour traffic (approximately 80 to/from the west and 20 to/from the east), these peak volumes would be further reduced due to the variability in the timing of peak demands for the two land uses".

The consultant finally concluded in Section 5.2 that:
"The additional volumes will be distributed throughout the day and would not generate concurrent peak traffic demands. This will assist in further mitigating the traffic impacts associated with the proposed amendment."

In section 6.0, the consultant reports on construction traffic as follows:
"The traffic generated during the construction of the proposed development sites is not anticipated to be atypical for such developments, and the impacts associated with these additional vehicles will be low due to the nature of the adjacent road network which do not have substantial volumes of either commercial or domestic traffic."

It is also noted that the level of construction traffic will not differ greatly in type and scope from that of the previously approved land division.

5.1.2 Identify any potential effects of traffic on communities, including, road safety, convenience, noise and dust.

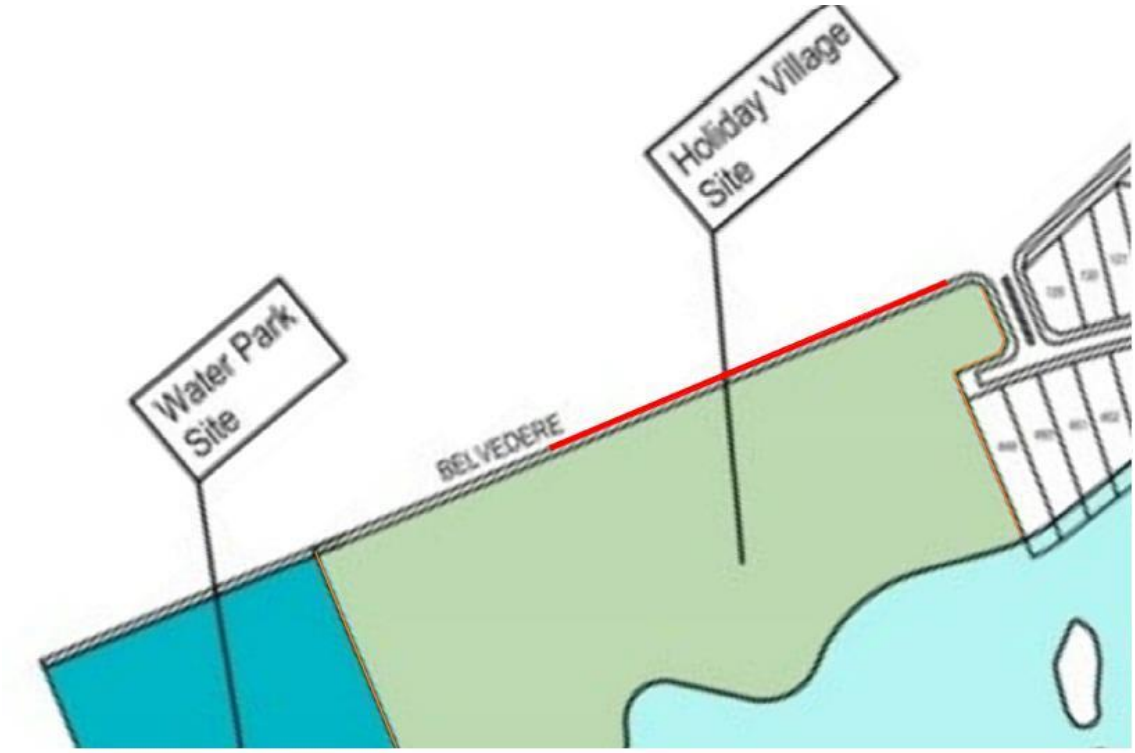
This aspect of road safety was addressed in the consultant's report and reported as follows in Section 4:

"The proposed amendment includes the relocation of the existing approved intersection of Marina Way and Belvedere Road. In addition, it seeks to provide a new access point to service the proposed Water Park (which could also service the Holiday Village).

The proposal will not alter the previously approved access arrangements for the residential allotments within the site, in that there will be no direct access to Belvedere Road for residential allotments.

A site inspection was undertaken to assess safe locations for the installation of new intersections and driveways that would meet the requirements of Austroads' Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (AGRD4A), particularly with respect to sight line requirements and offsets from adjacent intersections.

It was determined that a section of Belvedere Road would preclude the safe construction of new intersections and access points, as shown in Figure 13, due to sightline restrictions as a result of the bend in the road. The proposed relocated intersection will be sited to the east of this restricted area and as such will be a compliant location.



(Consultant's) Figure 5: Precluded access locations (shown in red)

A future access point to one or both of the adjacent development sites can also be safely accommodated in the approximate location of the boundary between the two sites.

This access could be used solely for the Water Park site (located close to the eastern boundary of the site), with access to the Holiday Village site provided via Marina Way.

Alternatively, both of the sites could be accessed via a common access point on Belvedere Road. Either of these two options would ensure that there would be only one additional access constructed on Belvedere Road, which would ensure a limited location for conflicting movements to/from the road."

Final access details will be determined during the design development in the Development Application stage. At this stage, it is Tallwood's intention to pursue a common access point to both projects and avoid any access from Marina Way.
Aspects such as noise and dust will not differ from that which would have occurred under the current approvals and are covered by the current CEMMP.

5.1.3 Describe any requirements where traffic infrastructure requires temporary or permanent modifications and access requirements that may be needed for local and /or arterial roads during construction and for ongoing traffic volumes.

Traffic access from Belvedere Road both construction and on-going will require some modifications on Belvedere Road. This is discussed in Section 5.1.2 above. The predicted traffic volumes are not large and will have minimum impact. These impacts will be handled by conventional design procedures.

5.2 Introduced Plant and Animal Species

Assessment Requirement 9: The proposed development has the potential for the spread of introduced or nuisance plants and animals

5.2.1 Identify the potential for the introduction or dispersal of new pest or nuisance plant and animal species, and the associated implications for native species, habitat and agricultural land.

The main risk of new pest or nuisance plants and animal species being brought to site is during the construction phase. Without adequate safeguards, this would be mainly due to vehicles and machinery coming onto site which have previously been working in areas where there are new species. Conversely, species already on the Mannum Waters site could be dispersed to new sites by the same process.

5.2.2 Identify the potential for increased distribution and abundance of existing pest or nuisance plant and the associated implications for terrestrial and aquatic environments.

If no control is undertaken, construction activities may result in the spread of weeds, through soil disturbance and vehicle movement, affecting adjacent wetland areas and landowners. Even without construction and without control the site would become weed dominated and be a source of propagules to adjacent areas.

5.2.3 Outline mitigation measures and their effectiveness in reducing or avoiding the introduction or spread of pest or nuisance plant and animal species.

As part of the construction management activities, weed control will be undertaken, as specified in a CEMMP, including:

- Before major earthworks are conducted:
  - Broad spectrum knock down herbicide (Roundup Biactive) will be used on areas that are to be cleared for development to reduce the potential seed bank of the soil used for landscaping.

- Once earthworks are completed and planting is about to begin:
  - Broad spectrum herbicide will be used again to remove any weeds that have germinated on the areas where revegetation is to occur.

  The timing for the above two activities will ideally occur when spraying will be most effective, which is during weeds active growth period. For many weeds this is from autumn to spring.

- To minimise the risk of introducing new weeds (and disease) all construction equipment and vehicles entering the site will be required to have been cleaned. Leaving the site all will be cleaned at a purpose-built facility with the wash down water collected and appropriately disposed of.

It is important to note that for both proposals, the entire sites will be developed, so that all weeds will be removed. Following construction, open areas will be extensively landscaped, and as part of an ongoing weed management will be undertaken as specified in the OEMMP.

5.3 Construction, Operation and Maintenance Effects

Assessment Requirement 10: The construction and operation of the proposal would require a range of impacts to be minimised, mitigated and monitored through an environmental management plan framework.

5.3.1 Provide a site construction plan (including construction techniques and the timing of construction activities) and outline strategies to minimise effects on residents, the community and the local environment. The plan should also outline any on site infrastructure required during construction (e.g. site compounds, storage areas etc.), including the management and decommissioning of these sites.

This section is considered to be premature. The development of both the Holiday Village and the Adventure Water Park will be subject to the existing Management and Monitoring Plans of Mannum Waters. The type of development, construction aspects and level of impact on the neighbourhood is commensurate with the residential areas the projects are displacing. As the concepts at this stage will undergo refinement and possible changes in layout, but not in scope, site layouts, specific to the two sites, will be finalised at the Development Application stage and be part of those submissions. As previously stated the two sites are physically separated from the rest of Mannum Waters and construction activities will have no appreciable added impacts noise, traffic and other environmental aspects.

5.3.2 Describe the proposed methodology and frequency for floodplain excavation (or dredging), earthworks drainage, the disposal of excavated material, maintenance activities and the impacts on the environment (particularly turbidity and water quality).

Neither the Holiday Village nor the Adventure Water Park development requires any dredging earthworks drainage of the disposable of excavated material for their development over and above that already undertaken. All works will be undertaken behind protective embankments in the dry. Opening of the Holiday Village waterbody will be part of the development of the Stage 6 residential area under the existing approval as previously discussed.

5.3.3 Identify the source and origin of any construction materials, including revetments and fill for land forming.

Apart from pavement and concrete structures which will be obtained from quarry suppliers and local concrete suppliers in accordance with the engineering specifications, all earth-shaping activities will be undertaken using the natural materials on site. This is in accordance with the normal practices on the Mannum Waters site as applied to the residential areas. Utilising the existing landfalls and earthworks previously undertaken, only moderate cut and fill earthmoving will be required to achieve the shaping required for the development of the Holiday Village and Adventure Water Park.

5.3.4 Describe the implications of placing a large amount of fill on the floodplain, particularly contamination and implications for natural drainage, water circulation and flood management.

Under the current proposals, there will be no large amounts of fill placed on the flood plains affecting natural drainage, water circulation or flood management. The construction of the Western Wetland will involve small scale earthworks for the manipulation of the existing surface to establish areas of various depths within the wetlands. Similarly, earth-shaping with small depths of cut will be all that is required to provide shape to the main areas of the Holiday Village and Adventure Water Park. The most significant quantities of fill will be taken from embankments created for the old anabranch, since abandoned, to create the new embankments for the adventure Water Park lake. These will lie within the anabranch excavated area and have no influence on water circulation.

5.3.5 Identify measures for the control of stormwater run-off, mud (including drag out onto public roads), vibration, litter, dust, noise, odour (including from rotting aquatic vegetation, algal blooms and organic soils) and other emissions during construction.

The amendments to the CEMMP to be prepared for the Adventure Park and Holiday Village construction stage will identify:

- Measures to control runoff and soil erosion by incorporating a soil erosion and drainage management plan (SEDMP). Also, as previously mentioned, the sites will remain isolated from the waterways by embankments during the construction phase, so any stormwater runoff is contained on site.
- Measures to avoid drag out on to the road will be specified, and will likely include vehicle washdown and a shaker at the exit to Belvedere Road.

- Dust control measures will be specified, including:
    - Dust suppression by watering, and not working on high wind days. This was the approach previously taken for the existing development construction.
    - Noise is not an issue as previously discussed, refer Section 3.1.1.
- The only activity that could cause vibration would be road compaction, but effects would be localised, as was the case for the existing residential development.
- It is to be noted that for the existing Mannum Waters development, construction methods and activities will be similar for the proposed developments, and no problems were reported or complaints received from nearby residents.
- There are no waterbodies on the development site, so there will be no issues with aquatic plant debris.

5.3.6 Outline waste management strategies and the potential for incorporating recycling and resource recovery.

As part of the normal operation as established with Mid Murray Council, general waste will be collected as part of the Mid Murray Council existing collection system. Green waste and recycled waste will be separately taken to the recycled depot located approximately 2km from the projects.

5.3.7 Describe the impact the proposed development will have on any gas, electricity, water, sewerage, stormwater management and telecommunication systems infrastructure.

There is adequate capacity within the service infrastructure of Mannum Waters to facilitate the needs of the Holiday Village and Adventure Water Park by extension of water supply, sewerage, electricity and NBN services in the same way as would have occurred had the residential areas been extended under the original approval. Gas is not available at Mannum.

Although there will be an increase in local demand at this end of the site, with three quarters of the original Mannum Waters residential areas still undeveloped and projections suggesting that residential sales will take more than 35 years to fulfil, it is clear that existing services will be adequate to cater for the new proposals. In addition, as no agreement has been reached with SA Water in the relocation of the wastewater treatment plant, it seems likely that the northern area, approximately one quarter of the original approval, will remain undeveloped. Consequently, no expansion of headworks of the various services will be required.

5.3.8 Describe the use of amenity/landscape plantings (including lawn areas) and broad scale revegetation, especially the opportunities for the use of locally endemic species. The effectiveness of existing revegetation works around the marina should be considered.

Landscaping elements including grassing, trees and shrubs have been used with effect for street planting and perimeter planting in the marina. In these areas they require irrigation. Additional plantings are proposed for the median strips at Mannum Waters during 2020 as the particularly difficult soils and climate require trials to find the plants which can be easily sustained. Endemic plants have been used extensively and effectively within the

constructed wetlands and around their perimeters. The effectiveness of this planting can be seen in Photos 6, 11, 12 and 13.

Photo 11 – Revegetation Eastern Wetland

Photo 12 – Revegetation Eastern Wetland

Photo 13 – Revegetation Eastern Wetland

Internal formal landscaping will be provided at both the Holiday Village and Adventure Water Park with more natural planting used around the boundaries and within the wetlands building based on successful plantings achieved so far.

5.3.9 Identify the implications for maintenance dredging or removal of aquatic plant growth, including disposal options and impacts on the environment and community.

It is not envisaged that there will be a need to remove aquatic plant growth. In the years of operation there has been no issue in the waterways, and this will be the same for the Adventure Water Park lake and Holiday Village waterbody which will be under strict management regimes. Plant growth is desirable around margins and the extent of growth is controlled by depth. In the wetlands no aquatics will be removed, except for any pest plants, but these will be removed as they appear so quantities will be small.

5.3.10 Provide information on the expected levels of noise associated with the operation of the facility, identifying all potential noise sources, and describe the extent to which these noise emissions could be reduced and contained to minimise the effects upon the environment, the residential community and the wider locality.

This has been addressed previously within the consultant's report "Mannum Water Park – Environmental Noise assessment, **Appendix D** and within section 3.1.1.

5.3.11 Outline measures to be adopted to control nuisance insects, particularly mosquito populations and other potential disease vectors that could pose a risk to human health.

Nuisance insects are not an issue with the current Mannum Waters development and the same will be the case with the new waterbodies and wetlands. The design of these systems

allows for a diverse ecosystem and sufficient predation, particularly with a fish population, to control numbers. This is the general experience with adequately designed constructed systems.

5.3.12 Detail measures to ensure that residential, recreational and commercial activities would be conducted in an environmentally sustainable manner, particularly to protect water quality.

This is addressed in Section 2.3

5.3.13 Identify opportunities for energy and water conservation.

As discussed previously, water conservation within the developments occurs with the adoption of water sensitive urban design measures. But it is to be noted that any clean runoff into the waterways is desirable to some extent as it helps the water balance, reducing the draw from the River Murray.

Energy conservation techniques will be an included component of building design within each project and will be identified at the Development Application stages.

5.3.14 Outline the proposed environmental management measures that would be adopted to deal with the identified construction, operational and maintenance effects. Include reference to any baseline studies, monitoring programmes, training programmes and reporting mechanisms (internally and to public authorities). Outline the effectiveness of mitigation measures for perceived and recognised impacts. Include consideration of previously demonstrated best practice or approaches which may have been used for similar works in similar habitats, which may be of benefit and/or have been endorsed for their proven low impact effects.

The previous EIS for the Mannum Waters development identified the requirements for environmental protection and management. The various baseline studies included in the EIS provided the basis for assessment, in particular ecosystem services, the current condition of ecosystems and threats, measures to reduce threats and minimise or prevent adverse impacts from the development.

The CEMMP prepared for the development met all of the legislative requirements, incorporating all relevant codes of practice and guidelines. The CEMMPs for the proposed developments will utilise and build on as necessary the existing CEMMP. Importantly, at the outset:

- Key environmental risks will be defined and mitigation measures.
- Legislative requirements confirmed/revised as necessary.
- Roles and responsibilities defined, including:
    - Appointment of environmental officer/advisor
    - Undertaking site inductions and training of site personnel
    - Preparing a schedule of project management meetings, which also address environmental issues.
    - Undertaking regular inspection of activities

- Defining performance indicators, with reporting against these indicators, including establishing monitoring in consultation with relevant agencies.
- Preparing a community consultation program.

The previous work was carried out successfully, without any incident or unexpected adverse impact.

The OEMMP, for each of the individual plans, identified in Section 1.4, identifies:

- Plan objectives.
- Roles and responsibilities.
- A schedule of management activities.
- Periodic review and reporting.

5.3.15 Describe the proposed monitoring of impacts during and after construction, particularly water quality (including consideration of the existing data collection).

Monitoring and reporting requirements are specified in the CEMMP and will be identified at the Development Application stage as an amendment to the current CEMMP and would normally involve:

- Nominating responsibilities.
- A schedule of inspections.
- Defining the scope of water quality monitoring (location, parameters, frequency).
- Assessment and reporting of environmental performance against defined performance indicators.

5.4 Planning and Environmental Legislation and Policies

Assessment Requirement 11: A range of planning and environmental related statutory requirements would need to be met for the construction and operation of the proposed development.

Heynen Planning Consultants were engaged to prepare a report on the relevant planning and environmental related statutory requirements that would need to be met for the construction and operation of the proposed developments. This is a full and comprehensive report and, rather than separate sections from their original report, it has been included in its entirety as **Appendix G**.

5.4.1 Describe the proposed development in terms of its consistency with the relevant Development Plans, Planning and Design Code, the Planning Strategy and the State Planning Policies.

See Appendix G

5.4.2 Describe the proposed development in terms of its consistency with relevant State and Commonwealth

See Appendix G

APPENDIX 1 – Relevant Legislation

Legislation

- *Development Act 1993*
- *Development Regulations 2008*
- *Public Health Act 2011*
- *Environment Protection Act 1993*
- *Native Vegetation Act 1991*
- *River Murray Act 2003*
- *Natural Resources Management Act 2004*
- *Native Title Act 1994*
- *Aboriginal Heritage Act 1988*
- *National Parks and Wildlife Act 1972*
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

Strategy & Policy

- Development Plans and Planning and Design Code o Mid Murray Council
- Region Plans

o Murray and Mallee Region Plan

- State Planning Policies, 2019
- Water Allocation Plan for the River Murray Prescribed Watercourse, 2019.
- Natural Resources South Australia Murray-Darling Basin Strategic Plan, 2014.
- Environment Protection (Noise) Policy, 2007
- Environment Protection (Water Quality) Policy, 2015
- Environment Protection (Air Quality) Policy, 2016
- Environment Protection (Waste to Resources) Policy, 2010
- South Australia's Waste Strategy 2015 – 2020, Office of Green Industries SA
- Building Code of Australia

Guidelines

- NHMRC Guidelines for Managing Risks in Recreational Water, 2008
- EPA Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry,

1999

- EPA Construction Environmental Management Plans Guidelines, 2018
- Guide for Applications to Clear Native Vegetation, 2017

Appendix A

Guidelines for the preparation of an Amendment to the Environmental Impact Statement

STATE PLANNING COMMISSION

GUIDELINES

For the preparation of an

AMENDMENT to the ENVIRONMENTAL IMPACT STATEMENT

'Mannum Waters' Marina and Residential Development – Holiday Village and Adventure Water Park

Tallwood Pty Ltd

Endorsed 5 December 2019

State Planning Commission

Department of Planning, Transport and Infrastructure

www.saplanningportal.sa.gov.au

Department of Planning, Transport and Infrastructure
Level 5, 50 Flinders Street
GPO Box 1815
Adelaide South Australia 5001

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1. BACKGROUND

The 'Mannum Waters' Residential Marina proposal was declared a Major Development in 2005 and was the subject of an Environmental Impact Statement (EIS) process. The EIS was released for public consultation in 2006. The proposal was granted a Provisional Development Authorisation by the Governor on 30 October 2008. Construction started in June 2010, with the major earthworks, marina basin, boat ramp, constructed wetlands and initial stages of the residential land-division now completed.

The major development site has also been rezoned by the Mid Murray Council and a series of zones and policy areas have been established. The role of these zones is to guide the staged construction of the approved development and to provide planning polices for Council to assess aspects of the development that were not captured by the declaration (such as applications for dwellings, tourist accommodation and commercial buildings).

The proponent for the marina development - Tallwood Pty Ltd, now wishes to modify the layout plan and design of the site to incorporate a proposed holiday village and adventure water park. This would require the current development authorisation to be varied to approve the additional land uses. In order for the Minister for Planning to consider granting such an approval (as the delegate of the Governor), a relevant EIS would be required. Thus, the EIS would need to be amended pursuant to Section 47 of the *Development Act 1993*. An amended Assessment Report would also be required for decision-making. Prior to this process being undertaken, the 2005 major development declaration would need to be varied to capture the proposed land uses.

On 18 March 2019 the proponent wrote to the Department of Planning, Transport and Infrastructure (the Department) seeking to vary the existing major development declaration to specifically include provision for a holiday village and adventure water park. A variation to the declaration, to insert *recreational and tourist development*, was gazetted on 1 August 2019.

On 22 August 2019, the proponent provided a Review of the EIS document as part of the amendment process to inform the preparation of Guidelines.

The State Planning Commission (SPC) is responsible for setting the level of assessment required (Environmental Impact Assessment, Public Environmental Report or Development Report) and provides Guidelines for the preparation of the assessment document. For this proposal, an EIS has previously been set as the level of assessment. The previous Guidelines issued in November 2005 for the residential marina did not address the proposed two new components. Thus, revised Guidelines need to be issued for the preparation of an Amendment to the EIS.

Due to the nature of proposal, the need for a broader assessment and investigation of the following is required:

- The strategic tourism / recreational and economic benefits of establishing a holiday village and adventure water park within the existing marina development site, the Mannum township and the region.
- Impact upon the River Murray, especially water quality and water allocation requirements.
- Impact on existing marina residents (especially noise and traffic)
- Impact on the local road network.

Following consideration of the potential implications of the proposal, the State Planning Commission has now prepared Guidelines (this document) for the proposed holiday village and adventure water park based upon the significant issues relating to the proposed development. The Amendment to the EIS should be prepared in accordance with these Guidelines and should describe what the proponent wants to do, what the environmental effects will be and how the proponent intends to manage the project.

The Amendment to the EIS should cover both the construction and ongoing operation of the development and, where possible, should outline opportunities to incorporate best practice design and management.

For the purposes of environmental impact assessment under the *Development Act 1993*, the meaning of 'environment' is taken to include an assessment of environmental (biological and physical), social and economic effects associated with the development and the means by which those effects can be managed.

In this context this document is the guidelines as set by the State Planning Commission specifically prepared for this application. The guidelines have been developed to properly define the expected impacts (extent, nature and significance) associated with the proposal in the manner suggested, the proposed mitigation strategies, and on balance whether such impacts are acceptable.

The documentation and analysis from the assessment process will then be used by the Minister (as the delegate of the Governor for this application) in the decision-making process, pursuant to Section 48 of the *Development Act 1993*, to decide whether the proposal can be approved, and the conditions that would apply.

The Commission's role in the assessment process is now completed. From this point the Minister will continue with the assessment under Section 47 of the Act.

2. DESCRIPTION OF PROPOSAL

The proposal is to establish a holiday village and adventure water park at the south-western end of the marina site. The approved layout plan identifies this land as being an undeveloped future stage of the residential land division (site of the holiday village) and proposed open space comprising a constructed wetland and revegetation area (site of the water park). The land is currently disused grazing land (cliff top) and dairy flat (floodplain) that adjoin the marina basin and constructed wetland area.

The Holiday Village would comprise:

- Reception office, small store and Manager's residence.
- 61 cabins of various sizes.
- 41 powered caravan / motorhome sites.
- 15 powered camping sites and 15 unpowered camping sites.
- Associated facilities, including recreation rooms, camp kitchens, amenities blocks, laundry etc.
- Caravan and boat storage area.
- Boat ramp.

The existing residential waterway adjacent the marina would be expanded at the western end to create a recreational lake for the holiday village. This would be integrated with the existing constructed wetland beside the River Murray (i.e. which is used for maintaining water quality through natural filtration).

The Adventure Water Park would comprise a variety of low to high intensity activities. The park would include a reception office, shops and café. Activities would include water slides, Zorb balls, cable ski / wakeboarding area, flyboard / jetpack area and zip-lines. The activities would be undertaken within a series of constructed water bodies (i.e. 'pools' / artificial lakes / waterways) located adjacent the existing constructed wetland. The park pool water would be filtered by natural biological processes and renewed from the River Murray. Discharges would be minimal and would be integrated with the existing constructed wetlands for the control of water quality and salinity. It is estimated to operate for 102 full open days during each calendar year.

The proposal is intended to compliment the recreational and tourism uses associated with the marina, which has become an attraction for Mannum and the region (especially due to the boat ramp and base for houseboats). The proposal would establish a Holiday Village with water frontage and access to the River Murray, plus an Adventure Water Park of a scale not present in the State. Bringing new visitors to the development may also encourage increased residential and commercial allotment sales to help complete the overall development.

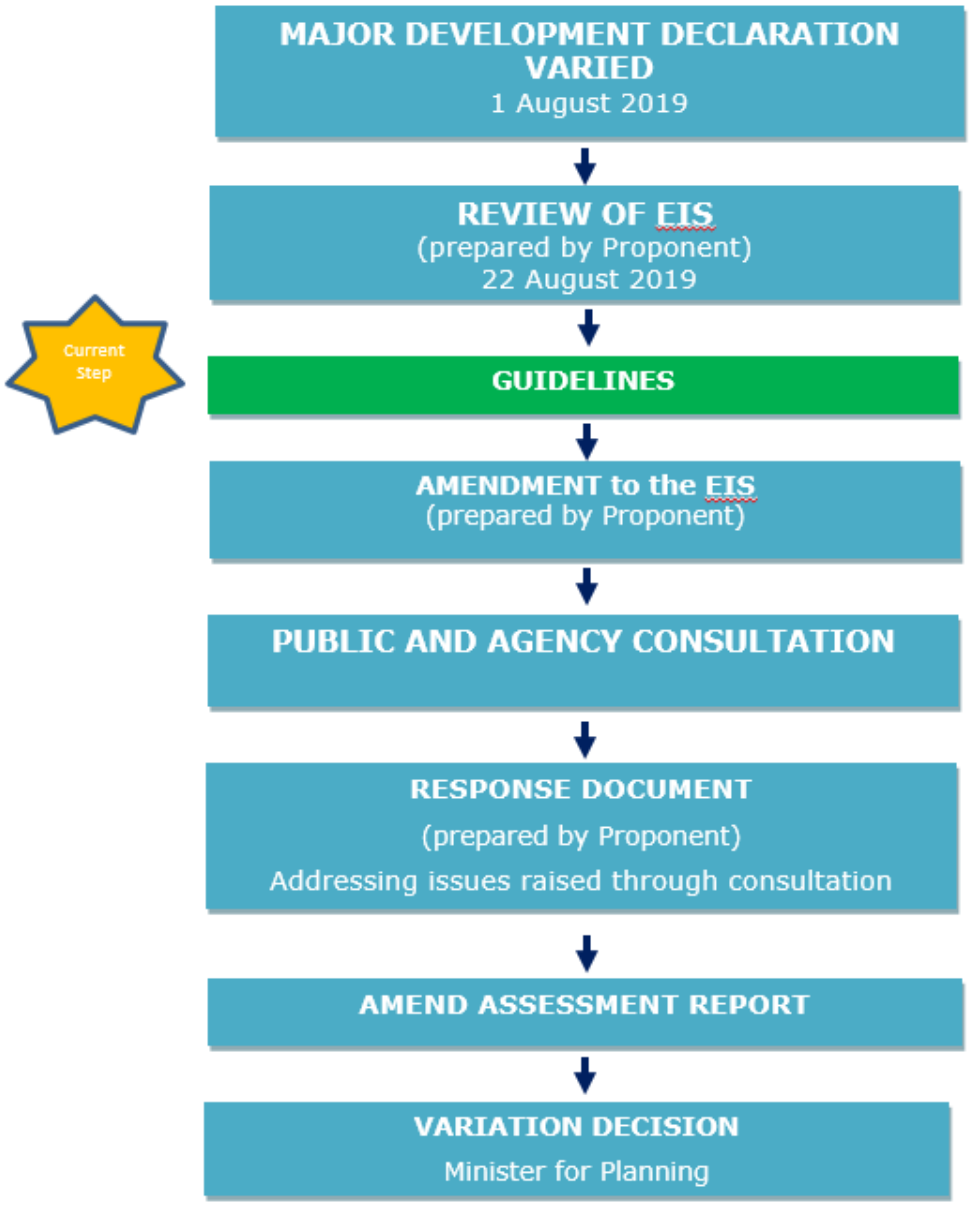
The capital expenditure for the proposed development is $7M and is expected to generate substantial employment opportunities for the region.

3. MAJOR DEVELOPMENT PROCESS AND ROLE OF GUIDELINES

The Major Development assessment process enables the Minister for Planning to utilise impact assessment as a strategic tool.

Impact assessment enables the holistic consideration of proposals that might otherwise be of a nature or scale that is not expected through the regular development assessment process and/or Council Development Plan(s).

The major development assessment process has several steps:



These Guidelines are prepared to inform the preparation of the Amendment to the EIS. They set out the assessment issues associated with the proposal along with their scale of risk as determined by the State Planning Commission.

An Amendment to the EIS must be prepared by the proponent in accordance with the Guidelines and should specifically address each guideline.

Each guideline is intended to be outcome focused and may be accompanied by suggested assessment approaches. These suggestions are not exhaustive, and may be just one of a wide range of methods to consider and respond to a particular guideline.

The Amendment to the EIS should detail any expected environmental, social and economic effects of the development, and the extent to which the development is consistent with the provisions of the Councils Development Plan, the Planning and Design Code, the Planning Strategy and any matter prescribed by the Regulations under the Act.

Whilst not mandatory for this Amendment to the EIS due to it being declared under the Development Act, the proponent may wish to address the State Planning Policies given they are now a relevant planning instrument.

The completed Amendment to the EIS is submitted (by the proponent) to the Minister for public release, and is subsequently referred to the relevant Council(s) and government agencies for comment.

An opportunity for public comment will occur when the completed Amendment to the EIS is released. Public exhibition is undertaken for 20 business days. An advertisement will be placed in the *Advertiser* and local newspapers inviting submissions.

Copies of the submissions from the public, Council and relevant government agencies will be provided to the proponent.

The proponent must then prepare a 'Response Document' to address the matters raised during the public exhibition period.

An Amendment to the Assessment Report is then prepared. The amended Assessment Report and the Response Document will be available for inspection and purchase at a place determined by the Minister for a period determined by the Minister.

Availability of each of these documents will be notified by advertisements in *The Advertiser* and local newspapers. A copy of the Amendment to the EIS, Response Document and the Amendment to the Assessment Report will be provided to Council.

When a proposal is subject to the EIS process, from 1 July 2019 the Minister for Planning makes the final decision under Section 48 of the Act having regard to Regulation 11 (3) of the *Planning, Development and Infrastructure (Transitional Provisions) (Code) Variation Regulations 2019*. .

In deciding whether the proposal will be approved and any conditions that will apply, the Minister for Planning must have regard to:

- provisions of the appropriate Development Plan or Planning and Design Code
- the Development Act and Regulations
- if relevant, the Building Code of Australia
- The South Australian Planning Strategy, including the Integrated Land Use and Transport Plan
- the Amendment to the EIS, Response Document and the Minister's Amendment to the Assessment Report
- if relevant, the *Environment Protection Act 1993*
- any other relevant government policy and/or legislation.

The Minister for Planning can at any time indicate that the development will not be granted authorisation. This may occur if the development is inappropriate or cannot be properly managed. This is commonly referred to as an ***early no***.

4. AMENDMENT TO THE ENVIRONMENTAL IMPACT STATEMENT (AEIS)

The AEIS should be presented in terms that are readily understood by the general reader. Technical details should be included in the appendices.

The report must include the following:

Assessment of expected environmental, social and economic effects
The assessment of effects should include all issues identified in these Guidelines and cross referenced to supporting technical references.

Consistency with Government policy
The *Development Act 1993* requires the AEIS to state the consistency of the expected effects of the proposed development:

- with the relevant Development Plan, Planning and Design Code and Planning Strategy.
- with the objects of the *Environment Protection Act 1993*, the general environmental duty and relevant environment protection policies, and
- with the objects of the *River Murray Act 2003*, the Objectives for a Healthy River Murray and the general duty of care.

Avoidance, Mitigation, Management and Control of adverse effects
The proponent's commitment to meet conditions proposed to avoid, mitigate, satisfactorily manage and/or control any potentially adverse impacts of the development on the physical, social or economic environment, must be clearly stated as part of the AEIS.

The design of the proposal should be flexible enough to incorporate changes to minimise any impacts highlighted by this evaluation or post-operation monitoring programs.

The report should include the following:

Summary
The AEIS should include a concise summary of the matters set out in Section 46B of the *Development Act 1993* and include all aspects covered under the headings set out in the Guidelines, in order for the reader to obtain a quick but thorough understanding of the proposal and the resulting environmental impacts.

Introduction
The introduction to the EIS should cover the following:

- background to, and objectives of, the proposed development
- details of the proponent
- staging and timing of the proposal, including expected dates for construction and operation
- relevant legislative requirements and approval processes
- purpose and description of the AEIS process

Need for the Proposal
A statement of the objectives and justification for the proposal, including:

- the specific objectives that the proposal is intended to meet, including market requirements
- expected local, regional and state benefits and costs, including those that cannot be adequately described in monetary or physical terms (e.g. effects on aesthetic amenity)
- a summary of environmental, economic and social arguments to support the proposal, including the consequences of not proceeding with the proposal.

Description of the Proposal

The description of the proposal should include the following information:

- the nature of the proposal and location
- a project plan to outline objectives, constraints, key activity schedule and quality assurance
- site layout plans (including indicative land division plan, if relevant)
- the construction and commissioning timeframes (including staging)
- a description of the existing environment (including the immediate and broader location)
- a description of the current land use activities occurring in the area
- details of all buildings and structures associated with the proposed development
- details of any other infrastructure requirements and availability
- details of the construction methods to be used
- details on the operation of the proposed development, including proposed maintenance programs
- the relevant Development Plan zones
- management arrangements for the construction and operational phases (including Environmental Management and Monitoring Plans)
- a contingency plan for delays in construction.

Plans and Forms

- Current Certificate(s) of Title.
- **Context and locality plans** should illustrate and analyse the existing environment and site conditions and the relationship of the proposal to surrounding land and buildings. The plan should be drawn to a large scale and be readily legible. The plan(s) should indicate:
    - any neighbouring buildings, infrastructure or facilities, including identification of all nearest sensitive receptors and the likely use of existing or proposed neighbouring buildings (e.g. dwelling, farm outbuildings, shop, office)
    - location of any watercourse, dams, underground wells and/or any other environmentally sensitive areas
    - location of any state heritage and cultural heritage in relation to the site
    - existing native vegetation, regulated or significant trees
    - known sites for protected, threatened or vulnerable species, including migratory species, on the site, the adjoining land and riverine environment
    - existing roads and access tracks (public & private)
    - any other information that would help to set the context for the locality
- **Site plan(s)** clearly indicating all proposed buildings, structures and works (drawn at a scale of 1:100 or 1:200).
- **Elevations** (drawn at a scale of 1:100 or 1:200) showing all sides of the buildings, structures and works with levels and height dimensions provided in Australian Height Datum.
- **Cross sections** of the buildings, structures and works (including any stockpile and storage facilities) showing ground levels, floor levels, ceiling heights and maximum height in Australian Height Datum.
- Any technical or engineering drawings and specifications including geotechnical data, details of cut and fill and depth to groundwater.

Specialist Reports and Details

- A **Water Quality Management Plan** prepared by an appropriately qualified consultant or engineer that includes hydrodynamic modelling of water circulation in the constructed main lake and the maintenance of suitable water quality for recreational users and the environment (including any discharges to the marina waterways, constructed wetlands or the Murray River). The Plan must outline measures to manage and monitor water quality.

- A **transport and access impact assessment** prepared by a suitably qualified traffic and access planner/engineer. The assessment should evaluate current and proposed access arrangements including the effect on the arterial road network and car parking, as well as vehicle interface with the local road network. Any assessment must include the traffic and

access impact for the construction period as well as any ongoing operations and maintenance including details of the traffic/transport vehicle sizes/movements outside of normal gazetted heavy vehicles.

- A **waste management and minimization plan (for construction and operation)** detailing the sources of waste including spoil and removed vegetation, the location of waste management storage areas (including the separation of waste streams, such as recyclables, hard waste and e-waste) and disposal facilities located on site or within laydown areas and provide details of how these facilities will be serviced.

- A **noise assessment** prepared by a suitably experienced, professional acoustic engineering consultant[1] to moderate external and environmental noise disturbance and amenity impacts for residents and other sensitive uses within the immediate area as a result of the proposed development (primarily during construction).

- Details of any proposed **wastewater management**, including segregation, collection, treatment, storage, reuse and disposal of wastewater.

- A **construction environmental management plan** (CEMP) that describes how construction will be managed to mitigate negative environmental impacts to the environment, and public health and the amenity, and how those environmental management requirements will be implemented. Any CEMP should include consideration of a soil erosion and drainage management plan such as details of proposed stormwater management, including any opportunities for retention and reuse.

- A **fire hazard management plan** that considers requirements both during the construction and operational phases - including measures to minimise fire risk at and to/from the site, resources and training required, sources of water to fight fires (and how this water will be accessed), options to utilise and coordinate with other operations in the region/area, and cost recovery.

- A **operational environmental management plan** (OEMP) that describes how operations, in particular maintenance regimes, will be managed to mitigate negative impacts to the environment, and public health and the amenity, and how any ongoing environmental management requirements will be implemented. Any OEMP should include risk management plan which includes consideration of minimising maintenance works during fire danger season.

Sources of Information

- All sources of information (e.g. reference documents, literature services, research projects, authorities consulted) should be fully referenced, and reference should be made to any uncertainties in knowledge. Where judgements are made, or opinions given, these need to be clearly identified as such, and the basis on which these judgements or opinions are made need to be justified. The expertise of those making the judgements including the qualifications of consultants and authorities should also be provided.

- Any technical and additional information relevant to the EIS that is not included in the text should be included in appendices.

- It is **RECOMMENDED** that the AEIS consider issues that may generate concerns based on inaccurate or outdated perceptions. The information provided should explain key concepts in a factual manner. This can help to provide base level information to assist with community understanding of the proposal.

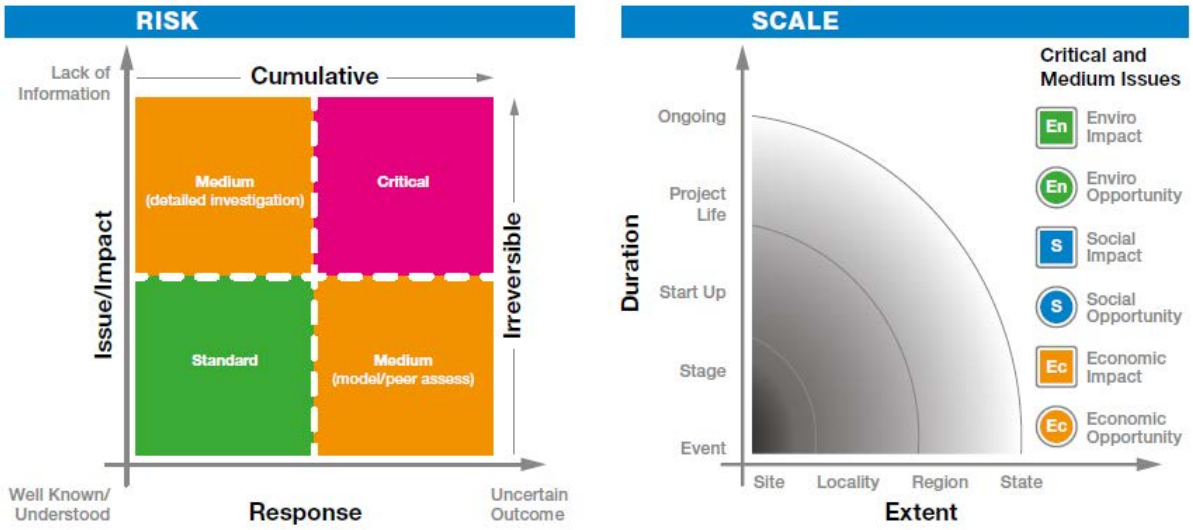
[1] An acoustic engineer is defined as a person eligible for full Member status of both Engineers Australia and the Australian Acoustical Society

5. ASSESSMENT

Impact assessment is an important tool that enables the consideration of projects that might otherwise struggle to be addressed properly or fairly under the 'normal' assessment system.

In setting these Guidelines, the State Planning Commission has considered the scale of issues associated with the project and determined whether they represent issues or opportunities. The potential impacts and issues have then been organised according to the level of work and type of attention required by the proponent: either standard, medium or critical:

- Where the issue is well known and the response is well understood then the risk assessment is classed as '**standard**'
- Where work is required to address the issue but the risk is likely to be manageable with additional information then the risk assessment is classed as '**medium**'.
- Where information about the issue is lacking and the response is unclear, the issue is classed as '**critical**'.



The issues and impacts identified by the Commission as requiring standard, medium or critical level assessment are listed below. Each requirement includes a description of the issue/impact and a description of the action or investigation needed.

To assist with the assessment of the AEIS the proponent is requested to provide a table (as an appendix) that cross references each Guideline requirement (action or investigation needed) with the relevant section and page of the EIS.

NOTE: The investigative requirements of the AEIS do not negate the need for the proponent to obtain all necessary licences, permits and/or management plans prior to undertaking any investigations or works in relation to this AEIS. It also does not negate the need for the proponent to comply with any legislative obligations or duty of care under the relevant legislation.

			Risk		Scale		Level of assessment
No	Issue/Impact	Description	Issue/Impact	Response	Duration	Extent	
1	Land Use and Economic Effects	The proposal will have an impact on the local and regional economy during construction and operation and may result in immediate and long terms effects on marina residents, land owners and surrounding uses. .	The proposal is expected to have a positive impact in terms of employment and contribution to the local economies during construction. Potential impacts on existing and future residents / landowners could include construction effects (especially dust and noise) and ongoing noise and traffic effects during operation (especially due to increased visitation and recreational activities).	The proponent needs to provide an analysis of employment generation opportunities and the economic benefits of the proposal, including flow on effects for the marina development and the region.	During construction and ongoing.	Local and Regional	More information required on: • Strategic tourism related benefits. • Employment opportunities • Multiplier/flow on effects. • Impact on surrounding land uses. **= CRITICAL**
2	Effect on the River Murray	The proposed development is located on the floodplain next to the River Murray, which is an important environment and water resource for South Australia.	The proposal would require the use of river water to fill and maintain water bodies. The management of waterbodies would need to ensure water quality in the river is not detrimentally affected, especially to protect downstream users. The proposed uses would introduce a substantial level of human activity that could cause disturbance the natural environment (especially the Baseby Wetlands)	The proponent would need to detail how water would be sourced and how water quality would be protected.	During construction and ongoing.	Regional and State	The River Murray water resource could be negatively impacted by potential threats to water quality. Need for further assessment, including any interaction with the existing marina development or discharges to the river. **= CRITICAL**
3	Effect on Water Quality	The proposal includes the construction and operation of artificial water bodies for recreational use.	The waterbodies need to be designed and managed to ensure safe use, especially water quality standards. The waterbodies may also interact with the existing waterways.	The proponent needs to detail the design and operational requirements and standards applicable for recreational use and to protect the environment.	Design and ongoing.	On-site and surrounding environment.	Protecting the health and safety of recreational users is essential. Hydrodynamic modelling for the main lake would need to demonstrate how suitable water quality would be maintained. **= CRITICAL**
4	Effect on the Physical Environment	The proposed development has the potential to substantially disturb landforms, soils and groundwater and to affect storm water run-off.	Construction activities (especially for the waterbodies) has the potential to cause erosion (wind and water), sedimentation and the alteration of natural drainage patterns. Waterbody excavations could also intercept groundwater that may be saline.	Whilst the 2006 EIS adequately described the physical environment, the proponent will need to provide a detailed description of the potential effects of the proposed works.	Primarily during construction.	Local	Issue is well understood, but more specific information is required. **=MEDIUM**

			Risk		Scale		Level of assessment
5	Effect on Native Vegetation and Fauna (Terrestrial and Aquatic)	Construction would require the clearance of some native vegetation / fauna habitat and disturbance to fauna species.	Based on the information provided in the 2006 EIS, construction would involve a small amount of clearance of native vegetation that has been degraded by past agricultural uses and salinity (and is of low habitat value). Ecologically important riverine habitat would not be affected. Local fauna would be disturbed by human activity, especially when the water park is in use.	The proponent would need to calculate the amount and type of native vegetation clearance. The level of human disturbance to fauna (especially from noise) would need to be determined.	During construction and operation.	Local	Whilst the receiving environment can be sensitive to change, the issue is well understood, but more specific information is required = **MEDIUM**
6	Effect on Cultural Heritage.	The proposed development has the potential to impact on sites / locations of Indigenous heritage through disturbance during construction.	The proposed development may have impacts on recorded and unrecorded Aboriginal heritage sites, objects and remains, which may be located on the site.	The 2006 EIS provided a detailed description on existing Aboriginal heritage matters. During construction of the existing marina, several identifies sites of significance had to be managed in accordance with the requirements of the Aboriginal Heritage Act.	During construction	State	Issue is well understood, but more specific information is required = **MEDIUM**
7	Hazard Risk	The construction and operation of the proposed development involves a range general and specific risks.	Associated risks include: • Erosion and land contamination. • Acid Sulphate soils. • Public health and safety associated with waterbodies. • Contamination of waterbodies (including algal blooms). • Flood protection. • Road safety.	The proponent will need to provide a detailed risk assessment.	During construction and operation.	Local	Issue is well understood, but more specific information is required on level of risk. = **MEDIUM**
8	Traffic Effects	The proposal requires temporary site access during construction and a permanent access point during operation.	During construction local traffic may be affected, especially for the delivery of materials and infrastructure. During operation local traffic may be affected by increased traffic volumes, especially during peak visitation periods.	The proponent will need to provide a detailed description of traffic impacts and how they would be managed.	During construction and operation.	Locall	More information is required, but impacts would be manageable. **= STANDARD**
9	Introduction/spread of exotic plant and animal species	The proposed development has the potential for the spread of introduced or nuisance plants and animals.	Construction activities could increase the abundance of pest plants or animals (especially weeds). During operation the pest or nuisance species could be attracted (especially scavengers).	The proponent will need to provide a detailed description of the risk and effect of introduced or nuisance plant and animal species to terrestrial and aquatic environments.	During construction and operation.	Local	More information is required, but impacts would be manageable. **= STANDARD**

			Risk		Scale		Level of assessment
			The waterbodies would need to be managed to minimise pest species populations (especially aquatic weeds and European Carp).				
10	Construction, Operation and Maintenance Effects	The construction and operation of the proposal would require a range of impacts to be minimised, mitigated and monitored through an environmental management plan framework.	A range of standard and specific impacts would need to be adequately addressed (including consultation with stakeholders and the adoption of a risk analysis approach and relevant industry standards).	The proponent will need to outline the proposed construction and operational management techniques and measures.	During construction and ongoing.	Local and Regional	More information is required, but impacts would be manageable. = **STANDARD**
11	Legislation, Policies and Strategies	A range of planning, environmental and energy related statutory requirements would need to be met for the construction and operation of the proposed development.	The proposal will need to comply with relevant State and Australian government legal requirements, policy directions and strategic objectives.	The proponent will need to provide a detailed description of all relevant requirements.	During construction and ongoing.	N/A	Issue is well understood, but more specific information is required. **= STANDARD**

CRITICAL ASSESSMENT

Land Use and Economic Effects

Assessment Requirement 1: The proposal will have an impact on the local and regional economy during construction and operation and may result in immediate and long term effects on marina residents and surrounding uses.

1.1 *Identify the main land uses in the area and the level of impact on residents / landowners and land uses in the immediate and surrounding environs during construction and operation.*

1.2 *Describe the proximity of the proposal to existing and future dwellings and any potential impacts of the proposal on quality of lifestyle*

1.3 *Outline any mitigation measures to alleviate or avoid impacts on surrounding residents / landowners and land uses.*

1.4 *Provide a full economic analysis of the proposal including details on the economic effects in terms of the benefits to the existing marina development, the Mannum township and the broader region during the construction and operational phases of the proposed development (including the 'multiplier effect').*

1.5 *Describe potential employment opportunities and the expected impacts on communities.*

1.6 *Identify potential economic effects on tourism and recreation.*

1.7 *Identify any economic implications for the region if the proposal does not proceed.*

1.8 *Describe the visual effect on the amenity of the local communities, tourism values / experiences and landscape quality (especially the River Murray).*

Effect on the River Murray

Assessment Requirement 2: The proposed development is located on the floodplain within close proximity of the River Murray, which is an important water resource.

2.1 *Calculate the amount of water that would be taken from the river to initially fill the constructed waterbodies and on an annual basis to maintain them (i.e. due to evaporation).*

2.2 *Outline the arrangements for securing a water allocation for the filling and maintenance of water levels in the waterbodies, including the location where the allocation could be sourced from.*

2.3 *Describe how the development could affect the water resource values and users of the River Murray, particularly downstream water supply intakes.*

2.4 *Outline the visual effects from the River Murray and environs of the proposed development in this locality, especially the appearance and built form of buildings and structures.*

2.5 *Describe the effect of the proposed development on riverine environment, especially as a result of any discharges from the waterbodies and by increased human activity.*

2.6 *Describe any effects of the proposed development on the biological diversity and conservation significance of the Baseby Levee Wetland system.*

2.7 *Describe the general impact of increased recreational activities, including pollutant loads and noise.*

2.8 *Describe how the constructed water bodies would be managed during times of manipulated high and low river levels.*

2.9 *Detail the measures to protect the river and wetlands during and after construction.*

2.10 *Describe how public access to the river front would be managed.*

Water Quality

Assessment Requirement 3: Suitable water quality maintained within the constructed waterbodies for recreational uses and to protect the environment.

3.1 *Outline measures to protect and maintain suitable water quality in the proposed water bodies, particularly the management of run-off and salinity and the control of sediment, micro-organism and pollutant sources (including nutrients, herbicides, pesticides and any chemical treatments).*

3.2 *Detail how sufficient water turn-over rates and flushing will be achieved for the waterbodies, especially through the use of modelling for the main recreational lake. Integration with the current management of waterbodies and wetlands should also be detailed.*

3.3 *Outline measures to protect and maintain suitable water quality in the existing waterways and constructed wetlands (including current management and monitoring).*

3.4 *Describe the impact that water discharged from the waterbodies may have on water quality and the health of the river.*

3.5 *Describe water sensitive urban design measures that could be adopted.*

3.6 *Describe the approach to water sustainability, including ways in which mains water supply use can be minimised or supplemented and opportunities for recycling water (particularly stormwater).*

MEDIUM ASSESSMENT

Effect on the Physical Environment

Assessment Requirement 4: The proposed development has the potential to disturb landforms, soils, groundwater and to affect surface water run-off.

4.1 *Describe the existing groundwater and land related environmental conditions, especially salinity.*

4.2 *Describe the short and long term effects of fill placement and the construction of waterbodies on land and/or groundwater quality and movement, including measures to manage salinity.*

4.3 *Identify any risks and implications of causing or exacerbating land degradation (especially soil erosion) and the impacts of dust emissions during construction.*

4.4 *Describe potential changes to hydrology (e.g. drainage patterns or groundwater characteristics), including the implications of these changes on aquatic and terrestrial environments.*

4.5 *Outline mitigation measures and their likely effectiveness in minimising or avoiding disturbance to the physical environment (including surface waters and groundwater) during construction and operation.*

4.6 *Describe stormwater and wastewater management and the potential impact on land and/or groundwater.*

Effect on Native Vegetation and Fauna (Terrestrial and Aquatic)

Assessment Requirement 5: Construction would require limited clearance of native vegetation (and reduction of fauna habitat) and disturbance to fauna species.

5.1 *Describe the location, extent, condition, habitat value and significance of native vegetation species and communities that may need to be cleared or affected during construction.*

5.2 *Describe the location, extent, condition and significance of native fauna species and populations that may be affected during both construction and operation (especially disturbance due to noise or human activities).*

5.3 *Outline measures to mitigate the effects on native vegetation and fauna.*

5.4 *Describe the establishment and management of aquatic and fringing vegetation (natural, planted or introduced) associated with the constructed waterbodies.*

Effect on Cultural Heritage

Assessment Requirement 6: The proposed development has the potential to impact on sites / locations of Aboriginal heritage through disturbance during construction.

6.1 *Identify any effects on Aboriginal sites of archaeological or anthropological significance (including but not limited to those listed in the Register of the National Estate and the SA Register of Aboriginal Sites and Objects). Indicate any consultation with local Aboriginal organisations that have an in interest in the area.*

6.2 *Outline measures adopted to avoid or minimise impacts on Aboriginal sites of archaeological or anthropological significance.*

Hazard Risk

Assessment Requirement 7: The construction and operation of the proposal involves a range general and specific risks.

7.1 *Detail procedures to be adopted to identify whether acid sulphate soils are present and management measures that would be required during construction and operation.*

7.2 *Detail procedures to be adopted to identify whether the land is contaminated and management measures that would be required during construction and operation.*

7.3 *Describe strategies for ensuring public safety during construction and operation, including the management of boats and jet skis.*

7.4 *Describe any hazardous materials, with reference to storage, use, handling and disposal of these materials during construction and operation.*

7.5 *Describe procedures and strategies to prevent, manage and mitigate pollutant spills, sewage leaks or algal blooms, including the ability to isolate the water bodies from the river and constructed wetlands.*

7.6 *Detail the relevant requirements of the flood protection policies in the Development Plan and how compliance would be achieved.*

7.7 *Describe strategies to ensure public safety on and around the water bodies, especially the recreational use of water bodies in accordance with relevant health standards.*

STANDARD ASSESSMENT

Traffic Effects

Assessment Requirement 8: The proposal requires access for the transportation of construction materials and infrastructure to site and a permanent access point for ongoing operation.

8.1 *Describe all traffic types and volumes during the construction and operational phases (especially during peak periods) and traffic management measures.*

8.2 *Identify any potential effects of traffic on communities, including, road safety, convenience, noise and dust.*

8.3 *Describe any requirements where traffic infrastructure requires temporary or permanent modifications and access requirements that may be needed for local and /or arterial roads during construction and for ongoing traffic volumes.*

Introduced Plant and Animal Species

Assessment Requirement 9: The proposed development has the potential for the spread of introduced or nuisance plants and animals

9.1 *Identify the potential for the introduction or dispersal of new pest or nuisance plant and animal species, and the associated implications for native species, habitat and agricultural land.*

9.2 *Identify the potential for increased distribution and abundance of existing pest or nuisance plant and the associated implications for terrestrial and aquatic environments.*

9.3 *Outline mitigation measures and their effectiveness in reducing or avoiding the introduction or spread of pest or nuisance plant and animal species.*

Construction, Operation and Maintenance Effects

Assessment Requirement 10: The construction and operation of the proposal would require a range of impacts to be minimised, mitigated and monitored through an environmental management plan framework.

10.1 *Provide a site construction plan (including construction techniques and the timing of construction activities) and outline strategies to minimise effects on residents, the community and the local environment. The plan should also outline any on site infrastructure required during construction (e.g. site compounds, storage areas etc.), including the management and decommissioning of these sites.*

10.2 *Describe the proposed methodology and frequency for floodplain excavation (or dredging), earthworks drainage, the disposal of excavated material, maintenance activities and the impacts on the environment (particularly turbidity and water quality).*

10.3 *Identify the source and origin of any construction materials, including revetments and fill for land forming.*

10.4 *Describe the implications of placing a large amount of fill on the floodplain, particularly contamination and implications for natural drainage, water circulation and flood management.*

10.5 *Identify measures for the control of stormwater run-off, mud (including drag out onto public roads), vibration, litter, dust, noise, odour (including from rotting aquatic vegetation, algal blooms and organic soils) and other emissions during construction.*

10.6 *Outline waste management strategies and the potential for incorporating recycling and resource recovery.*

10.7 *Describe the impact the proposed development will have on any gas, electricity, water, sewerage, stormwater management and telecommunication systems infrastructure.*

10.8 *Describe the use of amenity/landscape plantings (including lawn areas) and broad scale revegetation, especially the opportunities for the use of locally endemic species. The effectiveness of existing revegetation works around the marina should be considered.*

10.9 *Identify the implications for maintenance dredging or removal of aquatic plant growth, including disposal options and impacts on the environment and community.*

10.10 *Provide information on the expected levels of noise associated with the operation of the facility, identifying all potential noise sources, and describe the extent to which these noise emissions could be reduced and contained to minimise the effects upon the environment, the residential community and the wider locality.*

10.11 *Outline measures to be adopted to control nuisance insects, particularly mosquito populations and other potential disease vectors that could pose a risk to human health.*

10.12 *Detail measures to ensure that residential, recreational and commercial activities would be conducted in an environmentally sustainable manner, particularly to protect water quality.*

10.13 *Identify opportunities for energy and water conservation.*

10.14 *Outline the proposed environmental management measures that would be adopted to deal with the identified construction, operational and maintenance effects. Include reference to any baseline studies, monitoring programmes, training programmes and reporting mechanisms (internally and to public authorities). Outline the effectiveness of mitigation measures for perceived and recognised impacts. Include consideration of previously demonstrated best practice or approaches which may have been used for similar works in similar habitats, which may be of benefit and/or have been endorsed for their proven low impact effects.*

10.15 *Describe the proposed monitoring of impacts during and after construction, particularly water quality (including consideration of the existing data collection).*

Planning and Environmental Legislation and Policies

Assessment Requirement 11: A range of planning and environmental related statutory requirements would need to be met for the construction and operation of the proposed development.

11.1 *Describe the proposed development in terms of its consistency with the relevant Development Plans, Planning and Design Code, the Planning Strategy and the State Planning Policies.*

11.2 *Describe the proposed development in terms of its consistency with relevant State and Commonwealth legislation, including the River Murray Act 2003 and the Murray Darling Basin Agreement.*

APPENDIX 1 – USEFUL DOCUMENTS

Legislation

- *Development Act 1993*
- *Development Regulations 2008*
- *Public Health Act 2011*
- *Environment Protection Act 1993*
- *Native Vegetation Act 1991*
- *River Murray Act 2003*
- *Natural Resources Management Act 2004*
- *Native Title Act 1994*
- *Aboriginal Heritage Act 1988*
- *National Parks and Wildlife Act 1972*
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

Strategy & Policy

- Development Plans and Planning and Design Code
    - Mid Murray Council
- Region Plans
    - Murray and Mallee Region Plan
- State Planning Policies, 2019
- Water Allocation Plan for the River Murray Prescribed Watercourse, 2019.
- Natural Resources South Australia Murray-Darling Basin Strategic Plan, 2014.
- Environment Protection (Noise) Policy, 2007
- Environment Protection (Water Quality) Policy, 2015
- Environment Protection (Air Quality) Policy, 2016
- Environment Protection (Waste to Resources) Policy, 2010
- South Australia's Waste Strategy 2015 – 2020, Office of Green Industries SA
- Building Code of Australia

Guidelines

- NHMRC Guidelines for Managing Risks in Recreational Water, 2008
- EPA Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry, 1999
- EPA Construction Environmental Management Plans Guidelines, 2018
- Guide for Applications to Clear Native Vegetation, 2017

Appendix B Letters of Support

FROM THE OFFICE OF THE MAYOR

Ref: 3/COM/MWCWG/1/MM

15 March 2019

David Potter
Mannum Waters
Tallwood Pty Ltd
PO Box 897
MORPHETT VALE SA 5162

Dear David,

Council acknowledges your email dated 6 March 2019 with respect to the proposed amendment to your Major Development approval for Mannum Waters.

We understand you are seeking to amend the approval to include in the plan for Mannum Waters, a Water Park/Holiday Village.

As we have discussed previously, Council are 'in principle' supportive of the proposed amendment, however I also note that as part of the process Council staff will be given the opportunity to provide a formal response once all relevant documentation has been submitted to DPTI. We look forward to this opportunity.

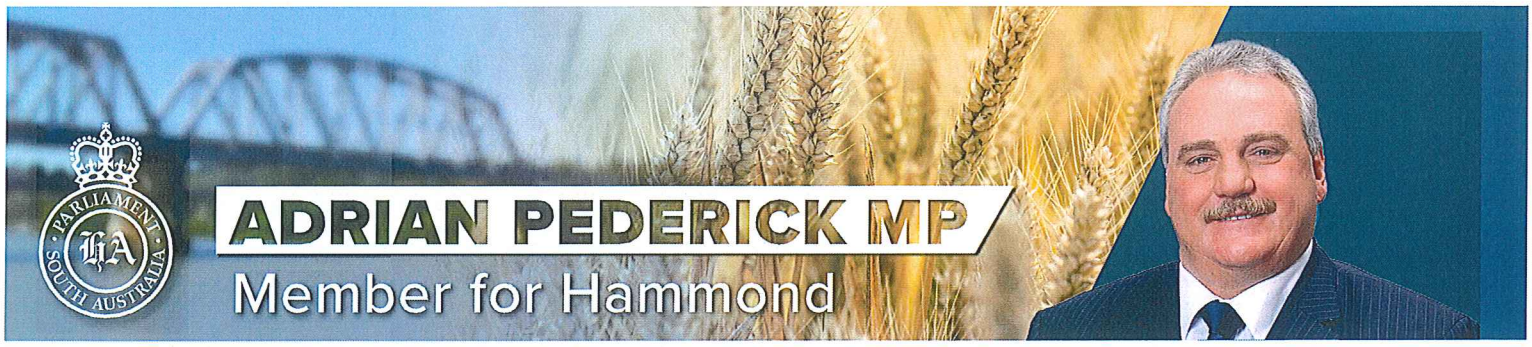
Thank you for keeping the Council informed on the proposed plans for Mannum Waters.

If you have any questions please contact Council's Director – Development & Environmental Services, Jake McVicar on 8564 6020 or postbox@mid-murray.sa.gov.au.

Yours faithfully

D. Burgess

Dave Burgess
MAYOR



REF: 200004787
Please quote REF No

Mr David Potter
Project Manager
Tallwood Pty Ltd
PO Box 897
MORPHETT VALE SA 5162

To whom it may concern.

Amendment of Mannum Waters major development declaration

I wish to express my support for the further development of a Holiday Village and a Water Park on the Mannum Waters site.

I have viewed the proposal and believe this would be a great addition to tourism facilities adjacent to the river. I am very impressed with the quality of this development and believe that further development on the site will enhance an opportunity for economic growth in the region.

This proposal would also create further employment and economic activity for the township of Mannum and surrounding districts.

Yours sincerely,

ADRIAN PEDERICK MP JP
Member for Hammond
Government Whip in the House of Assembly
Presiding Member; Environment, Resources & Development Committee
Chair, Regional Affairs Committee

15/3/19

Building a positive future for Hammond

8531 1676 | hammond@parliament.sa.gov.au | 20 Mannum Rd, Murray Bridge SA 5253
adrianpederick.com.au /AdrianPederickMP @AdrianPederick

Regional Development Australia
MURRAYLANDS & RIVERLAND
SOUTH AUSTRALIA

MURRAYLANDS OFFICE
137 Adelaide Road
PO Box 134
Murray Bridge SA 5253
P: 08 8535 7170

RIVERLAND OFFICE
6 Kay Avenue
PO Box 839
Berri SA 5343
P: 08 8580 8500

info@rdamr.com.au
www.rdamr.com.au
ABN: 32 137 252 384

14 March 2019

Mr David Potter
Project Manager
Mannum Waters

Via email: potdc@icloud.com

Re: Mannum Waters Holiday Village and Water Park

It is my pleasure to write a letter of support on behalf of Regional Development Australia Murraylands & Riverland (RDAMR) for Tallwood, the developers behind Mannum Waters. They are applying to the Department of Planning, Transport & Infrastructure (DPTI) to amend the Major Development application to add a Holiday Village and a Water Park development to "Schedule 1 – Specified Kinds of Development".

Since Mannum Waters gained approval to allow construction to commence in 2010, Tallwood has undertaken significant advances in the project. However, to maintain progress and increase the desirability of the destination, it is necessary for them to increase the draw of the destination and the Water Park and Holiday Village are seen as a viable option to achieve this. Tourism is one of the most significant economic drivers for regions along the Murray River. It accounts for 15% of the Murray River, Lakes and Coorong region's workforce (1,400 jobs) and $145M of the region's economy.

The provision of the Water Park and Holiday Village will replace 26 waterfront allotments and 26 non-waterfront allotments on the currently approved plan. The Holiday Village will provide water frontage and access to the Murray River plus an Adventure Water Park of scale not seen, so far, in South Australia. These developments will be particularly effective in bringing new visitors to the area, whilst encouraging others to establish holiday homes in the vicinity and reinforce the infrastructure and services for permanent residents.

As the region's primary economic development agency, RDAMR has a long-term vision to achieve a vibrant, resilient region that capitalises on change, embraces economic development and prosperity, and provides an inspirational living, investment and working environment. We have been privy to have read some draft plans and working papers on the proposed works and believe they align seamlessly with our vision.

RDAMR is aware that an Environmental Impact Statement undertaken has dealt with all aspects of Aboriginal Heritage, native vegetation, groundwater and soil contamination and we commend Tallwood for addressing potential impacts on the area.

We strongly support Tallwood's application for an amendment to the Mannum Waters Major Development Declaration and wish them well with their application.

Yours sincerely,

Jo Podoliak
Chief Executive Officer

cc: John Coombe OAM, Acting CEO, Mid-Murray Council

Building stronger regions

Appendix C A Discussion Paper on the use of River Murray Water at Mannum Waters

A discussion paper on the use of River Murray water at Mannum Waters

Tallwood Pty Ltd

30th April 2020

Background

Mannum Waters was granted a Provisional Development Authorisation by the Governor on 30 October 2008. Following consideration of Reserved Matters, approval to undertake construction was obtained on 1st April 2010.

Currently an Amended Environmental Impact Statement is being prepared to allow the assessment of two additional projects for inclusion in the Major Development. They are a Holiday Village and an Adventure Water Park.

Under the original approval, specific areas of open water surface were included to allow boat movement, and permanent and ephemeral wetlands were included for improvements to the environment and the extension of habitats. These water areas were directly connected to the River Murray with surface levels fluctuating with the normal River Murray pool levels at Mannum. Filling the water bodies and wetlands and maintaining their level against evaporation losses required water allocations from the River Murray. These have been acquired on the open market with the appropriate site and works approvals and through the use of ELMA water to assist with salinity control.

The extreme rise in water purchase costs and the environmental needs for conservation make it essential that following the change of development, water use is curtailed as much as possible and that the revised areas do not exceed the original approval. Consequently, Tallwood has reviewed the provision of the waterways and permanent wetland water and how it may utilise ephemeral wetlands to a greater degree by the controlled supply of water.

Location

Mannum Waters is located on the boundary of the Eastern Mount Lofty Ranges (EMLR)-Water Allocation Plan and the River Murray (RM)-Water Allocation Plan

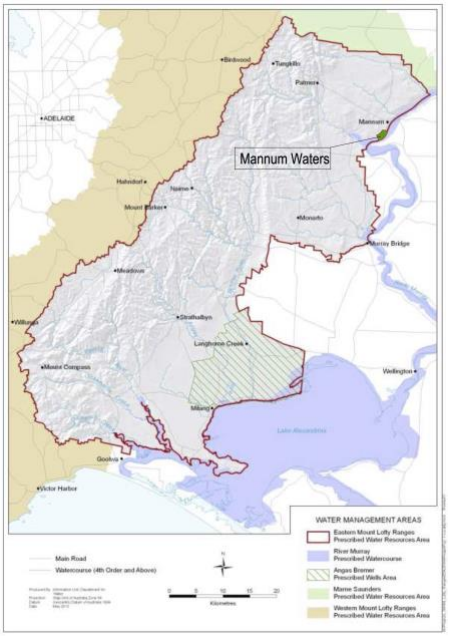


Fig. 1 Mannum Waters overlapping the border of the Eastern Mount Lofty Ranges-WAP

Water Use from the River Murray

Prior to construction commencing, rainwater flowed to the old floodplains at Mannum Waters from a catchment within the Eastern Mount Lofty Ranges-WAP area. This included flow from the surrounding hillsides, from drainage creeks and swales and from rainfall which landed within the floodplains. All rainfall was contained on the floodplains, as a levee, at the boundary with the adjacent Crown Land, prevented flow to the River Murray. In turn the levee, since its construction prevented all flows on the river from entering the flood plains, other than the 1956 flood.

In the EMLR-WAP, "Figure 1.2 Eastern Mount Lofty Ranges PWRA surface water catchments", this particular catchment is identified as Bees Knees and later in "Figure 1.9 Surface water catchments in the Eastern Mount Lofty Ranges PWRA for the purposes of water resource capacity", it is included in the Long Gully Group. The Long Gully group was assessed as having no capacity for prescribed water resources. Consequently, all water within the catchment remains available for environmental use.

The EMLR-WAP makes the point in Section 2.1.2: "The objects of the NRM Act include assistance in achieving ecologically sustainable development in the State by establishing an integrated scheme to promote the use and management of natural resources in a manner that:

- recognises and protects the intrinsic values of natural resources;
- seeks to protect biological diversity and, insofar as is reasonably practical, to support and encourage the restoration or rehabilitation of ecological systems and processes that have been lost or degraded; "

"Section 2.2 Environmental Water Requirements of the Eastern Mount Lofty Ranges PWRA" specifically identifies the environmental water requirements provided by surface water. In particular the environmental objective is stated as:

"An environmental objective was set for the region to describe the desired state that is to be achieved by providing environmental water requirements. This objective is to maintain and/or restore self- sustaining populations of aquatic and riparian flora and fauna which are resilient in times of drought. This objective aims to conserve biota and ecosystems currently or likely to be present in the region through the establishment of a suitable water regime. This will promote resilience through increasing species population numbers and distribution. It is not the intention of the objective to restore the habitat and ecosystems to pre-European conditions."

With the reconstruction of the floodplains into the waterways and wetlands of Mannum Waters, the flows which emanate from the EMLR catchment continue to support this objective.

Prior to construction all water flowing to the Mannum Waters site either infiltrated the soil surfaces of the hillsides and creek beds or flowed to the floodplains and generally evaporated as the floodplains have been shown to be practically impermeable and losses to the groundwater were insignificant.

Water now arriving at the Mannum Waters waterbodies and wetlands is therefore coming from two sources, firstly from within the EMLR and secondly being received from the River Murray. The ruling equation is:

Water used at Mannum Waters includes water from evaporation at permanent water surfaces plus irrigation water to landscaped areas

=

Water arriving annually from the EMLR catchment

+

Water received from the River Murray

At the moment full account is not being given for water arriving from the EMLR or for that which falls on the Mannum Waters Site. Rainwater which falls on the water bodies and the permanent wetlands is accounted for within the allowance for evaporation losses.

In February 2019, the Government of South Australia through Natural Resources – Murray Darling Basin issued the fact sheet "Water Allocation Plan for the River Murray Prescribed Watercourse - Water licences for marinas, canal estates and other artificial water bodies" Essentially this fact sheet reiterated the earlier Fact Sheet 91. However, it does not include the disallowance of off-sets and it does not require the evaporation allowance to be linked to annual restrictions. The relevant clause on this matter is as follows:

"The annual water use of an artificial water body remains the volume of water required to compensate for annual net evaporation losses each year, even during years when there may be restrictions placed on water allocations."

The fact sheet is relevant to water taken from the River Murray but not for the water received from the EMLR. However, the Fact sheet makes the point that:

"If an artificial water body is constructed by enlarging an existing anabranch, backwater or other natural water body, the development application will need to clearly specify the extent of the enlargement and a licence and water allocation will only be required for the volume of the enlarged area."

Mannum Waters water bodies and wetlands have been constructed on a natural water body viz. an extensive floodplain isolated from the river Murray through levee construction. The waterbody was ephemeral, as for much of the time evaporation exceeded rainfall. However, as discussed later there were times when the catchment contained water for a significant time. Prior to the present level of construction, the water flowing to the Mannum Waters site on average each year was assessed as 457.95ML. This was identified in the original Environmental Impact Statement for Mannum Waters.

At Mannum Waters rather than enlarging the size of the natural water body (floodplain area), construction works will actually diminish the size of the water body of 86.0ha to a combined permanent water surface area of 37.93ha (see Table 2).

Table 1 shows the predictions of water flows to permanent water surface areas at Mannum Waters based on the original development approval.

Item	Area ha	Run-off coeff. or water gain coeff.	Annual rainfall to river flats (ML)	Comments specific to item
Marina Waterbody	8.28	1.00	25.18	
Marina Road Reserve	3.23	0.70	6.88	Run-off directly to the waterways
Residential allotments	44.63	0.20	27.14	Low density with rainwater tanks
Residential waterways	15.10	1.00	45.92	
Residential road reserves	10.85	0.50	16.50	Kerbed
Commercial area	0.68	0.70	1.45	High level of impervious areas
Parks	7.91	0.03	0.72	Gentle to steep slopes
Aboriginal heritage areas	1.38	0.03	0.13	Medium slopes
Golf course extension	7.01	0.03	0.64	Gentle to steep slopes
Revegetation areas	23.15			Generally separated from the waterbodies
Landscaped embankments	6.53	0.50	9.93	1:4 slopes
Constructed permanent wetlands	6.60	1.00	20.07	
Constructed ephemeral wetlands	12.50	1.00	28.51	Portion only
Constructed wetland riparian areas	24.55	0.02	1.49	Proportion contributes to waterbodies and wetlands
Creek catchment	3100	0.02	188.54	Mostly gentle slopes, pasture, defined creek
Total			**373.10**	

Run-off coefficients were determined by Kellog, Brown and Root for the EIS in 2007

Table 1. Water flows to areas of permanent water surfaces – original design 2007

Under present arrangements, evaporation is calculated on the permanent water surface areas. On the original proposal this includes the Marina waterbody, the residential waterways, the constructed permanent wetlands and those portions of the constructed ephemeral wetlands which are permanent. Currently evaporation losses are assessed at 800mm of evaporation/year. The amount takes into account the difference between average evaporation and annual rainfall. The loss by evaporation was therefore predicted as occurring over 39.36ha of water surface with a total annual loss of 314.9ML. Deleting the permanent water areas from the items in Table 1 (119.69ML), the available water from the rest of the catchment in an average year is 253.4ML. On this basis a volume of 61.5ML would be taken from the River Murray in an average year.

In the redesign which includes the Adventurer Water Park and the Holiday Village the revised areas on completion will be as shown in Table 2:

Item	Area ha	Run-off coeff. or water gain coeff.	Annual rainfall to river flats (ML)	Comments specific to item
Marina Waterbody	8.28	1.00	25.18	
Marina Road Reserve	3.23	0.70	6.88	Run-off directly to the waterways
Residential allotments	39.55	0.20	24.05	Low density with rainwater tanks
Residential waterways	14.95	1.00	45.46	
Residential road reserves	10.15	0.50	15.43	Kerbed
Commercial area	0.68	0.70	1.45	High level of impervious areas
Parks	9.02	0.03	0.82	Gentle to steep slopes
Aboriginal heritage areas	2.85	0.03	0.26	Medium slopes
Golf course extension	7.01	0.03	0.64	Gentle to steep slopes
Revegetation areas	16.16			Generally separated from the water bodies.
Landscaped embankments	6.53	0.50	9.93	1:4 slopes
Constructed permanent wetlands	6.98	1.00	21.23	
Constructed wetland riparian areas	27.00	0.02	1.64	
Holiday Village	5.33	0.04	0.65	Medium density with rainwater tanks
Holiday Village waterbody	3.60	1.00	10.95	
Adventure Water Park Main area	6.96	0.03	0.63	Low density
Adventure Water Park Lake	4.12	1.00	12.53	
Creek catchment	3100.00	0.02	188.54	Mostly gentle slopes, pasture, defined creek
Total			**366.27**	

Run-off coefficients were determined by Kellog, Brown and Root for the EIS in 2007

Table 2. Water flows to areas of permanent water surface – new design 2020

In this current proposal, the Marina waterbody, the residential waterways, the Holiday Village waterbody, The Adventure Water Park Lake and constructed permanent wetlands represent the permanent water surfaces. The loss by evaporation will be over 37.93ha of water surface with a total annual loss of 303.4ML. Deleting the permanent water areas from the items in Table 2 (115.35ML) the available water from the rest of the catchment in an average year is 250.9ML. On this basis a volume of 52.5ML would be taken from the River Murray in an average year.

At the present stage of the current development, the details are as follows:

Item	Area ha	Run-off coeff. or water gain coeff.	Annual rainfall to river flats (ML)	Comments specific to item
Marina Waterbody	8.28	1.00	25.18	
Marina Road Reserve	3.23	0.70	6.88	No kerbing
Residential allotments (developed)	13.11	0.20	7.97	Low density with rainwater tanks
Residential allotments (un-developed)	26.44	0.03	2.41	Gentle to steep slopes
Residential waterways	14.95	1.00	45.46	
Residential road reserves (developed)	4.09	0.50	6.22	Kerbed
Residential road reserves (un-developed)	6.06	0.03	0.55	Gentle to steep slopes
Commercial area	0.68	0.03	0.06	Gentle to steep slopes
Parks	9.02	0.03	0.82	Gentle to steep slopes
Aboriginal heritage areas	2.85	0.03	0.26	Medium slopes
Golf course extension	7.01	0.03	0.64	Gentle to steep slopes
Revegetation areas	16.16			Separated from waterways
Landscaped embankments	6.53	0.50	9.93	1:4 slopes
Constructed permanent wetlands	10.19	1.00	30.99	
Constructed wetland riparian areas	23.79			Do not contribute to waterbodies and and wetlands
Holiday Village	5.33			Isolated from water bodies
Holiday Village waterbody	3.60			Isolated from water bodies
Adventure Water Park Main area	6.96			Isolated from water bodies
Adventure Water Park Lake	4.12			Isolated from water bodies
Creek catchment	3100.00	0.02	188.54	Mostly gentle slopes, pasture, defined creek
Total			**325.91**	

Run-off coefficients were determined by Kellog, Brown and Root for the EIS in 2007

Table 3. Water Flows to areas of permanent water surface at the present time

At the present time, the Marina waterbody, the residential waterways and constructed permanent wetlands represent the permanent water surfaces. The loss by evaporation will be over 33.42ha of water surface with a total annual loss of 267.36ML. Deleting the permanent water areas from the items in Table 3 (101.63ML) the available water from the rest of the catchment in an average year is 224.3ML. On this basis a volume of 43.1ML would be taken from the River Murray in an average year.

The two following cross-sections show the different profiles from the original site to the final one after reshaping. The opening to the river provides the opportunity for a two-way gravity flow.

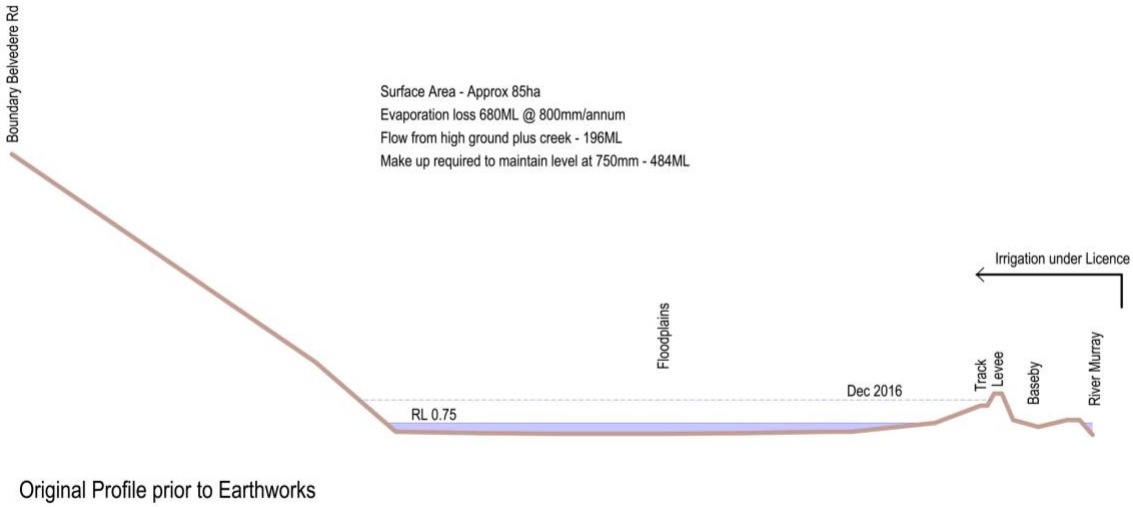


Fig. 2 Original profile North to South

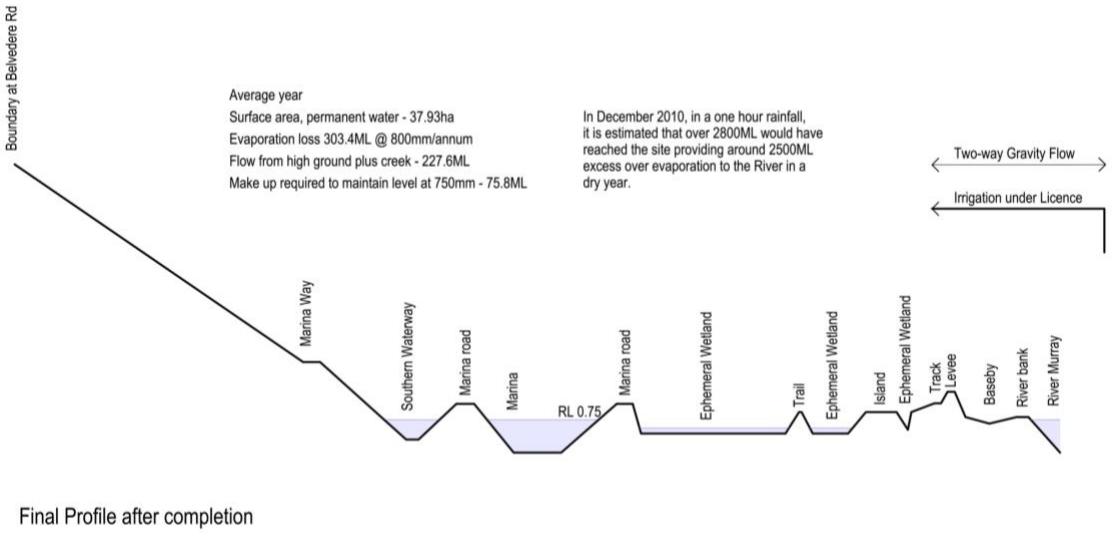


Fig. 3 Final profile with various embankments limiting storage at 750mm

The various embankments limit where the permanent water can access at the 750mm pool level. A December 2016 one-hour rainfall would have seen a considerable amount of water entering the River Murray had the entrance through the levee been open at that time.

An average year

In all of the above, it has been assumed that it is appropriate to use an average year in the EMLR catchments to assess the water requirements. This principle was established in Fact Sheet 91. In reality, make up water from the River Murray will vary from year to year, however poor flows in the River do not necessarily coincide with poor falls in the EMLR.

In December 2010, the River Murray was just beginning to emerge from the millennium drought and was subject to 67% irrigation restrictions. At that time, Mannum Waters and surrounds experienced a massive downpour. Estimated at a 1 in 500 frequency rainfall and depositing 150mm over the creek catchment in an hour, water flooded into Mannum Waters completely filling newly created waterways and overflowing into the floodplains. No water could gain access to the river due to the levee, but in that one downpour the annual evaporation would have been more than met, see photos below.

The creek flows to Mannum Waters are spasmodic and run-off coefficients are subject to conjecture. However, there needs to be an agreed basis for calculations which recognises that annual variations will occur and that for operational purposes simple averages offer the most appropriate solution for annual calculations. In Tallwood's opinion, the contributing flows to the waterways from the EMLR catchments cannot be ignored in those calculations otherwise excessive payments will be made for water not actually taken.

ELMA Water

Applying water to soil on irrigated and non-irrigated land in the LMRIA is a management approach to address salinity and acid sulphate soil issues. Tallwood currently has an annual allocation of 127.356ML. This was based on an irrigation rate of 6.44L/ha. The newly proposed optimised rate of 4.49L/ha would reduce the ELMA allocation at Mannum Waters to 88.793ML.

Groundwater at Mannum Waters is very high in total dissolved salts particularly below the old floodplains (31,000 ppm to 63,000 ppm) approximately 1.3m to 2.5m below the flood plain surface of RL -0.5m. Fresh water within the new water bodies and wetlands provide a positive back pressure on the groundwater at virtually no loss due to the practically imperviousness nature of the soil. Tallwood has assumed that this is an appropriate use of ELMA water, assisting in providing a depth of soil to sustain vegetation and an extension of new habitats.

New Design

The Amended EIS proposes a change of some of the present permanent wetlands in the following sequence.

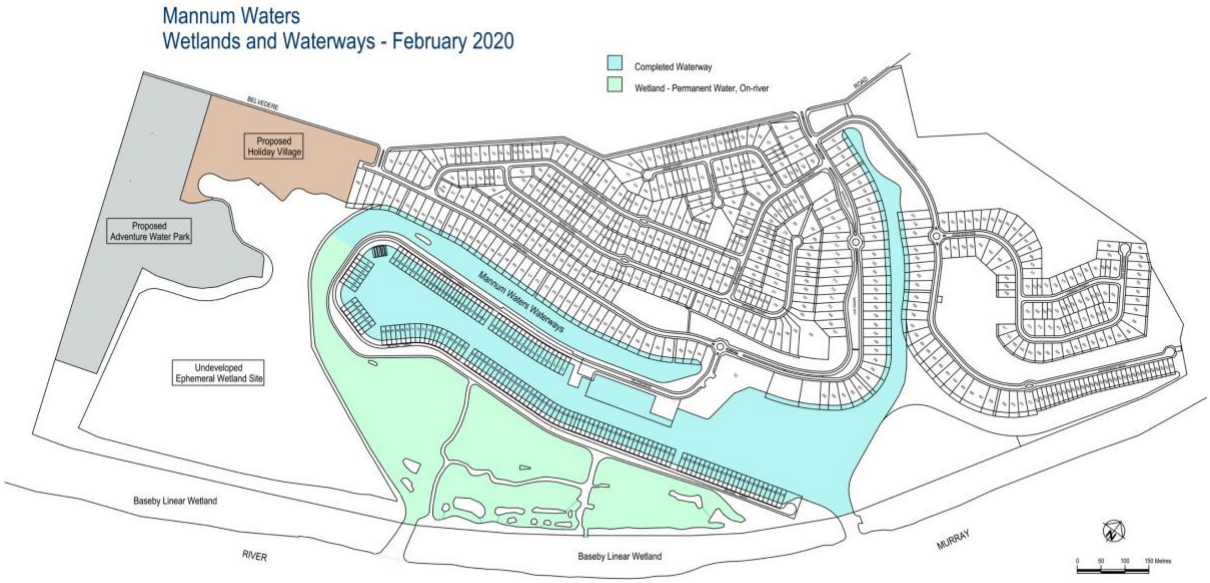


Fig. 4 As at February 2020 all wetlands have permanent water surface

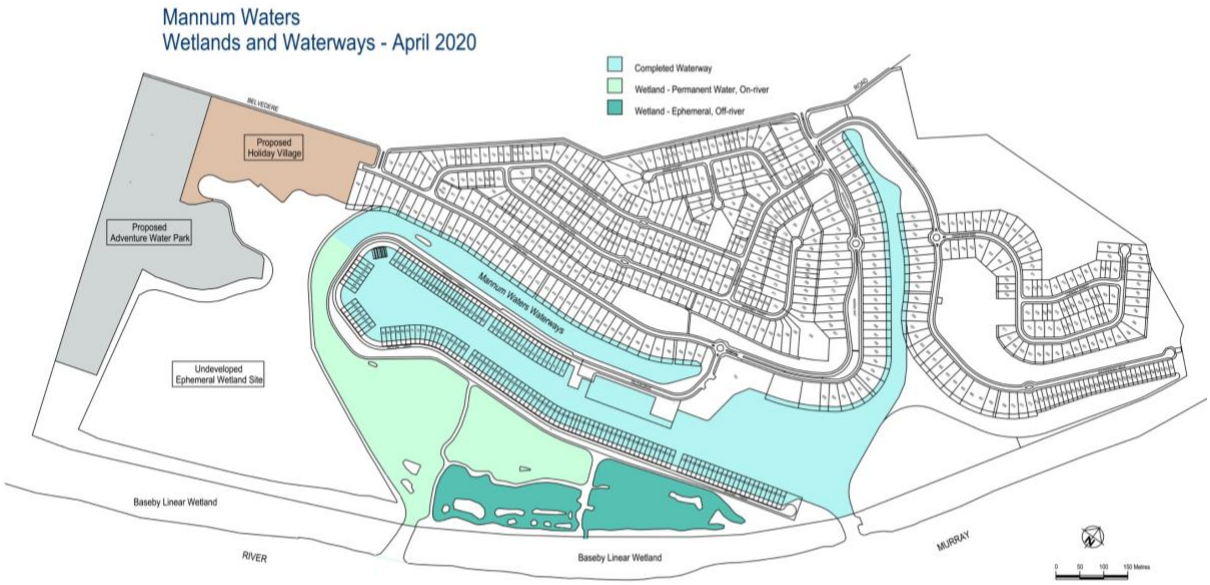


Fig. 5 As at April 2020 two permanent wetlands disconnected from River Murray

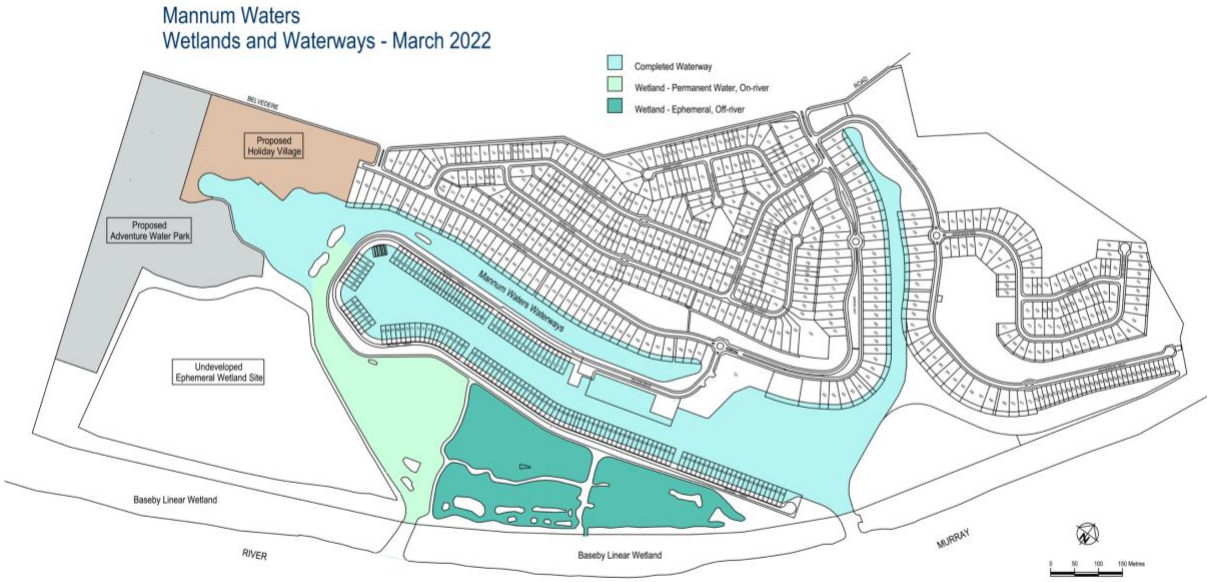


Fig. 6 As at March 2022 a further permanent wetland disconnected from River Murray

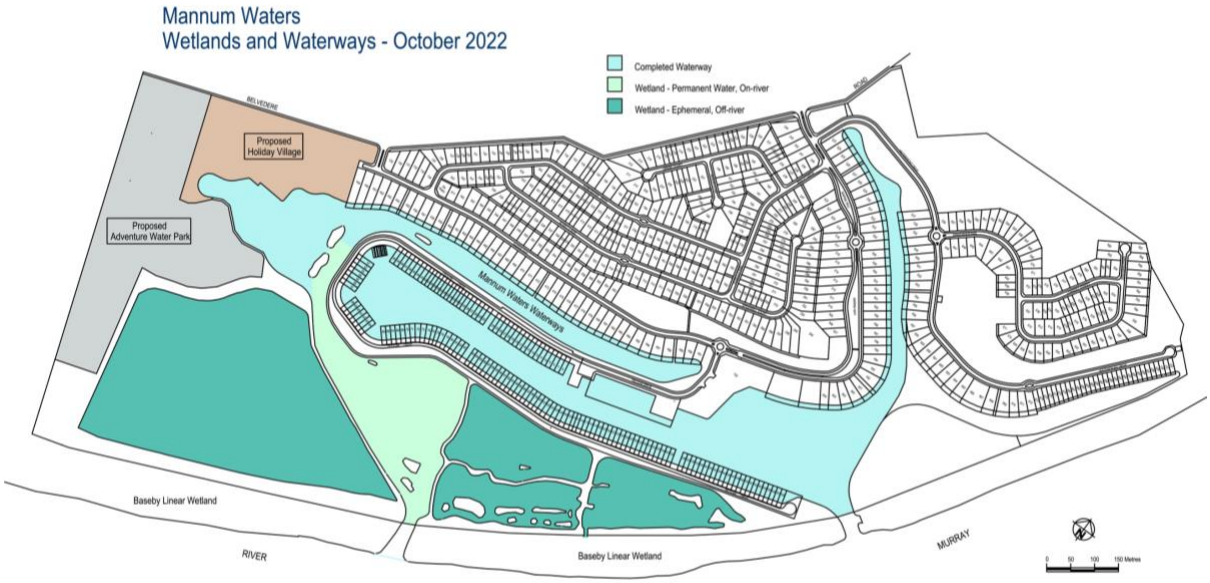


Fig.7 As at October 2022 a new ephemeral wetland and Holiday Village waterbody added

The ephemeral wetlands will be separated from the river. Water will be added by gravity flow or pumped through metered connections with agreed annual flows. Some water will be returned to the river by pumping to aid salinity control.

The design pool level at Mannum is RL 0.75. At this level and flows, it is understood that conditions are met to cover evaporation, infiltration, water allocations, ELMA and environmental flows. Below this level for long periods of time requires restrictions. At levels above RL 0.75 it is assumed that surplus water over design environmental water flows is available. Under those conditions as water levels rise some will flow into floodplains etc and be lost to the system. When pool levels are high it seems possible that controlled flow could be allowed to enter the ephemeral wetlands without accountability to assist in controlling salinity, sustaining the wetlands environment and supporting the habitats. Embankments around the ephemeral wetlands are proposed at RL 1.45 to establish walking trails above most flooding events. Below this level flows to the wetlands could be permitted at an agreed level say RL 0.80 and above.

Conclusions

The inclusion of the Holiday Village and Adventure Water Park in the Mannum Waters development together with the redesign of the wetlands has decreased the water use requirement from the water use proposed under the original approval. **In this regard, the new proposals have a positive impact on the River Murray water use.**

This discussion also revisits the basis of the actual water use of Mannum Waters in an average year, believing that a fair assessment of actual water use from the River Murray is very much lower than currently determined. This is to be revisited with the Department of Environment and Water.

Based on the assessments indicated in this discussion paper, Mannum Waters Permanent Water Bodies in an average year will draw 52.5ML from the River Murray, see comments on Table 2. Of this 12.53ML will be used by the Adventure Water Park lake and 21.23 ML by the constructed permanent wetlands. The Adventure Water Park would have responsibility for the Lake evaporation and the permanent wetland can be accounted for by the ELMA provision. **This would leave an amount of 27.74ML to be accounted for from the River Murray in an average year for the evaporation losses from the Mannum Waters water bodies.**

Tallwood believes that the use of ELMA water for managing the wetlands both permanent and ephemeral is a legitimate environmental use for salinity control at the site and the extension of habitats. **As the new ELMA provision is still unresolved a figure of 75ML has been adopted for wetland design purposes in the Amended EIS.**

Eastern Constructed Wetlands at Mannum Waters

Appendix D Environmental Noise Assessment, Nov 2019, Sonus Pty Ltd

Mannum Water Park

Environmental Noise Assessment

November 2019

S6259C3

sonus.

Chris Turnbull
Email: ct@sonus.com.au
www.sonus.com.au

Document Title : Mannum Water Park

Document Reference: S6259C3

Date : November 2019

Author : Chris Turnbull, MAAS

Reviewer : Mathew Ward

GLOSSARY AND ABBREVIATIONS

Term	Definition
A weighting	Frequency adjustment representing the response of the human ear.
dB	Linear (unweighted) sound pressure or power level in decibels.
dB(A)	A weighted noise or sound pressure or power level in decibels.
Equivalent noise level	Energy averaged noise level (sound pressure).
L_{Aeq}	The A weighted equivalent sound pressure level in decibels.

TABLE OF CONTENTS

INTRODUCTION

A water park is proposed to be located at the south-western end of the Mannum Waters Site.

As part of the Development Application, the following information has been requested:

> *A noise assessment prepared by a suitably experienced, professional acoustic engineering consultant (An acoustic engineer is defined as a person eligible for full Member status of both Engineers Australia and the Australian Acoustical Society) to moderate external and environmental noise disturbance and amenity impacts for residents and other sensitive uses within the immediate area as a result of the proposed development (primarily during construction).*

The water park is proposed to incorporate a range of activities, with noise understood to be generated from the following:

- Flyboarding;
- Cable Skiing;
- Wild rapids attraction;
- Patrons at the park and on the attractions;
- Plant and equipment; and,
- Car parking

The closest sensitive receivers to the proposed water park include the existing house to the north-west, the existing houses to the east (within Mannum Waters) and houseboats in the marina. In addition, there are future residential allotments within Mannum Waters, which are located closer than the existing dwellings. The site location and surrounding area is provided as Appendix A.

The water park is proposed to be developed in association with a holiday village, which comprises caravan, cabin and camping sites. These developments will be dependent on each other with many of the holiday village guests travelling to the area specifically to attend the water park during the day. In these circumstances, the associated holiday village has not been considered as a sensitive receiver but rather as an associated component of the overall development.

This assessment considers noise at the surrounding noise sensitive receivers in the vicinity of the development to ensure there are no unreasonable impacts on the acoustic amenity of the area.

The assessment has been based on the following:

- Environment Protection Authority correspondence "*EPA 361-23*" dated 12 September 2019;
- The "*Mannum Water Environmental Impact Statement (EIS) Review for the Inclusion of a Holiday Village and Water Park"* dated August 2019;
- The "*Launch adventure park"* proposal dated 2018 and concept plan provided as Appendix B;
- Observations and noise measurements and conducted of flyboarding on 22 October 2019;
- Observations of noise from "The Big Wedgie" water slide on 4 October 2019; and,
- The operation of the water park between 10:00am and 6:00pm.

DEVELOPMENT PLAN

The proposed water park is located within a *Mannum Marina* and a *Residential Marina Zone* of the Mid Murray Council Development Plan[1] (the **Development Plan**). The closest residence to the north-west is located within a *River Murray Zone*, the existing and future Mannum Waters residences are located within a *Residential Marina Zone,* and the houseboats at Mannum Waters are located in a *Mannum Marina Zone;* all within the same Development Plan.

The Development Plan has been reviewed and the following provisions are considered relevant to the noise assessment.

> ***GENERAL***
> *PRINCIPLES OF DEVELOPMENT CONTROL*
> *Interface between Land Uses*
> *85 Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:*
> *...*
> *(b) noise;*
> *...*
> *86 Development should be designed and sited to minimise negative impact on existing and potential future land uses considered appropriate in the locality.*
> *Noise*
> *91 Development should be designed, constructed and sited to minimise negative impacts of noise and to avoid unreasonable interference.*
> *92 Development should be consistent with the relevant provisions in the current Environment Protection (Noise) Policy.*
>
> ***MANNUM MARINA ZONE***
> *OBJECTIVES*
> *Objective 3: Development that does not unreasonably interfere with the desired character of the locality by generating noise nuisance.*
> *PRINCIPLES OF DEVELOPMENT CONTROL*
> *26 Development should be sited and designed to minimise potential adverse impacts on the amenity of adjoining residential land through noise, dust, smoke or odour generation, light spill or hours of operation.*
> *27 Development with potential to emit significant noise (including licensed premises and boat maintenance activities) should incorporate appropriate noise attenuation measures in to their design to prevent noise from causing unreasonable interference with the amenity and desired character of adjoining residential areas.*

[1] Consolidated - 23 August 2018

ENVIRONMENTAL PROTECTION (NOISE) POLICY 2007

Operational Noise

Principle of Development Control 92 of the Development Plan references the *Environment Protection (Noise) Policy 2007* (the **Policy**), which provides objective noise criteria to assess environmental noise from a development at noise sensitive receivers.

The Policy is based on the World Health Organisation Guidelines to prevent annoyance, sleep disturbance and unreasonable interference on the amenity of an area. Therefore, compliance with the Policy is considered to be sufficient to satisfy all provisions of the Development Plan relating to environmental noise.

The Policy provides goal noise levels to be achieved at noise sensitive receivers based on the principally promoted land use of the Development Plan Zones in which the noise source (the water park) and the noise sensitive receivers are located.

The Policy also applies a more onerous "development" goal noise level (by a margin of 5 dB(A)) for new noise sources in recognition of the increased sensitivity of a receiver to a new noise source.

Based on the land uses, the proposed operating hours, and the "development" nature of the project, the Policy provides the following goal noise levels ($L_{Aeq,15min}$) to be achieved at the noise sensitive receivers:

- 50 dB(A) at the existing Mannum Waters residences within a *Residential Marina Zone*;
- 52 dB(A) at the existing residences to the north within a *River Murray Zone*;
- 55 dB(A) at the future Mannum Waters residences within a *Residential Marina Zone*; and,
- 60 dB(A) at the houseboats at Mannum Waters within a *Mannum Marina Zone*.

When measuring or predicting noise levels for comparison with the Policy, penalties may be applied to the average goal noise level for each characteristic of tone, impulse, low frequency and modulation of the noise source. To apply a penalty, the characteristic must be dominant when considered within the context of the existing acoustic environment at the noise sensitive receivers. The application of penalties is discussed in the *Assessment* section of this report.

Construction Noise

The appropriate assessment methodology for noise from construction activities is provided by the Policy.

The Policy provides an emphasis on implementing reasonable and practicable noise reduction measures and does not set mandatory standards or objective criteria for construction activity which is conducted between 7:00am and 7:00pm and does not occur on a Sunday or public holiday.

Specifically, Part 6, Division 1 of the Policy provides the following relevant requirements:

23—Construction activity

(1) The following provisions apply to construction activity resulting in noise with an adverse impact on amenity:

(a) subject to paragraph (b), the activity—

(i) must not occur on a Sunday or other public holiday; and

(ii) must not occur on any other day except between 7.00 a.m. and 7.00 p.m.;

(b) a particular operation may occur on a Sunday or other public holiday between 9.00 a.m. and 7.00 p.m., or may commence before 7.00 a.m. on any other day—

(i) to avoid an unreasonable interruption of vehicle or pedestrian traffic movement; or

(ii) if other grounds exist that the Authority

(c) all reasonable and practicable measures must be taken to minimise noise resulting from the activity and to minimise its impact, including (without limitation)

(i) commencing any particularly noisy part of the activity (such as masonry sawing or jack hammering) after 9.00 a.m.; and

(ii) locating noisy equipment (such as masonry saws or cement mixers) or processes so that their impact on neighbouring premises is minimised (whether by maximising the distance to the premises, using structures or elevations to create barriers or otherwise); and

(iii) shutting or throttling equipment down whenever it is not in actual use; and

(iv) ensuring that noise reduction devices such as mufflers are fitted and operating effectively; and

(v) ensuring that equipment is not operated if maintenance or repairs would eliminate or significantly reduce a characteristic of noise resulting from its operation that is audible at noise-affected premises; and

(vi) operating equipment and handling materials so as to minimise impact noise; and

(vii) using off-site or other alternative processes that eliminate or lessen resulting noise.

...

(3) For the purposes of this clause, construction activity results in noise with an adverse impact on amenity if measurements taken in relation to the noise source and noise-affected premises show—

(a) that the source noise level (continuous) exceeds 45 dB(A); or

(b) that the source noise level (maximum) exceeds 60 dB(A).

ASSESSMENT

Operational Noise

The noise at the sensitive receivers has been predicted for the proposed water park operation. The predictions of noise have been based on the following operational assumptions of the highest level of activity in any 15 minute period[2] between 10:00am and 6:00pm:

- continuous operation of all proposed attractions on site (including 2 Jet Skis for flyboarding);
- 500 patrons at the water park; and,
- 100 car movements in the carpark.

The proposed activity has been incorporated into a noise model. The model has been used to predict noise levels at the sensitive receivers for full capacity operation, and under conditions which are conducive to the propagation of noise for the proposed operating hours.

Noise Model Inputs

The noise from flyboarding has been based on observations and noise measurements made on 22 October 2019. The noise from flyboarding was observed to be generated from a Jet Ski (used to pipe water to the flyboard) and the water movement used to propel the flyboard. The noise was measured to be at a level of 69 dB(A) at a distance of 20m. This is understood to represent the loudest noise source proposed for the site.

The noise from the Cable Skiing has been based on the information in the *Lloyd George Acoustic* Environmental Noise Assessment for the "Wildwood Wake and Aqua Park" (Reference: "17104184-02" dated 1 February 2018) which indicated that the cable ski mechanism measured at the Perth Wake Park was inaudible at a distance of 40m.

The noise from patrons and water movement has been based on observations made of the noise from "The Big Wedgie" water slide on 4 October 2019. The noise from patrons using the water slides was observed to be at levels equivalent to that of standard talking and the noise from water movement was negligible at a distance greater than 50m. For the purposes of this assessment, the noise from patrons at the water park has conservatively been based on historical noised measurements of children playing and patrons at outdoor licenced venues. This is considered to be conservative assessment of the noise as the historical measurements represent the noise from children playing and patrons talking with occasional shouting and laughing, resulting in levels much louder than that observed at "The Big Wedgie".

[2] Default assessment period of the Policy.

The noise from car park activity has been based on historical observations and noise measurements made of car park activity in a range of locations. The noise measurements account for people talking as they vacate or approach their vehicles, the opening and closing of vehicle doors, vehicles starting, vehicles idling, and vehicles moving into and accelerating away from their park position.

At this stage of the development, the final plant and equipment has not been selected. Therefore the noise has been based on the following indicative plant and equipment selections:

- 10 pumps for the movement of water (such as for the *Wild Rapids* attraction), each generating a noise level of 68 dB(A) at a distance of 1m (when measured outside and away from reflecting surfaces); and,
- 5 air-conditioning units (such as for *Shop, Cafe*, etc.), each generating a noise level of 67 dB(A) at a distance of 1m (when measured outside and away from reflecting surfaces).

Noise Predictions

Based on the above noise model inputs, the predicted noise levels at the closest sensitive receivers (as shown in Appendix A) are detailed in the table below.

The noise from the proposed operation is not considered to generate characteristics of the noise that are dominant when considered within the context of other noise from the river and marina. Therefore, penalties for noise characteristics have not been applied to the predicted noise levels.

Receiver	Criterion (dB(A))	Predicted Noise Level (dB(A))	Compliance
Existing residences within *Residential Marina Zone*	*50*	41	***Yes***
Existing residence within *River Murray Zone*	*52*	47	***Yes***
Future residences within *Residential Marina Zone*	*55*	46	***Yes***
Houseboats within a *Mannum Marina Zone*	*60*	46	***Yes***

Based on the above, the noise is predicted to comply with the Policy at all noise sensitive receivers without any specific acoustic treatment measures.

It is noted that the noise from the plant and equipment selections should be reviewed during the detailed design phase to confirm that the goal noise levels of the Policy will be achieved.

Construction Noise

The Policy provides an emphasis on implementing reasonable and practicable noise reduction measures for construction activity and does not set mandatory standards or objective criteria for construction activity which is conducted between 7:00am and 7:00pm, and does not occur on a Sunday or public holiday.

The equipment and activities that are present at the site will vary throughout the project, depending on the construction phase. However it is understood the construction noise will predominantly be associated with site earthworks.

Although no specific noise criteria apply during standard daytime construction hours, the noise from typical earthwork activities are predicted to be 55 dB(A) when activity is occurring at the closest location on the site to the closest receiver. Lower noise levels are predicted when the construction activity is occurring at different locations, or at receivers located further away.

A noise level of 55 dB(A) will achieve the goal noise level of the Policy that applies to an existing noise source that can continuously occur at any time between 7:00am and 10:00pm at all sensitive receivers in the vicinity.

Based on the above noise predictions, the noise from construction is unlikely to have a detrimental impact on the amenity of the locality. Notwithstanding, a Construction Environmental Management Plan, or similar, is recommended to be prepared to include measures that ensure the Policy will be satisfied, including the implementation of all reasonable and practicable noise reduction measures.

The Construction Environmental Management Plan should ensure that:

1. construction activity creating noise is restricted to:
    - the hours between 7:00am to 7:00pm;
    - any day other than a Sunday or public holiday;

2. All reasonable and practicable noise mitigation measures are implemented, subject to detailed information on the actual construction processes being refine. This could include:
    - Commencing any noisy activity after 9:00am;
    - Shutting down or throttling equipment whenever it is not in actual use;
    - Ensuring that noise reduction devices such as mufflers are fitted and operating effectively;
    - Ensuring that equipment is not operated if maintenance or repairs would eliminate or significantly reduce a characteristic of noise resulting from its operation;
    - Operating equipment and handling materials so as to minimise noise.
    - Substituting construction methods with alternative processes that produce less noise where cost effective to do so;
    - Fitting broadband reversing signals to vehicles which remain on the site; and,
    - Implementing administrative measures such as inspections, scheduling and providing training to establish a noise minimisation culture for the works.

The Construction Environmental Management Plan should also address any activity that is required to occur outside of the hours between 7:00am to 7:00pm, such as if concrete pouring is to occur before 7:00am on days of extreme heat.

CONCLUSION

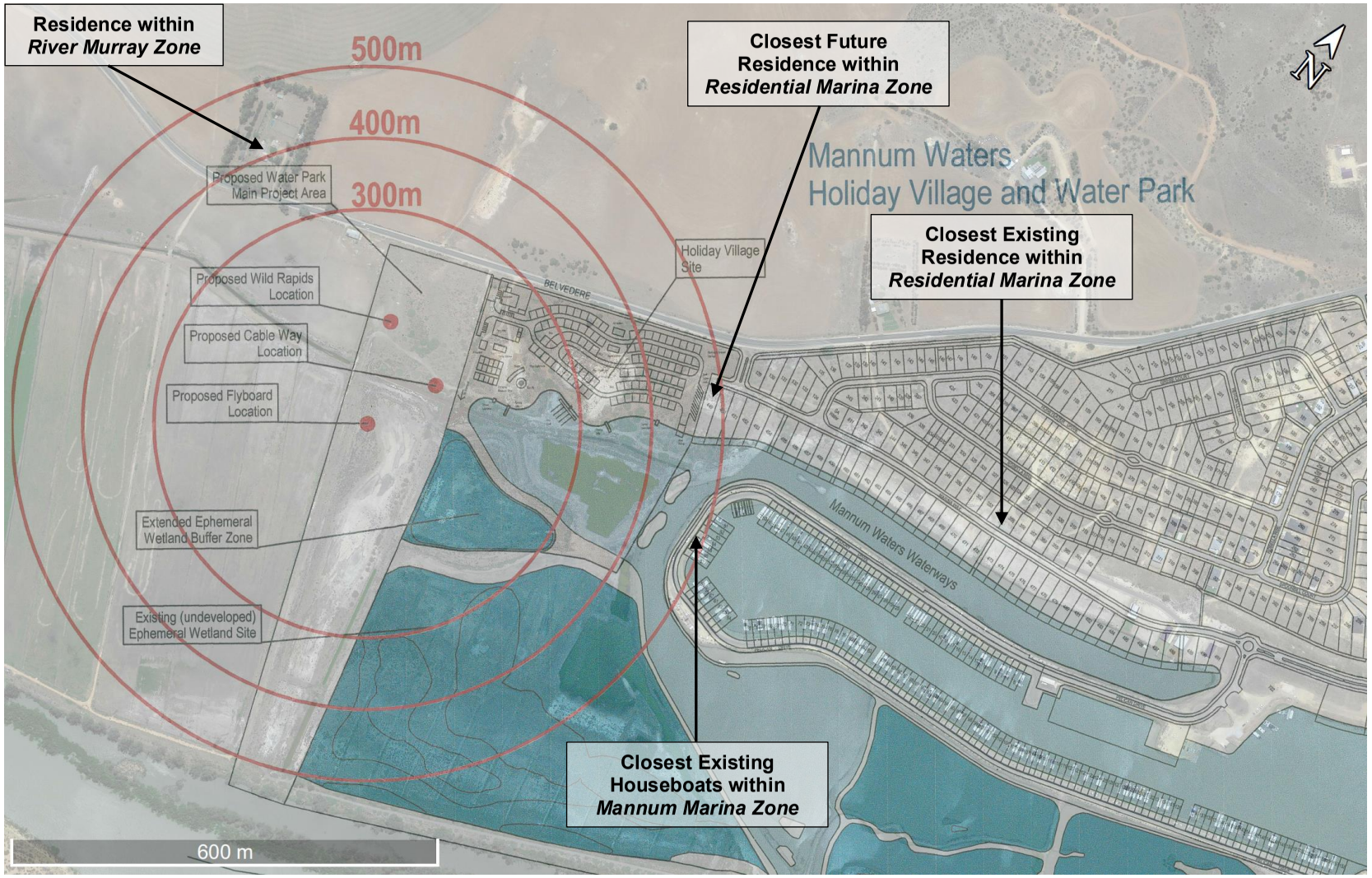
An environmental noise assessment has been made of the water park proposed to be located at the south-western end of the Mannum Waters Site.

The noise at the sensitive receivers has been predicted for the proposed water park operation. Based on the predictions, the requirements of the *Environment Protection (Noise) Policy 2007* will be achieved at the closest sensitive receivers without any specific acoustic treatment measures.

In addition, the noise from construction will achieve the requirements of the *Environment Protection (Noise) Policy 2007* where it is restricted to the hours between 7:00am and 7:00pm, does not occur on a Sunday or public holiday. The development of a Construction Environmental Management Plan will ensure that and *all reasonable and practicable measures are taken to minimise noise.*

Based on the above, it is considered that the development has been *designed and sited to minimise negative impact on existing and potential future land uses* and will *not detrimentally affect the amenity of the locality*, thereby achieving the provisions of the Mid Murray Council Development Plan related to environmental noise.

Appendix A: Aerial Image of the Site



Appendix B: Water Park Concept

Appendix E Traffic and access Impact Assessment, Feb 2020, MFY Pty Ltd

Tallwood Pty Ltd

MANNUM WATERS AMENDMENT

TRANSPORT AND ACCESS IMPACT ASSESSMENT

February 2020

19-0196

Traffic · Parking · Transport

Unit 6, 224 Glen Osmond Road
FULLARTON SA 5063

T: +61 8 8338 8888
F: +61 8 8338 8880
E: mfya@mfy.com.au
W: mfy.com.au

MFY Pty Ltd
ABN 79 102 630 759

DOCUMENT ISSUE

Revision issue	Date	Description	Approved by
Draft 1	20 December 2019	Draft for review	JL
Final	17 February 2020	Final	JL

CONTENTS

1.0 INTRODUCTION

This report assesses the transport and access impacts associated with a proposed amendment to the Mannum Waters mixed residential, commercial and marina development (the site) proposed by Tallwood Pty Ltd.

The site was granted Major Project status and approved by the Governor in 2010. MFY prepared a report detailing the traffic and parking matters for inclusion in an Environmental Impact Statement for this original proposal.

The current proposal seeks to amend the land uses at the western end of the site, resulting in a reduction in the number of residential allotments which will be replaced with a Holiday Village and Water Park.

2.0 SUBJECT SITE AND EXISTING SITUATION

The subject site is known Mannum Waters. It is located south-west of the Mannum township and is bounded by Belvedere Road to the northwest and the River Murray to the southeast.

The site is currently zoned Mannum Marina (M(Mar)) and Residential Marina (R(Mar)) in the Mid Murray Council Development Plan, as shown in Figure 1 below.

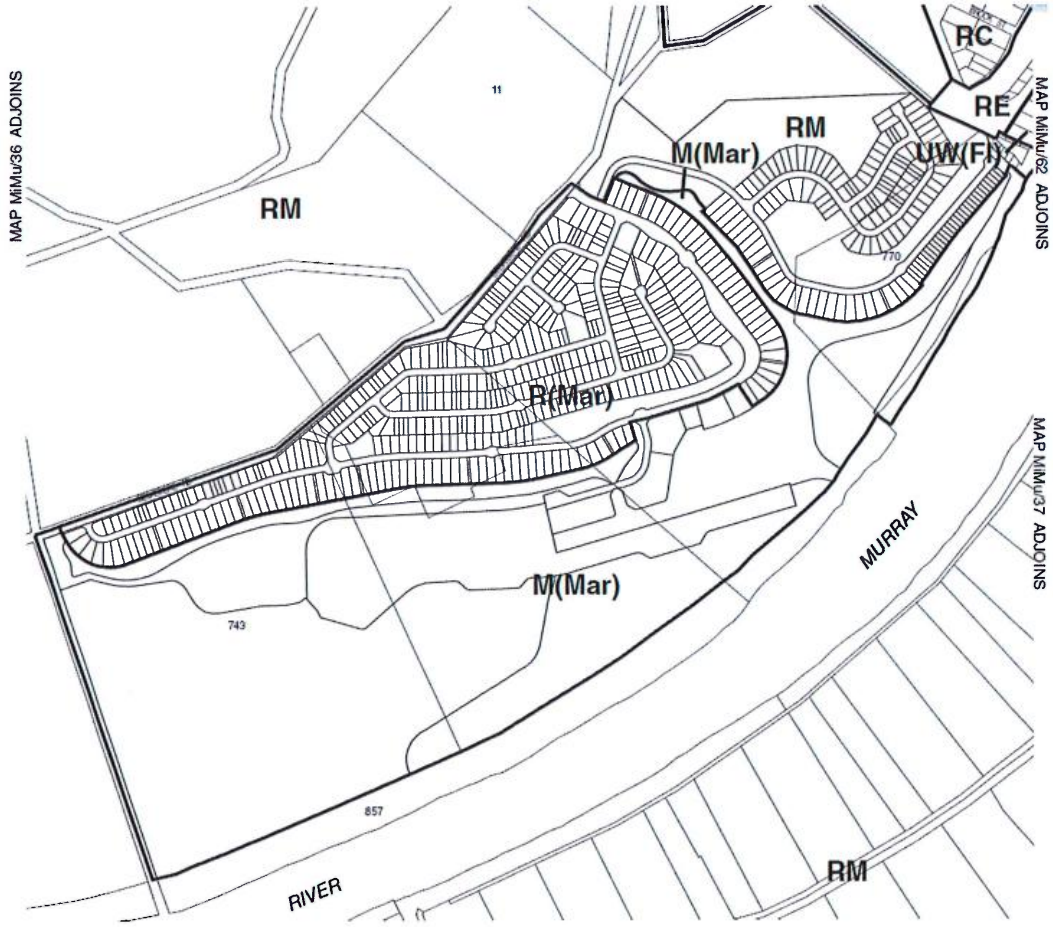


Figure 1: Current zones (source: Mid Murray Council Development Plan)

The master plan for Mannum Waters included a main circulation road, Marina Way, which was to intersect with Belvedere Road at two locations. The primary intersection has been constructed and provides access to the eastern portion of the development. The secondary intersection has not yet been built. Figure 2 identifies the existing road network within Mannum Waters.

Figure 2: Existing land division (source: SAPPA)

The marina has also been constructed and is almost fully occupied.

Subsequent to the initial stages of the Mannum Waters development, Belvedere Road has been upgraded by Council along the frontage of the subject site. It was previously an unsealed road east of the Marina Way intersection and is now a two-lane sealed road. It has a posted speed limit of 100 km/h. The upgrades included treatment of the Belvedere Road/Mannum Road intersection, which provides a channelised right-turn lane. Figure 3 shows the intersection treatment.

Figure 3: Belvedere Road/Mannum Road intersection treatment (source: Google maps)

Following its upgrade, the volumes on Belvedere Road would have increased as it now provides a more convenient route between Murray Bridge and the Mannum township. Data obtained from the Department of Planning, Transport and Infrastructure (DPTI) identify that Mannum Road has Average Annual Daily Traffic (AADT) volumes in the order of 1,700 vehicles per day (vpd). Belvedere Road would likely have traffic volumes of a similar order of magnitude.

3.0 PROPOSED AMENDMENT

It is proposed to rezone the eastern portion of the site, to provide a Holiday Village and Water Park. This will result in a reduction of 52 residential allotments and will reduce the length of Marina Way at the western end of the site.

The sites for the proposed Water Park and Holiday Village are shown in Figure 4.

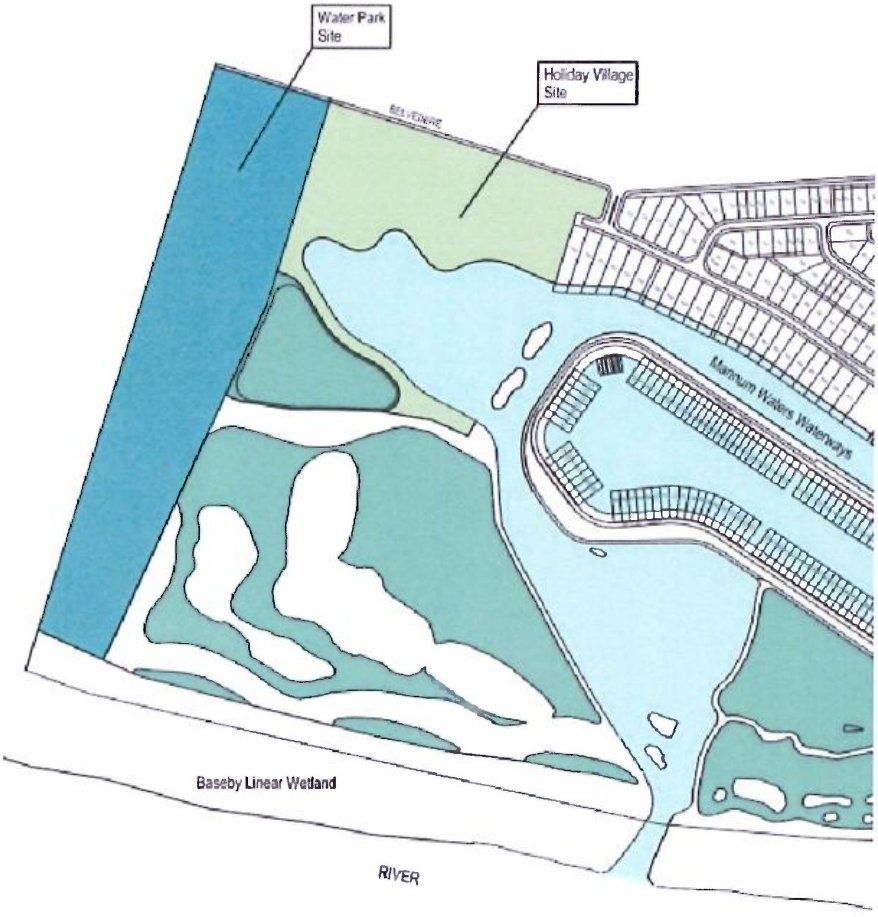


Figure 4: Proposed Water Park and Holiday Village sites

4.0 ACCESS LOCATIONS

The proposed amendment includes the relocation of the existing approved intersection of Marina Way and Belvedere Road. In addition, it seeks to provide a new access point to service the proposed Water Park (which could also service the Holiday Village).

The proposal will not alter the previously approved access arrangements for the residential allotments within the site, in that there will be no direct access to Belvedere Road for residential allotments.

A site inspection was undertaken to assess safe locations for the installation of new intersections and driveways that would meet the requirements of Austroads' *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (AGRD4A)*, particularly with respect to sight line requirements and offsets from adjacent intersections.

It was determined that a section of Belvedere Road would preclude the safe construction of new intersections and access points, as shown in Figure 5, due to sightline restrictions as a result of the bend in the road. The proposed relocated intersection will be sited to the east of this restricted area and as such will be a compliant location.

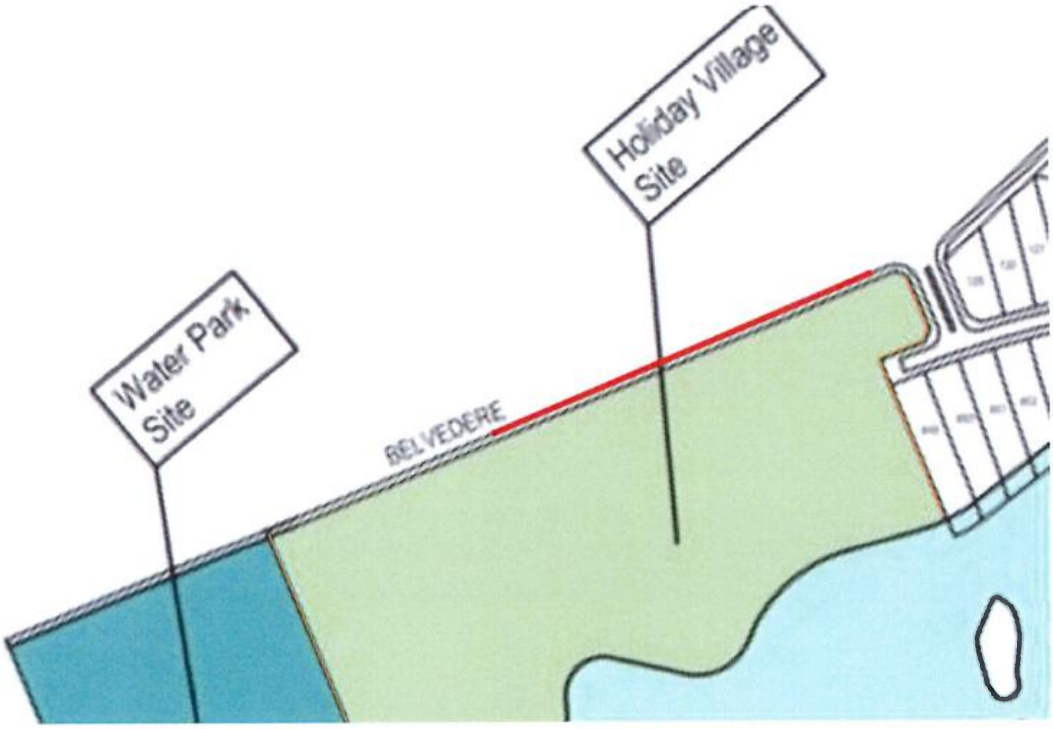


Figure 5: Precluded access locations (shown in red)

A future access point to one or both of the adjacent development sites can also be safely accommodated in the approximate location of the boundary between the two sites.

This access could be used solely for the Water Park site (located close to the eastern boundary of the site), with access to the Holiday Village site provided via Marina Way.

Alternatively, both of the sites could be accessed via a common access point on Belvedere Road. Either of these two options would ensure that there would be only one additional access constructed on Belvedere Road, which would ensure a limited location for conflicting movements to/from the road.

5.0 TRAFFIC ASSESSMENT

5.1 TRAFFIC VOLUMES AND DISTRIBUTION

5.1.1 RESIDENTIAL

The proposal will result in a reduction of 52 residential allotments, which would have generated traffic on Belvedere Road had they been constructed in accordance with the existing approval.

Based on a forecast traffic generation rates identified in the previous assessment (four trips per dwelling per day during peak periods such as the Christmas holidays), this would result in a reduction of approximately 200 trips per day on the adjacent road network (i.e. 100 trips entering the site and 100 trips exiting the site).

The majority of these trips would have been to/from the Mannum township. The previous assessment forecast this to be in the order of 85%, which would equate to approximately 170 trips to/from the east and 30 trips to/from the west.

The New South Wales (then) Roads and Traffic Authority's *Guide to Traffic Generating Developments* (the RTA Guide) identifies that 10% of these trips would typically occur in the peak hour (i.e. 20 trips in the peak hour).

5.1.2 HOLIDAY VILLAGE

A concept plan prepared for the proposed holiday village identifies that the site will be able to accommodate in the order of 132 cabins and caravan/camping sites (refer Figure 6).

Figure 6: Holiday Village concept plan

As discussed in Section 4 above, the site could either be accessed via a common driveway with the adjacent Water Park or via Marina Way which abuts the eastern boundary of the site.

Empirical traffic volume data were collected on behalf of MFY at the Waikerie Holiday Park in 2013, which identified a daily traffic volume in the order of four trips per site per day. The peak hour volumes were approximately 0.5 trips per site.

The distribution of these trips is likely to be relatively evenly split between Mannum (for local trips to shopping etc) and visitors accessing the Holiday Village from Murray Bridge and beyond.

Based on the above, it is forecast that there would be approximately 530 trips to/from the Holiday Village per day (i.e. 265 to the site and 265 from the site), with 65 trips occurring during the peak hour.

5.1.3 WATER PARK

The traffic generation associated with the proposed water park will vary based on seasonal conditions. The RTA Guide notes that that such facilities are site- and type-specific in their operation and traffic generation, often with seasonal variations in usage, and that assessment should be based on 85th percentile demand. A concept plan of the proposed Water Park layout is shown in Figure 7.

Figure 7: Water Park concept plan

Analysis of the traffic generation associated with the proposed water park has been based on an anticipated demand of 600-800 visitors per day, which would equate to a traffic generation of 240 to 320 vehicles accessing the site per day based on a rate of 2.5-3 visitors per car (given that such facilities are typically frequented by families and groups). This is considered to be an overestimate of external traffic volumes based on the location of the proposed facility, which is likely to generate a proportion of its demand from proposed Holiday Village and adjacent marina development.

Assuming 25% of visitors access the site during the peak hour, this would equate to 120 to 160 trips in the peak hour, with the majority to/from Murray Bridge.

5.1.4 SUMMARY

Table 1 presents a summary of the forecast daily traffic volumes for the proposed amendment.

Table 1: Forecast adjustments to Mannum Waters daily traffic volumes

Land Use	Daily volumes	To/from west	To/from east
Holiday Village	530	265	265
Water Park	640	540	100
Residential	-200	-30	-170
Total	**970**	**775**	**195**

The traffic generation associated with the proposed developments will not occur simultaneously. For example, traffic demands entering the Water Park will be greatest in the morning, whereas this would equate to the peak demands for traffic exiting the Holiday Village. Therefore, while a factor of 10% could be applied to the above daily volumes to forecast the peak hour traffic (approximately 80 to/from the west and 20 to/from the east), these peak volumes would be further reduced due to the variability in the timing of peak demands for the two land uses.

5.2 TRAFFIC IMPACT

The previous assessment of the Mannum Waters Development identified daily traffic volumes during peak season in the order of 2,700 vehicles per day, distributed to the east and west on the adjacent road network. The impact of this traffic was assessed on the basis that the majority of these trips would be distributed to/from Mannum, given that Belvedere Road was unsealed at the time and did not represent a convenient route for drivers. Subsequently, the upgrade of Belvedere Road has been completed, which would result in a more even distribution of traffic to/from the site in each direction. Significantly fewer trips would be made to/from the east as a result of this upgrade.

In terms of the impact on the Mannum township, 10% of the forecast additional daily traffic volumes associated with the proposed land use amendments would equate to

only 20 additional trips during the peak hour. This will have a negligible impact on the operation of the road network. The proposal will not change the nature and function of the existing residential roads within the Mannum township, particularly given that the additional traffic would be significantly lower than that which would have accessed Mannum from the marina development prior to the upgrade of Belvedere Road.

A larger volume would be generated to/from the west as a result of the proposal, with the distribution of drivers at the Belvedere Road/Mannum Road intersection predominantly right-in to and left-out of Belvedere Road. The existing treatment of this intersection, which provides a channelised right-turn lane, will adequately cater for these traffic volumes and the intersection will have sufficient capacity to accommodate the forecast turning movements.

A gap analysis undertaken in accordance with Austroads' requirements indicates that there will be not change to the forecast queue of one vehicle waiting to turn right from Mannum Road to Belvedere Road.

The additional volumes will be distributed throughout the day and would not generate concurrent peak traffic demands. This will assist in further mitigating the traffic impacts associated with the proposed amendment.

5.3 PEDESTRIANS AND CYCLISTS

Pedestrian and cyclist demand to/from the development sites will be relatively low, given the remote location of the development. However, it is likely that visitors to the Holiday Village will also frequent the Water Park, as would residents from within the broader Mannum Waters estate. The proposal for the development of the sites would benefit from incorporating pedestrian connectivity between the Holiday Village and the Water Park.

6.0 CONSTRUCTION IMPACTS

The traffic generated during the construction of the proposed development sites is not anticipated to be atypical for such developments, and the impacts associated with these additional vehicles will be low due to the nature of the adjacent road network which do not have substantial volumes of either commercial or domestic traffic.

Deliveries to the sites will generally be undertaken by general access vehicles (semi-trailers up to 19 m in length). In the event that larger loads are to be transported (e.g. Holiday Village cabins), these would be subject to a separate approval for oversize/overmass transport and appropriate conditions would be imposed to ensure the safe and efficient access of such vehicles to the site through permits issued by the National Heavy Vehicle Regulator in consultation with the impacted road authorities.

The number of workers anticipated to be involved with the construction of the sites will be readily accommodate in temporary parking and amenity areas within the subject sites and the associated traffic demand generated by these drivers will have a negligible impact on the adjacent road network.

7.0 PARKING REQUIREMENTS

The nature of the amended land uses will mean that the parking demands for each site will be correlated to the specifics of the development proposed for each of the sites. As such, it will be necessary for a first-principles assessment to be undertaken at the time of the Development Applications (DAs) to ensure that appropriate allowance for on-site parking is provided.

Accordingly, it would be desirable for flexibility to be incorporated in the parking provisions to enable a demand assessment to be considered during a DA assessment.

Formal parking should be provided to accommodate the 85th percentile peak parking demand for the developments, with opportunities for informal overflow parking to accommodate higher demand events. Given the posted speed limit on Belvedere Road, it would not be appropriate to rely upon on-street parking on this road.

8.0 FUTURE DEVELOPMENT REQUIREMENTS

Further consideration will need to be given to detailed design aspects of any DAs for the development sites to ensure that appropriate design standards are met, in accordance with typical Development Plan requirements. This will ensure that the proposals will provide for safe, functional and orderly development. Such aspects include:

- access locations, design and compliance to provide for drivers to enter and exit in a forward direction and meet minimum safety standards, including sightlines;
- parking demand assessment, undertaken by a suitably qualified professional;
- design and management of parking areas, including compliance with relevant Australian Standards,
- refuse and delivery requirements, including adequate manoeuvring areas to provide for vehicles to enter and exit the site in a forward direction; and
- pedestrian facilities and connectivity within and through the sites.

9.0 SUMMARY

This assessment has confirmed that the proposed amendments to the Mannum Waters development land uses will have a minimal impact on the adjacent road network.

While additional traffic volumes will be generated when compared to the current zoning of the land, these volumes will be not result in capacity or amenity impacts on the adjacent road network. The changes to Belvedere Road that have been implemented since the Mannum Waters development was initially assessed would have reduced the overall traffic demand generated to/from the Mannum township from the subject site. This small volume of additional traffic that is forecast to be generated as a result of the subject amendment would be more than offset by this previously realised reduction in traffic demand within the township.

The traffic volumes generated to/from Murray Bridge and beyond will be increased, but the existing road network will be able to safely accommodate the forecast movements.

Access to the sites will be able to be safely accommodated in accordance with relevant Standards and guidelines, and consideration of pedestrian connectivity will ensure that appropriate pedestrian facilities can also be provided for the higher demand routes, including between the subject development sites.

Parking associated with the development should be subject to review at the DA stage and should not include provision for parking on Belvedere Road given the high posted speed limit.

Appendix F Aboriginal Heritage Correspondence

Tallwood Pty Ltd
ABN 15 078 109 396
PO Box 897
Morphett Vale SA 5162
Phone (08) 8322 0500
Fax (08) 8219 0173

4th March 2019

Isobelle Campbell
Mannum Aboriginal Community Association Inc. (MACAI)
PO Box 58
Nildottie SA 5238

Dear Isobelle,

Re: **Mannum Waters Aboriginal Heritage**

Based on the report prepared by David Mott identifying the expected limits of the burials near the Mannum Waters Stage 5 and the meeting that I had with you and other representatives of MACAI on site late last year, I have prepared a drawing showing the areas of interest. As we will be meeting on site next Wednesday at 3:00pm, we will be able to confirm the areas and discuss them on site again. We would be grateful if you would confirm your agreement to the following:

Area A:
This area was not identified in the Mannum Waters Environmental Impact Statement for setting aside specific areas for Aboriginal Heritage. However, we have agreed to a walk-over assessment by MACAI representatives before undertaking work in this area. At this stage it has been agreed that further construction work immediately to the south of Stage 5 will ensure that where scattered artefacts (shell etc) exist, excavation will be avoided, and fill employed to raise the level above the artefacts.

Area B:
This area identifies the likely limits of burials as identified by the archaeologist, Mr David Mott. The area will be retained as a preservation area for Aboriginal Heritage. It will be filled and preserved in accordance to the requirements of MACAI.

Area C:
As discussed previously, allotments within this area will be developed for sale but with an encumbrance that:

- requires buildings to be supported on stumps in lieu of deep excavations;
- MACAI monitoring during earthworks.

Area D:
Allotments in this area will not be established for residential development but, eventually, will be developed as reserve to provide an open space connection between the existing Aboriginal Heritage site (Area E) and the burial sites (Area B).

Area E:
We have expanded this area to encompass the reburial of remains and to give additional space for planting programs.

Area F:
This category identifies other Aboriginal Heritage areas which have been identified and preserved within the Mannum Waters Development Plan.

To enable design work on Stage 6 to proceed, Tallwood needs the following:

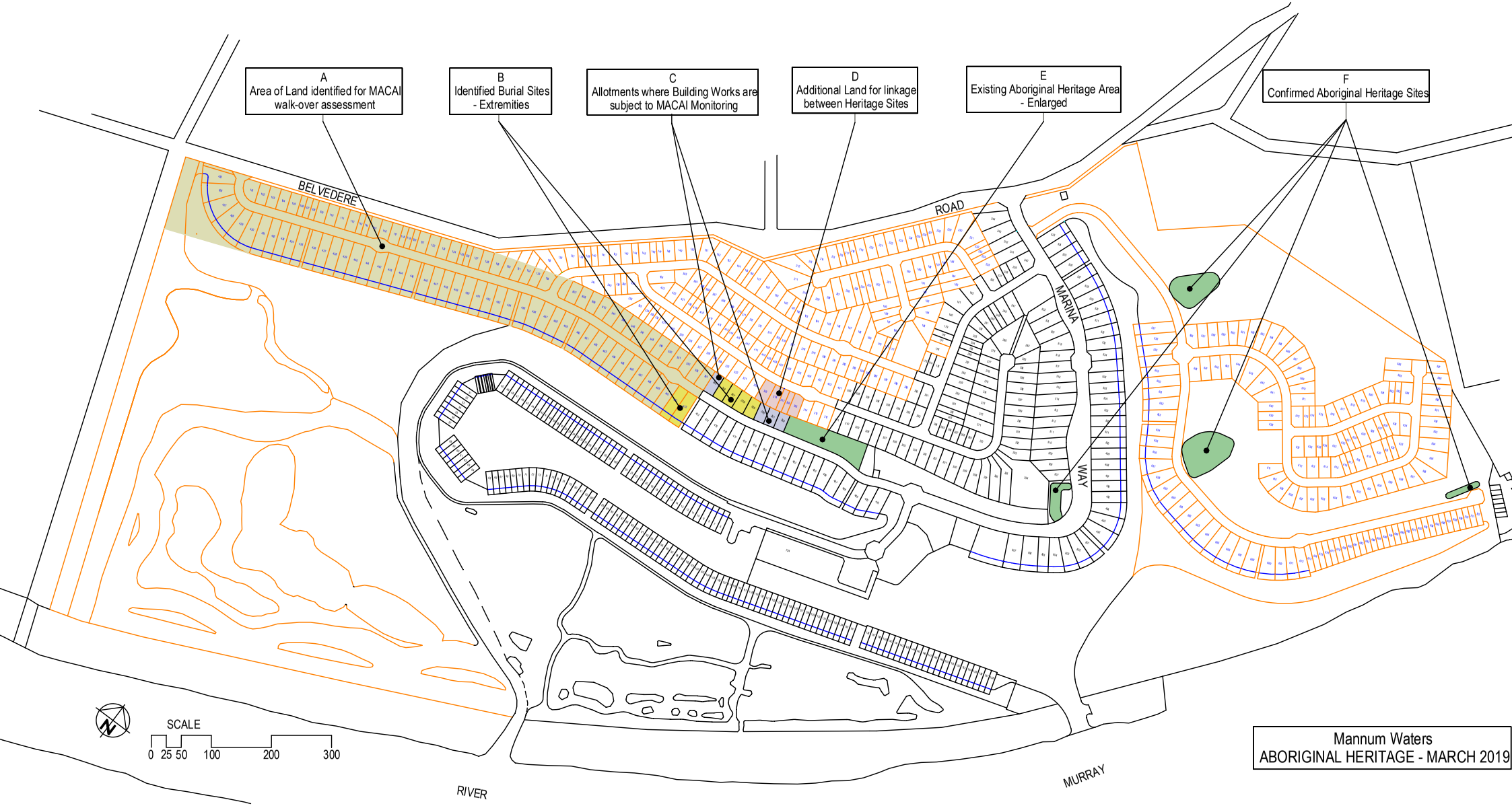
- your agreement to this procedure;
- your instructions on the filling and finishing to Areas B and D;
- the completion of a walk-over assessment in Area A.

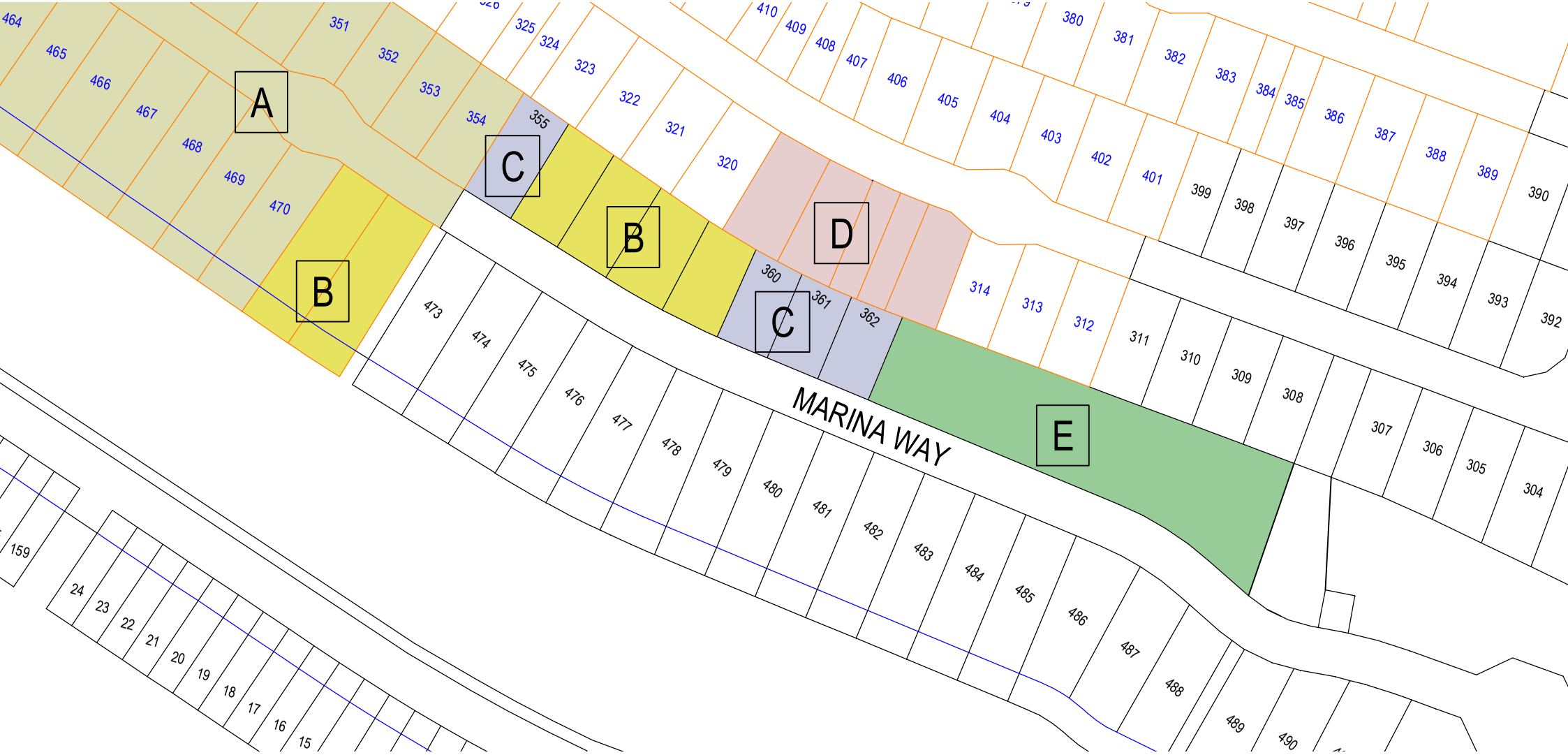
During our last site visit you also indicated that MACAI would seek to develop the planting on the protected sites. We would be glad to consolidate the procedures with you to achieve this result.

Thank you for your cooperation and assistance.

Yours faithfully,

David Potter
Project Manager
0409 701 099


A
Area of Land identified for MACAI walk-over assessment
B
Identified Burial Sites - Extremities
C
Allotments where Building Works are subject to MACAI Monitoring
D
Additional Land for linkage between Heritage Sites
E
Existing Aboriginal Heritage Area - Enlarged
F
Confirmed Aboriginal Heritage Sites
BELVEDERE
ROAD
MARINA
WAY
SCALE
0 25 50 100 200 300
RIVER
MURRAY
Mannum Waters
ABORIGINAL HERITAGE - MARCH 2019


A
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C
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D
C
E
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From: David Potter <potdc@icloud.com>
Subject: Re: Mannum Waters - current tasks and agreed ways forward
Date: 16 April 2019 at 2:35:41 pm ACST
To: David Mott <David.Mott@integratedheritageservices.com.au>
Cc: "issycampbell7@icloud.com" <issycampbell7@icloud.com>, John Weber <john@wfasurvey.com.au>, Andrew Rushworth <andrew@rushworth.com.au>, Jerry Frankiw <Jerry@wfasurvey.com.au>

Hi David,

I confirm that your email outlines the activities both undertaken and agreed to be undertaken. Thank you for your quick notification.

Kind regards,
David

David Potter
Mannum Waters
0409 701 099

On 16 Apr 2019, at 1:56 pm, David Mott <David.Mott@integratedheritageservices.com.au> wrote:

Hi Issy and David,

As discussed on site please find here an email discussing what we achieved today in terms of task and what is to be undertaken going forward.

If there are any amendments to these please reply. If everyone agrees this is the state of play, please also reply stating so.

Tasks Completed 16/04/2019

1. The re-burial site was excavated ready for re-burial of remains 20 April 2019;
2. The single burial was covered with soils for protection and to the satisfaction of all;
3. Discussions were had over several issues resulting in the following items to be undertaken -:

A. Stock fencing to delineate the Reserve that needs to be protected. The fencing will also serve as barrier to existing

turnarounds and track access;

B. Cultural awareness training and notification to relevant users of the land regarding current site delineations and protected reserve including instructions to not access the Reserve and sites via any vehicles (including any use of turnarounds/track);

C. Next stage site inspection/walkover to occur as soon after Easter as possible – one day fieldwork (short email report will follow providing results and recommendations);

D. Brian to fill in reburial area after Easter long weekend;

E. D. Mott to finalise reporting and site cards to be lodged with MACAI, Tallwood and DPC-AAR.

Also, should any further work be required in the reserve around reburial of future skeletal remains, a track and pad should be made for mechanical excavations, this will only occur if further remains are uncovered and as agreed between parties, dependant on the nature and extent of the discovery.

Regards

David Mott
Principal Consultant – Senior Archaeologist
Integrated Heritage Services Pty Ltd

Mobile: 0418 808 795
Email: David.Mott@integratedheritageservices.com.au
Web: www.integratedheritageservices.com.au

From: **Issy Campbell** issycampbell7@icloud.com
Subject: Re: Reburial complete
Date: 24 April 2019 at 11:56 am
To: David Potter potdc@icloud.com
Cc: David Mott David.Mott@integratedheritageservices.com.au

IC

Thanks heaps for your help . Much appreciated

ISSY CAMPBELL

On 23 Apr 2019, at 7:38 am, David Potter <potdc@icloud.com> wrote:

> Hi David and Issy,
>
> Brian has confirmed that the covering of the burial area has been completed.
>
> Kind regards,
> David
>
> David Potter
> Mannum Waters
> 0409 701 099
>
> > On 20 Apr 2019, at 1:10 pm, David Mott <David.Mott@integratedheritageservices.com.au> wrote:
> >
> > Hi David,
> >
> > I confirm that the reburial has been completed and Brian can go ahead with the remainder of the fill.
> >
> > I don't have his email address on my phone so could you please forward confirmation to him.
> >
> > Thanks
> >
> > Regards
> >
> > David Mott
> > Principal Consultant – Senior Archaeologist
> > Integrated Heritage Services Pty Ltd
> >
> > Mobile: 0418 808 795
> > Email: David.Mott@integratedheritageservices.com.au
> > Web: www.integratedheritageservices.com.au
> >
> > *This message sent from phone*

Appendix G Adventure Water Park – Acid Sulphate Soil Test Results

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 227430

Client Details

Client	Tallwood Pty Ltd
Attention	David Potter
Address	40 Aus Main Rd, Coromandel Valley, SA, 5051

Sample Details

Your Reference	**Tallwood - Mannum Waters (Water park)**
Number of Samples	12 Soil
Date samples received	02/10/2019
Date completed instructions received	02/10/2019

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

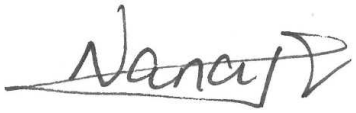
Date results requested by	09/10/2019
Date of Issue	09/10/2019

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Nick Sarlamis, Inorganics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

sPOCAS + %S w/w						
Our Reference		227430-1	227430-2	227430-3	227430-4	227430-5
Your Reference	UNITS	1	2	3	4	5
Date Sampled		01/10/2019	01/10/2019	01/10/2019	01/10/2019	01/10/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/10/2019	08/10/2019	08/10/2019	08/10/2019	08/10/2019
Date analysed	-	08/10/2019	08/10/2019	08/10/2019	08/10/2019	08/10/2019
pH $_{kcl}$	pH units	6.4	6.7	8.5	5.3	5.9
TAA pH 6.5	moles H^+ /t	<5	<5	<5	16	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.03	<0.01
pH $_{Ox}$	pH units	4.1	6.6	7.8	4.0	3.7
TPA pH 6.5	moles H^+ /t	<5	<5	<5	92	120
s-TPA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.15	0.20
TSA pH 6.5	moles H^+ /t	<5	<5	<5	76	120
s-TSA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.12	0.19
ANC_E	% $CaCO_3$	<0.05	0.06	2.1	<0.05	<0.05
a-ANC_E	moles H^+ /t	<5	12	410	<5	<5
s-ANC_E	%w/w S	<0.05	<0.05	0.66	<0.05	<0.05
S_{KCl}	%w/w S	0.03	0.40	0.09	0.58	0.35
S_P	%w/w	0.06	0.43	0.13	0.71	0.38
S_{POS}	%w/w	0.03	0.02	0.04	0.14	0.03
a-S_{POS}	moles H^+ /t	21	14	27	87	21
Ca_{KCl}	%w/w	0.37	0.50	0.43	0.73	0.48
Ca_P	%w/w	0.33	0.52	1.0	0.87	0.51
Ca_A	%w/w	<0.005	0.023	0.59	0.15	0.034
Mg_{KCl}	%w/w	0.15	0.18	0.11	0.34	0.51
Mg_P	%w/w	0.15	0.18	0.17	0.36	0.50
Mg_A	%w/w	<0.005	<0.005	0.060	0.021	<0.005
S_{HCl}	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
S_{NAS}	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
a-S_{NAS}	moles H^+ /t	<5	<5	<5	<5	<5
s-S_{NAS}	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
Fineness Factor	-	1.5	1.5	1.5	1.5	1.5
a-Net Acidity	moles H^+ /t	21	<5	<5	100	23
s-Net Acidity	%w/w S	0.03	<0.01	<0.01	0.16	0.04
Liming rate	kg $CaCO_3$ /t	1.6	<0.75	<0.75	7.7	1.8
s-Net Acidity without -ANCE	%w/w S	0.034	0.023	0.044	0.16	0.037
a-Net Acidity without ANCE	moles H^+ /t	21	14	27	100	23
Liming rate without ANCE	kg $CaCO_3$ /t	1.6	1.1	2.1	7.7	1.8

sPOCAS + %S w/w						
Our Reference		227430-6	227430-7	227430-8	227430-9	227430-10
Your Reference	UNITS	6	7	8	9	10
Date Sampled		01/10/2019	01/10/2019	01/10/2019	01/10/2019	01/10/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	08/10/2019	08/10/2019	08/10/2019	08/10/2019	08/10/2019
Date analysed	-	08/10/2019	08/10/2019	08/10/2019	08/10/2019	08/10/2019
pH $_{kcl}$	pH units	6.7	8.9	8.0	6.5	7.0
TAA pH 6.5	moles H^+ /t	<5	<5	<5	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
pH $_{Ox}$	pH units	4.0	7.5	5.2	5.1	4.6
TPA pH 6.5	moles H^+ /t	210	<5	20	<5	88
s-TPA pH 6.5	%w/w S	0.33	<0.01	0.03	<0.01	0.14
TSA pH 6.5	moles H^+ /t	210	<5	20	<5	88
s-TSA pH 6.5	%w/w S	0.33	<0.01	0.03	<0.01	0.14
ANC_E	% $CaCO_3$	<0.05	5.4	<0.05	<0.05	<0.05
a-ANC_E	moles H^+ /t	<5	1,100	<5	<5	<5
s-ANC_E	%w/w S	<0.05	1.7	<0.05	<0.05	<0.05
S_{KCl}	%w/w S	0.16	0.05	0.28	0.74	0.08
S_P	%w/w	0.22	0.09	0.29	0.69	0.16
S_{POS}	%w/w	0.06	0.04	0.008	<0.005	0.07
a-S_{POS}	moles H^+ /t	35	26	<5	<5	46
Ca_{KCl}	%w/w	0.39	0.58	0.61	0.75	0.42
Ca_P	%w/w	0.39	2.3	0.55	0.67	0.37
Ca_A	%w/w	<0.005	1.7	<0.005	<0.005	<0.005
Mg_{KCl}	%w/w	0.19	0.11	0.22	0.45	0.16
Mg_P	%w/w	0.22	0.17	0.26	0.40	0.18
Mg_A	%w/w	0.021	0.062	0.036	<0.005	0.017
S_{HCl}	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
S_{NAS}	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
a-S_{NAS}	moles H^+ /t	<5	<5	<5	<5	<5
s-S_{NAS}	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
Fineness Factor	-	1.5	1.5	1.5	1.5	1.5
a-Net Acidity	moles H^+ /t	210	<5	20	<5	88
s-Net Acidity	%w/w S	0.33	<0.01	0.03	<0.01	0.14
Liming rate	kg $CaCO_3$ /t	16	<0.75	1.5	<0.75	6.6
s-Net Acidity without -ANCE	%w/w S	0.33	0.041	0.032	<0.01	0.14
a-Net Acidity without ANCE	moles H^+ /t	210	26	20	<5	88
Liming rate without ANCE	kg $CaCO_3$ /t	16	1.9	1.5	<0.75	6.6

sPOCAS + %S w/w			
Our Reference		227430-11	227430-12
Your Reference	UNITS	11	12
Date Sampled		01/10/2019	01/10/2019
Type of sample		Soil	Soil
Date prepared	-	08/10/2019	08/10/2019
Date analysed	-	08/10/2019	08/10/2019
pH $_{kcl}$	pH units	5.7	7.2
TAA pH 6.5	moles H^+ /t	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01
pH $_{Ox}$	pH units	3.8	5.8
TPA pH 6.5	moles H^+ /t	70	12
s-TPA pH 6.5	%w/w S	0.11	0.02
TSA pH 6.5	moles H^+ /t	66	12
s-TSA pH 6.5	%w/w S	0.11	0.02
ANC_E	% $CaCO_3$	<0.05	<0.05
a-ANC_E	moles H^+ /t	<5	<5
s-ANC_E	%w/w S	<0.05	<0.05
S_{KCl}	%w/w S	0.85	0.02
S_P	%w/w	0.71	0.06
S_{POS}	%w/w	<0.005	0.04
a-S_{POS}	moles H^+ /t	<5	24
Ca_{KCl}	%w/w	0.88	0.42
Ca_P	%w/w	0.71	0.22
Ca_A	%w/w	<0.005	<0.005
Mg_{KCl}	%w/w	0.48	0.24
Mg_P	%w/w	0.45	0.26
Mg_A	%w/w	<0.005	0.019
S_{HCl}	%w/w S	<0.005	<0.005
S_{NAS}	%w/w S	<0.005	<0.005
a-S_{NAS}	moles H^+ /t	<5	<5
s-S_{NAS}	%w/w S	<0.01	<0.01
Fineness Factor	-	1.5	1.5
a-Net Acidity	moles H^+ /t	<5	16
s-Net Acidity	%w/w S	<0.01	0.03
Liming rate	kg $CaCO_3$ /t	<0.75	1.2
s-Net Acidity without -ANCE	%w/w S	<0.01	0.026
a-Net Acidity without ANCE	moles H^+ /t	<5	16
Liming rate without ANCE	kg $CaCO_3$ /t	<0.75	1.2

Misc Inorg - Soil						
Our Reference		227430-1	227430-2	227430-3	227430-4	227430-5
Your Reference	UNITS	1	2	3	4	5
Date Sampled		01/10/2019	01/10/2019	01/10/2019	01/10/2019	01/10/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2019	03/10/2019	03/10/2019	03/10/2019	03/10/2019
Date analysed	-	03/10/2019	03/10/2019	03/10/2019	03/10/2019	03/10/2019
Estimated Salinity*	mg/kg	8,000	37,000	20,000	45,000	59,000

Misc Inorg - Soil						
Our Reference		227430-6	227430-7	227430-8	227430-9	227430-10
Your Reference	UNITS	6	7	8	9	10
Date Sampled		01/10/2019	01/10/2019	01/10/2019	01/10/2019	01/10/2019
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	03/10/2019	03/10/2019	03/10/2019	03/10/2019	03/10/2019
Date analysed	-	03/10/2019	03/10/2019	03/10/2019	03/10/2019	03/10/2019
Estimated Salinity*	mg/kg	12,000	16,000	40,000	74,000	7,400

Misc Inorg - Soil			
Our Reference		227430-11	227430-12
Your Reference	UNITS	11	12
Date Sampled		01/10/2019	01/10/2019
Type of sample		Soil	Soil
Date prepared	-	03/10/2019	03/10/2019
Date analysed	-	03/10/2019	03/10/2019
Estimated Salinity*	mg/kg	77,000	14,000

Method ID	Methodology Summary
Inorg-034	Soil samples are extracted and measured using a conductivity cell and dedicated meter.
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			08/10/2019	1	08/10/2019	08/10/2019		08/10/2019	[NT]
Date analysed	-			08/10/2019	1	08/10/2019	08/10/2019		08/10/2019	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	1	6.4	6.5	2	89	[NT]
TAA pH 6.5	moles H^+ /t	5	Inorg-064	<5	1	<5	<5	0	125	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	1	4.1	4.1	0	101	[NT]
TPA pH 6.5	moles H^+ /t	5	Inorg-064	<5	1	<5	<5	0	94	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
TSA pH 6.5	moles H^+ /t	5	Inorg-064	<5	1	<5	<5	0	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	1	<0.05	<0.05	0	[NT]	[NT]
a-ANC_E	moles H^+ /t	5	Inorg-064	<5	1	<5	<5	0	[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	1	<0.05	<0.05	0	[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	1	0.03	0.03	0	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	<0.005	1	0.06	0.06	0	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	<0.005	1	0.03	0.03	0	[NT]	[NT]
a-S_{POS}	moles H^+ /t	5	Inorg-064	<5	1	21	20	5	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	1	0.37	0.36	3	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	<0.005	1	0.33	0.33	0	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	1	0.15	0.14	7	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	<0.005	1	0.15	0.14	7	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
a-S_{NAS}	moles H^+ /t	5	Inorg-064	<5	1	<5	<5	0	[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	<1.5	1	1.5	1.5	0	[NT]	[NT]
a-Net Acidity	moles H^+ /t	5	Inorg-064	<5	1	21	20	5	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	1	0.03	0.03	0	[NT]	[NT]
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-064	<0.75	1	1.6	1.5	6	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	<0.01	1	0.034	0.033	3	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-064	<5	1	21	20	5	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	1	1.6	1.5	6	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	08/10/2019	08/10/2019		[NT]	[NT]
Date analysed	-			[NT]	11	08/10/2019	08/10/2019		[NT]	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	11	5.7	5.6	2	[NT]	[NT]
TAA pH 6.5	moles H^+ /t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	11	3.8	3.8	0	[NT]	[NT]
TPA pH 6.5	moles H^+ /t	5	Inorg-064	[NT]	11	70	69	1	[NT]	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	[NT]	11	0.11	0.11	0	[NT]	[NT]
TSA pH 6.5	moles H^+ /t	5	Inorg-064	[NT]	11	66	65	2	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	[NT]	11	0.11	0.10	10	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	[NT]	11	<0.05	<0.05	0	[NT]	[NT]
a-ANC_E	moles H^+ /t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	[NT]	11	<0.05	<0.05	0	[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	[NT]	11	0.85	0.74	14	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	[NT]	11	0.71	0.72	1	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
a-S_{POS}	moles H^+ /t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	[NT]	11	0.88	0.76	15	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	[NT]	11	0.71	0.71	0	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	[NT]	11	0.48	0.46	4	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	[NT]	11	0.45	0.46	2	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
a-S_{NAS}	moles H^+ /t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	[NT]	11	1.5	1.5	0	[NT]	[NT]
a-Net Acidity	moles H^+ /t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-064	[NT]	11	<0.75	<0.75	0	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$/t	0.75	Inorg-064	[NT]	11	<0.75	<0.75	0	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			03/10/2019	2	03/10/2019	03/10/2019		03/10/2019	[NT]
Date analysed	-			03/10/2019	2	03/10/2019	03/10/2019		03/10/2019	[NT]
Estimated Salinity*	mg/kg	5	Inorg-034	<5	2	37000	39000	5	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	6	03/10/2019	03/10/2019		[NT]	[NT]
Date analysed	-			[NT]	6	03/10/2019	03/10/2019		[NT]	[NT]
Estimated Salinity*	mg/kg	5	Inorg-034	[NT]	6	12000	12000	0	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Reference	Description	Sample Description	Sample No.	Replicate	Date Sample	Type of samp	Date prepare
Units							-
PQL							
Method							
227430	Tallwood - M	1	1	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	1	1	1	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	2	2	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	2	2	1	01/10/2019	Soil	
227430	Tallwood - M	3	3	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	4	4	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	5	5	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	6	6	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	6	6	1	01/10/2019	Soil	
227430	Tallwood - M	7	7	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	8	8	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	9	9	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	10	10	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	11	11	0	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	11	11	1	01/10/2019	Soil	08/10/2019
227430	Tallwood - M	12	12	0	01/10/2019	Soil	08/10/2019

Date analyse	pH kcl	TAA pH 6.5	s-TAA pH 6.5	pH Ox	TPA pH 6.5	s-TPA pH 6.5	TSA pH 6.5
-	pH units	moles H+/t	%w/w S	pH units	moles H+/t	%w/w S	moles H+/t
		5	0.01		5	0.01	5
	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064
08/10/2019	6.4	<5	<0.01	4.1	<5	<0.01	<5
08/10/2019	6.5	<5	<0.01	4.1	<5	<0.01	<5
08/10/2019	6.7	<5	<0.01	6.6	<5	<0.01	<5
08/10/2019	8.5	<5	<0.01	7.8	<5	<0.01	<5
08/10/2019	5.3	16	0.03	4	92	0.15	76
08/10/2019	5.9	<5	<0.01	3.7	120	0.2	120
08/10/2019	6.7	<5	<0.01	4	210	0.33	210
08/10/2019	8.9	<5	<0.01	7.5	<5	<0.01	<5
08/10/2019	8	<5	<0.01	5.2	20	0.03	20
08/10/2019	6.5	<5	<0.01	5.1	<5	<0.01	<5
08/10/2019	7	<5	<0.01	4.6	88	0.14	88
08/10/2019	5.7	<5	<0.01	3.8	70	0.11	66
08/10/2019	5.6	<5	<0.01	3.8	69	0.11	65
08/10/2019	7.2	<5	<0.01	5.8	12	0.02	12

s-TSA pH 6.5	ANCE	a-ANCE	s-ANCE	SKCl	SP	SPOS	a-SPOS
%w/w S	% CaCO3	moles H+/t	%w/w S	%w/w S	%w/w	%w/w	moles H+/t
0.01	0.05	5	0.05	0.005	0.005	0.005	5
Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064
<0.01	<0.05	<5	<0.05	0.03	0.06	0.03	21
<0.01	<0.05	<5	<0.05	0.03	0.06	0.03	20
<0.01	0.06	12	<0.05	0.4	0.43	0.02	14
<0.01	2.1	410	0.66	0.09	0.13	0.04	27
0.12	<0.05	<5	<0.05	0.58	0.71	0.14	87
0.19	<0.05	<5	<0.05	0.35	0.38	0.03	21
0.33	<0.05	<5	<0.05	0.16	0.22	0.06	35
<0.01	5.4	1100	1.7	0.05	0.09	0.04	26
0.03	<0.05	<5	<0.05	0.28	0.29	0.008	<5
<0.01	<0.05	<5	<0.05	0.74	0.69	<0.005	<5
0.14	<0.05	<5	<0.05	0.08	0.16	0.07	46
0.11	<0.05	<5	<0.05	0.85	0.71	<0.005	<5
0.1	<0.05	<5	<0.05	0.74	0.72	<0.005	<5
0.02	<0.05	<5	<0.05	0.02	0.06	0.04	24

CaKCl	CaP	CaA	MgKCl	MgP	MgA	SHCl	SNAS
%w/w	%w/w	%w/w	%w/w	%w/w	%w/w	%w/w S	%w/w S
0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064
0.37	0.33	<0.005	0.15	0.15	<0.005	<0.005	<0.005
0.36	0.33	<0.005	0.14	0.14	<0.005	<0.005	<0.005
0.5	0.52	0.023	0.18	0.18	<0.005	<0.005	<0.005
0.43	1	0.59	0.11	0.17	0.06	<0.005	<0.005
0.73	0.87	0.15	0.34	0.36	0.021	<0.005	<0.005
0.48	0.51	0.034	0.51	0.5	<0.005	<0.005	<0.005
0.39	0.39	<0.005	0.19	0.22	0.021	<0.005	<0.005
0.58	2.3	1.7	0.11	0.17	0.062	<0.005	<0.005
0.61	0.55	<0.005	0.22	0.26	0.036	<0.005	<0.005
0.75	0.67	<0.005	0.45	0.4	<0.005	<0.005	<0.005
0.42	0.37	<0.005	0.16	0.18	0.017	<0.005	<0.005
0.88	0.71	<0.005	0.48	0.45	<0.005	<0.005	<0.005
0.76	0.71	<0.005	0.46	0.46	<0.005	<0.005	<0.005
0.42	0.22	<0.005	0.24	0.26	0.019	<0.005	<0.005

a-SNAS	s-SNAS	ineness Facta-Net Acidity	s-Net Acidity	Liming rate	cidity withou	cidity withou
moles H+/t	%w/w S	-	moles H+/t	%w/w S	kg CaCO3/t	%w/w S	moles H+/t
5	0.01	1.5	5	0.01	0.75	0.01	5
Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064	Inorg-064
<5	<0.01	1.5	21	0.03	1.6	0.034	21
<5	<0.01	1.5	20	0.03	1.5	0.033	20
<5	<0.01	1.5	<5	<0.01	<0.75	0.023	14
<5	<0.01	1.5	<5	<0.01	<0.75	0.044	27
<5	<0.01	1.5	100	0.16	7.7	0.16	100
<5	<0.01	1.5	23	0.04	1.8	0.037	23
<5	<0.01	1.5	210	0.33	16	0.33	210
<5	<0.01	1.5	<5	<0.01	<0.75	0.041	26
<5	<0.01	1.5	20	0.03	1.5	0.032	20
<5	<0.01	1.5	<5	<0.01	<0.75	<0.01	<5
<5	<0.01	1.5	88	0.14	6.6	0.14	88
<5	<0.01	1.5	<5	<0.01	<0.75	<0.01	<5
<5	<0.01	1.5	<5	<0.01	<0.75	<0.01	<5
<5	<0.01	1.5	16	0.03	1.2	0.026	16

rate withou	ate prepare	ate analyse	imated Salinity*
kg CaCO3/t	-	-	mg/kg
0.75			5
Inorg-064			Inorg-034
1.6	03/10/2019	03/10/2019	8000
1.5			
1.1	03/10/2019	03/10/2019	37000
	03/10/2019	03/10/2019	39000
2.1	03/10/2019	03/10/2019	20000
7.7	03/10/2019	03/10/2019	45000
1.8	03/10/2019	03/10/2019	59000
16	03/10/2019	03/10/2019	12000
	03/10/2019	03/10/2019	12000
1.9	03/10/2019	03/10/2019	16000
1.5	03/10/2019	03/10/2019	40000
<0.75	03/10/2019	03/10/2019	74000
6.6	03/10/2019	03/10/2019	7400
<0.75	03/10/2019	03/10/2019	77000
<0.75			
1.2	03/10/2019	03/10/2019	14000

Proposed Water Park
Test Hole Locations
Acid Sulphate Soil

0 50m

Appendix H Heynen Planning Consultants Report, June 2020

APPENDIX H

HEYNEN PLANNING CONSULTANTS REPORT

Project:	Mannum Waters Holiday Village and Adventure Water Park
Location:	Deposited Plan 119554, CT6216/17 in the Suburb of Mannum in the Hundred of Finniss
Proponent:	Tallwood Pty Ltd
Specific Description:	Amendment to the Environmental Impact Statement to Include Holiday Village and Adventure Water Park
Development Plan:	Mid Murray Council
Zone:	Residential Marina & Mannum Marina
Policy Area:	Waterfront Policy Area 22
	Conservation Policy Area 27

Gregg Jenkins
BUrb&RegPlan(Hons)

Suite 15 198 Greenhill Road
EASTWOOD SA 5063

Phone: 0475 933 823
Email: gregg@heynenplanning.com.au

CONTENTS:

DOCUMENTS CONSIDERED:

Heynen Planning Consultants has been requested by Tallwood Pty Ltd to consider the planning merit displayed by the proposed Mannum Waters Holiday Village and Adventure Water Park. The following legislation, policies and guidelines have been considered and where relevant considered within:

Legislation

- *Development Act 1993;*
- *Development Regulations 2008;*
- *Public Health Act 2011;*
- *Environment Protection Act 1993;*
- *Native Vegetation Act 1991;*
- *River Murray Act 2003;*
- *Natural Resources Management Act 2004;*
- *Native Title Act 1994;*
- *Aboriginal Heritage Act 1988;*
- *National Parks and Wildlife Act 1972; and*
- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999.*

Strategy & Policy

- *Mid Murray Council Development Plan;*
- *Planning and Design Code;*
- *Murray and Mallee Region Plan;*
- *State Planning Policies, 2019;*
- *Environment Protection (Noise) Policy, 2007;*
- *Environment Protection (Water Quality) Policy, 2015;*
- *Environment Protection (Air Quality) Policy, 2016;*
- *Environment Protection (Waste to Resources) Policy, 2010;*
- *South Australia's Waste Strategy 2015 – 2020, Office of Green Industries SA; and*
- *Building Code of Australia.*

Guidelines

- *NHMRC Guidelines for Managing Risks in Recreational Water, 2008*
- *Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry, 1999*
- *Guide for applications to clear native vegetation, 2017*
- *EPA Construction environmental management plans guidelines, 2018*

THE PROJECT

This Amended Environmental Impact Statement has been prepared to assess the environmental aspects presented by the inclusion of a Holiday Village and Adventure Water Park. The Holiday Village and Adventure Water Park is distilled into the following individual projects:

Holiday Village

1. Reception Office, small store and Manager's residence
2. Recreation Hall
3. Amenities and Laundry
4. Camp Kitchens
5. Open-air Classrooms
6. Fire-pit
7. Powered Campsites
8. Community BBQ
9. Shelters
10. Boat Ramp
11. Boat Trailer Park
12. Boat and Caravan Storage
13. Fishing Jetty
14. Hire-craft Dock
15. Canoe Launcher
16. Board Walk
17. Private Cabins
18. Communal Cabins
19. Ensuite Powered Sites
20. Powered Sites
21. Play Equipment and Jumping Balloon
22. Wetland Access

Adventure Water Park

1. Reception and ticket booth
2. Shops
3. Toilets and changerooms
4. Café
5. Deck areas
6. Parking
7. General landscaping
8. Low to high intensity activities including
9. Zorb balls
10. Launch slides
11. Tarzan swing and cliff jump pools
12. Cable ski and wakeboarding
13. Flyboard/Jetpack area
14. Inflatable obstacle course
15. Beach areas
16. Wild rapids
17. Walking paths
18. Private Islands
19. Zero depth pool
20. Water slides
21. Grass tube slide
22. Flow rider
23. Zip lines

THE SITE AND SUBJECT LAND

The Holiday Village and Adventure Water Park is proposed to be located on the western portion of Deposited Plan 119554, CT6216/17 in the Suburb of Mannum in the Hundred of Finniss (Figure 1: Subject Site).

Figure 1: Subject Site

THE LOCALITY

The land which contains the Mannum Waters development is located to the south-west of the Mannum township and is bounded by Belvedere Road to the north-west, Mannum Golf Course to the north-east, the River Murray to the south-east and land used for primary production (Dairy) to the south-west

The land where the Holiday Village and Water Park which form the subject of this application are to be sited is located in the western portion of the Mannum Waters development on land formally known as Piece 1006 in Deposited Plan 119554 or more commonly as 157 Belvedere Road, Mannum.

Within the locality a variety of land-uses are noted including residential land-uses which have been established in the portions of Mannum Waters which have been completed.

These include both dwellings and houseboats which have been moored along the artificial lakes/inlets created as part of the development.

Outside of Mannum Waters, the locality is a traditional rural locality with primary production land-uses along with some examples of residential uses. The township of Mannum is approximately 2 kilometres (as the crow flies) from the site and does not form part of the locality.

CONSIDERATION OF LEGISLATION, STRATEGY, POLICIES AND GUIDELINES

DEVELOPMENT ACT 1993 & DEVELOPMENT REGULATIONS 2008;

The Minister on 24 July 2019 declared to vary the current declaration in the Government Gazette pursuant to Section 46 of the Development Act 1993 to include the Holiday Village and Adventure Water Park.

Pursuant to Section 47 of the Development Act, the following is enclosed as an amendment to the Environmental Impact Statement.

The relevant legislation, strategies, policies and guidelines have been considered within this planning assessment, and where relevant, distilled and referenced within. My consideration of the "planning merit" displayed by the proposal summarises the appropriateness of the land use in addition to the environmental social and economic impact over the range of legislation, polies and guidelines.

Pursuant to Section 47 of the *Development Act 1993* the inclusion of the Holiday Village and Adventure Water Park to the prior Major Development of "Mannum Waters" requires an amended EIS to be prepared. In this regard, the process of preparation of the amended EIS is consistent with the *Development Act 1993*.

Figure 2: Overlay and Current Zoning (Development Plan)

Figure 3: Overlay and Policy Area

THE MID MURRAY COUNCIL DEVELOPMENT PLAN

The consideration of the Development Plan provisions below is in addition to those considered as part of the original approval. That is, the Development Plan has only been considered in detail where it relates to the proposed amendments. In my view, this is the correct approach as, plainly, the merit of the original approval remains unchanged as a result of the proposed development.

The Development Plan provisions considered as part of the original approval have been included at the end of this section but have not been considered in detail as they relate principally to the marina and residential development rather than the holiday village and water park.

The Appropriateness of the Proposal

Council Wide

Objective 4: Public and community facilities, located through the reservation of suitable land in advance of need.

PDC 52 Linkages between significant regional recreational and conservation features should be established or enhanced.

PDC 44 Development should only be undertaken where demands placed on essential services such as water supply, common effluent drains or electricity can be met by existing facilities or their expansion

PDC 309 Major tourism development should generally be located within the townships or in designated Zones or Policy Areas.

PDC 310 Tourism development should, where appropriate, add to the range of services and accommodation types available in an area.

PDC 320 Tourism development in rural areas should be developed in association with:
(a) agricultural, viticultural and winery development;
(b) heritage buildings and areas;
(c) public open space and reserves;
(d) linear parks;
(e) walking and cycling trails; and
(f) interpretive infrastructure and signs.

PDC 313 Tourism development should ensure that its scale, form and location will not overwhelm, over commercialise or detract from the intrinsic natural values of the land on which it is sited or the character of its locality.

The proposed holiday park and adventure water parks whilst spatially separated from the existing Mannum Waters development complements this development. The addition of new tourist accommodation in proximity to both the River Murray and the township of Mannum is a highly desirable outcome which will be of benefit to the Mannum community. The proposed development will ensure that presently underutilised land is activated and the amenity of the locality improved.

The Environmental Impact

Council Wide
Objective 7: Development safe from natural or man-made hazards and to be compatible with land capability.
Objective 62: Native flora, fauna and ecosystems protected, retained, conserved and restored.
Objective 75: Environmentally sustainable and innovative tourism development
Objective 78: Tourism development that protects areas of exceptional natural value, allows for appropriate levels of visitation, and demonstrates an environmental analysis and design response which enhances environmental values.
PDC 55 Development should not be undertaken unless:
(a) it conforms with the desired future character of an Area; and
(b) it is sited so as to protect scenic views from public roads or reserves, and is not located on visually-significant ridgelines.
PDC 75 Development should take place in a manner which will minimise alteration to the existing land form.
PDC 76 Excavation and earthworks should take place in a manner that is not extensively visible from surrounding localities.
PDC 311 Tourism development and any associated activities should not damage or degrade any significant natural and cultural features.
PDC 314 Any upgrading of infrastructure to serve tourism development should be consistent with the landscape and the intrinsic natural values of the land and the basis of its appeal.
PDC 315 Tourism development should be located in such a way as to maximise the retention of existing native vegetation and ensure the bed and banks of watercourses are protected from inappropriate development and management practices.
PDC 321 Where appropriate, tourism developments in areas outside townships should:
(a) adapt and upgrade existing buildings of heritage value; and
(b) seek to improve conditions in disturbed or degraded areas on the site
PDC 324 Tourism development, particularly in remote areas should be designed to minimise energy and water demands and incorporate alternative, sustainable technologies that use renewable energy sources and/or treat and reuse stormwater and wastewater to minimise reliance on mains services.
Mannum Marina Zone - Policy Area 27 (Conservation)
Objective 1: The conservation and enhancement of the natural environment and natural ecological processes for their historic, scientific, landscape, faunal habitat, biodiversity and cultural values.
PDC 6 Holding ponds and wetlands should ensure stormwater is managed in accordance with the Operational and Environmental Management Monitoring Plan.

The basis of the proposed development and of the Mannum Waters development generally is the proximity to the River Murray and the unique landscapes which surround. Put another way, both the holiday park and the water park rely on the River Murray for their continued viability by way of the high level of amenity drawn from the River Murray. To this end, the continued conservation of the River Murray is critical.

Furthermore, the subject land is presently vacant land and the proposed development (coupled with the previously approved development) allows for the re-vegetation of portions of land. Of particular note, the proposed development re-designs the previously approved wetlands.

As noted in subsections 4.2.1 to 4.2.4 the plant species selected are endemic to the region. Considering that the previous uses of the land have varied significantly (e.g. for drainage and agricultural purposes), the proposed holiday park and water park which will result in the re-vegetation of the subject land is a highly desirable outcome, consistent with the intent of the Development Plan.

PDC 323 Tourism development in rural areas should occur only where it:
(a) incorporates a separation distance or buffers to avoid conflict with existing rural industries or agriculture or otherwise is designed to overcome the potential impacts associated with the adjoining land use (such as noise, dust, spray drift, odour and traffic)
(b) will not give rise to demands for infrastructure and services, especially on public lands, that are inappropriate to the primary purpose of the zone and/or policy area.

> *The existing agricultural uses surrounding the subject land are for dairy purposes and not for cropping. Matters such as spray drift from the dairy lands has been discussed with the neighbouring owner who has advised that spraying undertaken by the dairy is tightly controlled, well documented and follows environmental guidelines using low drift nozzles. Spraying does not occur at the adjoining levy boundary and drift does not exceed 40m which is exceeded by the separation distances. Accordingly, the continued operation of these uses will not be prejudiced by the proposed development. Furthermore, the amenity of the proposed development will not be compromised by the surrounding land-uses. No negative impacts with respect to traffic are expected as a result of the development (refer Sonus and MFY reports).*

Council Wide
PDC 199 Development should comply with the current *Environment Protection (Water Quality) Policy*.
PDC 219 Development should not occur on land where the risk of flooding is likely to be harmful to safety or damage property.
PDC 220 Development should not be undertaken in areas liable to inundation by drainage or flood waters unless the development can achieve all of the following:
(a) it is developed with a public stormwater system capable of catering for a 1 in 100 year average return interval flood event;
(b) buildings are designed and constructed to prevent the entry of floodwaters in a 1 in 100 year average return interval flood event.
PDC 221 Development, including earthworks associated with development, should not do any of the following:
(a) impede the flow of floodwaters through the land or other surrounding land;
(b) increase the potential hazard risk to public safety of persons during a flood event;
(c) aggravate the potential for erosion or siltation or lead to the destruction of vegetation during a flood;
(d) cause any adverse effect on the floodway function;
(e) increase the risk of flooding of other land;
(f) obstruct a watercourse.

> *I understand that as per the original approval, Water Sensitive Urban Design (WSUD) techniques are being employed, as are stormwater management techniques. Furthermore, the quality of the water in the water-based recreational facilities associated with the water park will be managed by the wetland. As per the 'Eco Management Services' report, no negative impacts to the wetland or environmental circumstances of the land surrounding the site will result from the proposed development.*

Council Wide
PDC 342 Development that produces any sewage or effluent should be connected to a waste treatment system that complies with (or can comply with) the relevant legislation applying to that type of system.
PDC 343 The methods for, and siting of, effluent and waste storage, treatment and disposal systems should minimise the potential for environmental harm and adverse impacts on:
(a) the quality of surface and groundwater resources;
(b) public health;
(c) the amenity of a locality; and
(d) sensitive land uses.
PDC 344 Waste treatment should only occur where the capacity of the treatment facility is sufficient to accommodate likely maximum daily demands including a contingency for unexpected high flows and breakdowns.
PDC 345 Any on-site wastewater treatment system/ re-use system or effluent drainage field should be located within the allotment of the development that it will service other than:
(a) where the land is located within the flood plain known as the 1956 River Murray Flood Plain; or
(b) where the land is less than 100 metres from the normal pool level of the River Murray.

PDC 346 A dedicated on-site effluent disposal area should not include any areas to be used for, or could be reasonably foreseen to be used for, private outdoor open space, driveways, car parking or outbuildings.
PDC 347 The spreading or discharging of treated liquid or solid waste onto the ground should only occur where the disposal area consists of soil and vegetation that has the capacity to store and use the waste without contaminating soil or surface or ground water resources or damaging crops.

Both the water park and holiday village will be connected to the Mannum Waters Wastewater Treatment Plant, approved as part of the original approval and now operational. Ongoing discussion remains with SA Water with regards to a joint venture to relocate the existing waste water treatment facility.

The Social Impact

Council Wide
Objective 73: Creation of passive and active recreation areas.
Objective 74: Provision of open spaces.
Objective 77: Tourism development that sustains or enhances the local character, visual amenity and appeal of the area.
Objective 80: Tourism development that contributes to local communities by adding vitality to neighbouring townships, regions and settlements.
PDC 164 Development should be sited and designed to minimise its visual impact on:
(a) the natural, rural or heritage character of the area;
(b) areas of high visual or scenic value, particularly rural and riverine areas;
(c) views from the River Murray, public reserves, tourist routes, walking trails and scenic routes that are identified in Map MiMu/1 (Overlay 2).
PDC 312 Tourism development should have a functional or locational link with its natural, cultural or historical setting.
PDC 318 Tourist developments should demonstrate excellence in design to minimise potential impacts or intrusion on primary production activities and on areas of high conservation, landscape and cultural value.

The proposed development will not impact any primary production land. Put another way, the portion of the land where the holiday park and water park are now proposed was previously approved for a residential land-use. The proposed uses provide recreation areas and make-use-of (link) with the natural form and setting of the River Murray.

The Economic Impact

Objective 8: Maintenance and promotion of a diverse local economy
Objective 79: Tourism development in rural areas that does not adversely affect the use of agricultural land for primary production.
Objective 9: Satisfaction of the social, economic and cultural needs of the community.
Objective 81: Increased opportunities for visitors to stay overnight.
PDC 319 Tourism developments in rural areas should be sited and designed to minimise impacts and have a functional or locational link with either of the following:
(a) the surrounding agricultural production or processing;
(b) the natural, cultural or historical setting of the area.

As noted in Section 3.1.4, an estimated 79000 visitors (54000 to the holiday village and 50000 to the water park with some overlap presumed) will visit the facility yearly. This will result in an estimated 71 FTE jobs created. Plainly, significant benefits to the Mannum community will occur as a result of the proposed development.

In my view, it is also likely that the visitors who stay at the holiday village will make use of other businesses within the Mannum community which provides benefits to the community as a whole.

Additional temporary benefits will occur whilst the water park and the holiday park are under construction due to the jobs that will be created during this phase.

On balance, it is likely that the now proposed scheme for tourism purposes (i.e. holiday park and water park) will result in economic benefits which are equal to or greater than the originally approved residential scheme.

Accordingly, the substantial economic benefits as detailed throughout the EIS are consistent with the outcomes sought by the Development Plan.

Provisions Considered Relevant to Mannum Waters Development 'As a Whole'

Mannum Marina Zone

Objective 1: A zone accommodating a marina including berthing facilities and areas for the passage and manoeuvring of vehicles, with complementary tourist, accommodation, recreational, local retail and boat maintenance facilities

Objective 2: A zone that provides for a marina and riverine structures including:

(a) pontoons
(b) jetties
(c) piers
(d) boat berths
(e) slipway/boat ramp/boat lift
(f) repair facilities
(g) wastewater collection, storage and transfer facilities.

Although the development results in the removal of some residential allotments and a portion of the marina, it also provides the Mannum Waters development with improved recreational and tourist facilities. Accordingly, the proposed development is considered to be consistent with the intent of the zone.

Objective 3: Development that does not unreasonably interfere with the desired character of the locality by generating noise nuisance.

Per Attachment B (Detailed Concept of Water Park Facilities) and the Environmental Noise Assessment prepared by Sonus Acoustic Engineers (Sonus), the noise generated by the park will be within the EPA Standards. As identified by Sonus, the noise generated by the Water Park is predicted to comply with the Policy at all noise sensitive receivers without any specific acoustic treatment measures.

Mannum Marina Zone

Objective 4: Protection of the water quality of the River Murray, marina basin and wetlands.

Objective 5: Development designed and sited so that the natural appearance of the site visible from the River Murray and land located on the eastern side of the River is not impaired.

Objective 6: Development designed and sited to conserve water and energy, and minimise waste.

Objective 7: Development that contributes to the desired character of the Zone.

PDC 4 Development in the zone should be undertaken in accordance with the Structure Plan shown on Figure M(Mar)/1.

PDC 11 The design, scale and appearance of development should contribute to the creation of a cohesive character that reflects the riverine location, views and waterfront opportunities unique to the zone.

PDC 14 The riparian edge should be maintained along waterfront allotments.

PDC 23 The excavation and/or filling of land should:

(a) be kept to a minimum so as to preserve the form of the land and native vegetation; and
(b) result in stable slopes, which are covered with top soil and landscaping so as to preserve and enhance the natural character of the zone.

Mannum Marina Zone - Policy Area 27 (Conservation)

Objective 2: Provision of opportunities for the public to experience and appreciate the significance of the native vegetation and riparian habitat of the area through low impact recreational activities and interpretive facilities.

PDC 2 Development should be undertaken in a manner which minimises the effect on natural landscape features, flora and fauna and their habitat corridors, land adjoining water and scenically attractive areas.

Residential Marina Zone

Objective 1: A residential zone which caters for conventional and waterfront residential development along with residential development integrated with recreational activities in specific localities.

Residential Marina Zone

Objective 2: Development designed and sited to conserve water and energy, and minimise waste.

Residential Marina Zone

Objective 3: Protection of the water quality of the River Murray, marina basin and wetlands.
Residential Marina Zone
Objective 4: Development that contributes to the desired character of the Zone.
PDC 5 The design, scale and appearance of development should contribute to the creation of a cohesive character that reflects the riverine location, views and waterfront opportunities unique to the zone.
PDC 9 Development should be undertaken in a manner which minimises the effect on natural landscape features, flora and fauna and their habitat corridors, land adjoining water and scenically attractive areas.

As noted above, the proposed development will not impact on the natural characteristics of the River Murray and is designed to be a sustainable development. Furthermore, the development is consistent with the zone. It is presumed that the Structure Plan will be updated upon approval (presuming this is granted) of this application and thus the development will be consistent with this.

Mannum Marina Zone - Policy Area 27 (Conservation)
PDC 3 Important sites of Aboriginal and European heritage should be preserved.
Residential Marina Zone
PDC 23 Important sites of Aboriginal and European heritage should be preserved.

The proponent has liaised with representatives of Mannum Aboriginal Community Association Inc (MACAI) throughout the development of the original stages of the Mannum Waters and is aware of their obligations under the Aboriginal Heritage Act 1988 (as discussed in depth below). Further discussion on the matter is included within Appendix F.

Residential Marina Zone
PDC 30 All buildings should be connected to the SA Water sewer system.

The Mannum Waters Wastewater Treatment Plant is currently utilised to treat wastewater within Mannum Waters and as discussed above, it is my understanding that the water park and holiday village will equally be connected to this.

Residential Marina Zone
PDC 33 Development should be landscaped utilising primarily native species, suited to the local soil and climatic conditions, with open space and landscaping that minimises hard paved surfaces.
PDC 34 Landscaping should include the planting of locally indigenous species where appropriate.

The proposed development allows for re-vegetation of land and establishment of wetlands as does the Mannum Waters development generally. At the conclusion of the development, the level of landscaping and vegetation on the site will be substantially increased compared to the original circumstances of the land.

Interface

Council Wide
PDC 88 Development should be designed and sited to minimise negative impact on existing and potential future land uses considered appropriate in the locality.
PDC 89 Development adjacent to a Residential Zone or residential area within a Country Township, Service Centre or Settlement Zone should be designed to minimise overlooking and overshadowing of nearby residential properties.

The proposed development is only in proximity to existing residential land-uses within other stages of the Mannum Waters development. As noted above, the proposed development will complement the development and provide for increased recreational opportunities. The impact on the established land-uses is considered within the Sonus (acoustic impact), MFY (traffic impact) and Eco-Management Services Pty Ltd (impact on water quality).

PDC 91 Sensitive uses likely to conflict with the continuation of lawfully existing developments and land uses considered appropriate for the zone should not be developed or should be designed to minimise negative impacts.
PDC 97 Existing primary production uses and mineral extraction should not be prejudiced by the inappropriate encroachment of sensitive uses such as urban development.

PDC 98 Development that is adjacent to land used for primary production (within either the zone or adjacent zones) should include appropriate setbacks and vegetative plantings designed to minimise the potential impacts of chemical spray drift and other impacts associated with primary production.
PDC 99 New urban development should provide a buffer of at least 40 metres wide (inclusive of any fuel break, emergency vehicle access or road) separating urban and rural activities.

As discussed in detail above, the proposed development will not have any impact on the continued operation of established agricultural land-uses in proximity to the subject land.

Environmental Impact

Council Wide
Objective 6: Land liable to flooding from the River Murray, either kept free of development which could be damaged or which would impede floodwaters, or designed and located to minimise property damage or impede flood waters.
Objective 55: Retention, protection and restoration of the natural resources and environment.
Objective 56: Protection of the quality and quantity of South Australia's surface waters, including inland, riverine and underground waters.
Objective 57: The ecologically sustainable use of natural resources including soil and water resources (including underground water, surface water and watercourses as defined in the current Environment Protection (Water Quality) Policy).
Objective 58: Natural hydrological systems and environmental flows reinstated, and maintained and enhanced.
Objective 60: Development sited and designed to:
(a) protect natural ecological systems;
(b) achieve the sustainable use of water;
(c) protect water quality, including receiving waters;
(d) reduce runoff and peak flows and prevent the risk of downstream flooding;
(e) minimise demand on reticulated water supplies;
(f) maximise the harvest and use of stormwater;
(g) protect stormwater from pollution sources.
Objective 63: Restoration, expansion and linking of existing native vegetation to facilitate habitat corridors for ease of movement of fauna.
Objective 64: Minimal disturbance and modification of the natural landform.
Objective 65: Protection of the physical, chemical and biological quality of soil resources.
Objective 66: Protection of areas prone to erosion or other land degradation processes from inappropriate development.
Objective 87: Maintenance of the natural environment and systems by limiting development in areas susceptible to natural hazard risk.
Objective 88: Development located away from areas that are vulnerable to, and cannot be adequately and effectively protected from the risk of natural hazards.
Objective 92: Protection of life and property from the effects of flooding.
Objective 93: Prevention of development which could lead to a potential hazard in the event of a major flood.
PDC 172 Development should be undertaken with minimum impact on the natural environment, including air and water quality, land, soil, biodiversity, and scenically attractive areas.
PDC 173 Development should ensure that South Australia's natural assets, such as biodiversity, water and soil, are protected and enhanced.
PDC 174 Development should not significantly obstruct or adversely affect sensitive ecological areas such as creeks and wetlands.
PDC 175 Development should be appropriate to land capability and the protection and conservation of water resources and biodiversity.
PDC 176 Development should be designed to maximise conservation, minimise consumption and encourage re-use of water resources.
PDC 177 Development should not take place if it results in unsustainable use of surface or underground water resources.
PDC 178 Development should be sited and designed to:
(a) capture and re-use stormwater, where practical;
(b) minimise surface water runoff;
(c) prevent soil erosion and water pollution;
(d) protect and enhance natural water flows;

(e) protect water quality by providing adequate separation distances from watercourses and other water bodies;
(f) not contribute to an increase in salinity levels;
(g) avoid the water logging of soil or the release of toxic elements;
(h) maintain natural hydrological systems and not adversely affect:
(i) the quantity and quality of groundwater;
(i) the depth and directional flow of groundwater;
(ii) the quality and function of natural springs.
PDC 179 Water discharged from a development site should:
(a) be of a physical, chemical and biological condition equivalent to or better than its predeveloped state;
(b) not exceed the rate of discharge from the site as it existed in pre-development conditions.
PDC 180 Development should include stormwater management systems to protect it from damage during a minimum of a 1-in-100 year average return interval flood.
PDC 181 Development should have adequate provision to control any stormwater over-flow runoff from the site and should be sited and designed to improve the quality of stormwater and minimise pollutant transfer to receiving waters.
PDC 182 Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.
PDC 183 Development should include stormwater management systems designed to achieve the following stormwater runoff outcomes:
(a) for up to but not including the 5 year average return interval flood event:
(i) pre-development peak flows should not be exceeded;
(ii) the time to peak should match that of the pre-development case, as far as practical, provided this does not exacerbate downstream flooding;
(iii) runoff should be contained within designed flow paths that avoid unplanned nuisance flooding;
(b) for the 5 year to up to and including the 100 year average return interval flood event:
(i) flooding of residential, commercial, institutional, recreation and industrial buildings should be avoided;
PDC 184 Development should include stormwater management systems to minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system.
(ii) the time to peak and the peak flow should match that of the pre-development case, as far as practical (provided this does not exacerbate downstream flooding), unless catchment wide benefits can be demonstrated.

The proposed development and the majority of the Mannum Waters development generally is located within the 1956 Flood Plain. As previously noted, the development has been designed to ensure that the development does not impact on the River Murray.

Furthermore, the wetlands are used to ensure that any water that is discharged from the water park will not be directly discharged into the River Murray. This ensures that the salinity levels of the River Murray are not impacted by the proposed development.

Council Wide
PDC 374 Hazardous materials should be stored and contained in a manner that minimises the risk to public health and safety and the potential for water, land or air contamination.
PDC 375 Development that involves the storage and handling of hazardous materials should ensure that these are contained in designated areas that are secure, readily accessible to emergency vehicles, impervious, protected from rain and stormwater intrusion and other measures necessary to prevent:
(a) discharge of polluted water from the site;
(b) contamination of land;
(c) airborne migration of pollutants; and
(d) potential interface impacts with sensitive land uses.

No hazardous materials will be stored on site (per sections 4.4.4 and 4.4.5) and thus the risks will be minimal.

Council Wide
PDC 212 Development should not have an adverse impact on the natural, physical, chemical or biological quality and characteristics of soil resources.
PDC 213 Development should be designed and sited to prevent erosion.

PDC 214 Development should take place in a manner that will minimise alteration to the existing landform.
PDC 215 Development should minimise the loss of soil from a site through soil erosion or siltation during the construction phase of any development and following the commencement of an activity.

The soil has been analysed and it has been noted that the soil on the flood plains are high in salinity.

Thus, vegetation and plantings will be selected with this in mind. Within the holiday park, a different soil type to that within the flood plain is evident and plantings will likewise be chosen based on this soil type. All areas of the site previously used for agricultural purposes have been audited as part of the original approval and deemed suitable for human habitation.

The practices and principles for soil erosion and dust control are outlined in the current Construction Environmental Management and Monitoring Plan. Material removed from the areas used for artificial lakes will be removed and replaced at the holiday village site, to achieve the site levels. This ensures that the soil type will be consistent throughout the site.

Social Impact

Objective 26 Protect community health and amenity and support the operation of all desired land uses.
Objective 51: Retention of rural areas for agricultural and pastoral purposes.
Objective 52: Maintenance of the character of rural areas.
Objective 54: Protection of scenically attractive areas, particularly natural, rural and riverine landscapes.
Objective 67: Protection of the scenic qualities of natural and rural landscapes.
Objective 68: Preservation of the River Murray landscape and environment.
Objective 69: Conservation of land, buildings, structures and other items of significant historical, social and architectural or other Aboriginal or European heritage significance.
Objective 76: Tourism development that assists in the conservation, interpretation and public appreciation of significant natural and cultural features including State or local heritage places.

As noted above, the proposed development allows for the conservation and enhancement of the natural form of the River Murray. The new development will draw people to the Mannum area and increase tourist numbers with a development of state significance. Plainly, the proposed development will increase provide excellent outcomes for the Mannum Community whilst also furthering public appreciation of the natural features of the area.

Economic Impact

Council Wide
Objective 17: New development serviced with adequate public infrastructure commensurate with projected demands at the cost of the proponent.
Objective 25 Development located and designed to prevent adverse impact and conflict between land uses.
PDC 88 Development should be designed and sited to minimise negative impact on existing and potential future land uses considered appropriate in the locality.

The development is well-designed to ensure that there is no conflict between land-uses with all infrastructure funded by the proponent. The proposed development is highly appropriate in the locality for the reasons identified above.

PLANNING, DEVELOPMENT AND INFRASTRUCTURE ACT

In September 2020, Phase Three of the Planning and Design Code (P&D Code) under the *Planning, Development and Infrastructure Act 2016 (PDI Act)* is scheduled to become operational, replacing the *Development Act 1993* and the *Development Regulations 2008.*

The significance of this is that the Mid Murray Council is a part of this phase and accordingly, the Development Plan will likewise be superseded once the P&D Code becomes operational.

A general consideration of the proposal's consistency with the P&D Code is provided below. This consideration has been made using the draft version of the P&D Code as current on the 3rd of June 2020 and as such, it is noted that this could differ once enacted. That said, the consideration of the P&D Code is nonetheless appropriate and important noting the impending legislative 'changeover'.

Within the P&D Code, the subject land is proposed to span the Conservation Zone, General Neighbourhood Zone and Infrastructure (Ferry and Marina Facilities) Zone. This has not been overlaid as I understand that the zone boundaries are yet to be finalised, while noting the "integration" of the site these provisions are considered in totality over the site.

The Appropriateness of the Proposal

General Development Policies –

Open Space and Recreation

DO 1 Pleasant, functional and accessible open space and recreation facilities provided for active and passive recreation

Tourism Development

DO 1 Tourism development in suitable locations that caters to the needs of visitors.

PO 1.1 Tourism development complements and contributes to local, natural, cultural or historical context.

PO 1.2 Tourism development comprising multiple accommodation units (including any facilities and activities for use by guests and visitors) clustered to minimise environmental and contextual impact.

Transport, Access and Parking

DO 1 A comprehensive, integrated and connected transport system that is safe, sustainable, efficient, convenient and accessible to all users.

PO 8.1 Internal road and vehicle parking areas surfaced to prevent dust becoming a nuisance to park residents and occupants.

Conservation Zone

DO 1 The conservation and enhancement of the natural environment and natural ecological processes for their historic, scientific, landscape, faunal habitat, biodiversity and cultural values and provision of opportunities for the public to experience these through low-impact recreational and tourism development.

PO 1.1 Small-scale, low-impact land uses that provide for the conservation and protection of the area, while allowing the public to experience these important environmental assets.

PO 4.2 Development sited and designed to minimise impacts on the natural environment by:
(a) containing construction and built form within a tightly defined site boundary; and
(b) minimising the extent of earthworks.

Infrastructure (Ferry and Marina Facilities) Zone

DO 1 A zone accommodating on-water development associated with the function of marinas and passenger ferry services together with a range of complementary waterfront-oriented recreational and tourist development activities.

> *Both the proposed holiday village and water park will provide high amounts of open space and recreational opportunities. Whilst in the case of the holiday village, these will be limited to park guests and patrons, this ensures that there is not an over-reliance on the existing recreational facilities in the Mannum area.*
>
> *Conversely, the water park provides excellent recreational facilities for not only those visiting the holiday village but for other residents and visitors to the region also.*
>
> *Both aspects of the proposal are sensitive to their surrounds and encourage interaction with the natural context of the River Murray.*
>
> *Furthermore, the access gained to the holiday village and water park from Belvedere Road will be safe and convenient and comply with all relevant Australian Standards (refer MFY report).*

The Environmental Impact

General Development Policies

Interface between Land Uses

DO 1 Development located and designed to mitigate adverse effects on neighbouring and proximate land uses to reduce potential for conflict.
Design In Rural Areas
PO 5.1 Development sited and designed to maintain natural hydrological systems without negatively impacting:
(a) the quantity and quality of surface and groundwater;
(b) the depth and directional flow of surface and groundwater; or
(c) the quality and function of natural springs.
Conservation Zone
PO 5.4 Recreational trails and access ways located to direct the public away from sensitive areas to minimise impact on the natural environment.
PO 5.5 Recreational trails are raised or surfaced with permeable materials to minimise impact on the natural environment.
PO 7.1 Screening and planting is provided to buildings and structures and comprises locally indigenous species to enhance the natural environment.

> *The development is designed to ensure that there will be no impact on the River Murray itself or put another way, whilst the development takes advantage of its proximity to the river, no impacts will be felt by the river as a result of the development.*
>
> *Additionally, the re-establishment of locally indigenous and endemic vegetation on the site will ensure that positive environmental outcomes occur as a result of the proposed development.*

The Social Impact

General Development Policies
Tourism Development
PO 2.1 Potential conflicts between long-term residents and short-term tourists minimised through suitable siting and design measures.
PO 2.6 Long-term occupation does not displace tourist accommodation, particularly in important tourist destinations such as coastal and riverside locations.

> *The siting of the proposed uses is sufficiently separated from the existing parts of the Mannum Waters Development to ensure that there will be no impacts on the permanent residents as a result of the holiday village.*
>
> *The introduction of tourist accommodation in the proposed scheme also clearly achieves the intent of the P&D Code insofar as it seeks uses such as the proposed use in key tourist destinations such as in proximity to the River Murray.*

The Economic Impact

Infrastructure (Ferry and Marina Facilities) Zone
PO 1.2 Off-water development is:
(a) associated with marinas and passenger ferry services, including complementary conservation works; or
(b) caters to the needs and enjoyment of visitors and occupants such as tourist accommodation, restaurants, clubrooms, chandlery and the like, provided at a scale compatible with the role and function of the associated marina and / or the passenger ferry service.

> *The facilities provided as a result of proposed development will provide for the needs and enjoyment of those within the Mannum Waters development (both permanent residents and visitors) as well as the wider community.*

PUBLIC HEALTH ACT 2011

The proponent would need to comply with the *Public and Environmental Health Act 1987* in regard to the disposal of effluent from visitors and staff of both the Adventure Water Park and Holiday Village (as too for all of Mannum Waters).

The ongoing health of the pools pertaining to the Adventure Waterpark is addressed in detail within the section NHMRC Guidelines for Managing Risks in Recreational Water.

The amendments to include the Adventure Water Park and Holiday Village will not alter the previous assessment of the suitability of the Marina and Residential land use.

Tallwood Pty Ltd also are continuing discussion with SA Water to undertake the following:

- The relocation of the WWTP to the SA Water site already purchased. The new WWTP to be constructed by Tallwood Pty Ltd; and
- The transfer pipework from the old WWTP to the new WWTP and the pipework to distribute recycled water back to the Golf Course. This pipework to be funded by SA Water but constructed by Tallwood Pty Ltd.

Notwithstanding the outcome, the proposal will ensure an appropriate outcome for public health is resolved.

RIVER MURRAY ACT 2003

The *River Murray Act 2003* (the River Murray Act) comprises both the act itself and the schedule to the act which when the *River Murray Act* came into operation, amended 22 other South Australian Acts including the *Development Act 1993*. I also note the *Planning and Design Act 2016* (PDI Act 2016) has regard to the *River Murray Act*.

Generally speaking, the intent of the *River Murray Act* is to;

- establish an enforceable 'duty of care' to not harm the river;
- establish Ministerial powers to undertake activities and works on the river and to register management agreements with private landowners;
- establish Parliamentary Committees;
- powers to regulate future activities which have the potential to harm the river; and
- the referral of applications under made under the auspices of other pieces of legislation (such as the Development Act 1993 and PDI Act 2016) to the Minister responsible for administering the River Murray Act.

In effect, the principle purpose of the *River Murray Act* is to regulate activities or works taking place along the River Murray to ensure its protection and continued viability. As the proposed development is located along the River Murray, consideration of the *River Murray Act* as part of this EIS is necessitated.

In my view, the amendments made to the proposal do not necessitate a detailed reconsideration of the *River Murray Act* as the outcomes are commensurate with the originally approved proposal.

Accordingly, the discussion regarding the *River Murray Act* from the original EIS remain relevant.

NATURAL RESOURCES MANAGEMENT ACT 2004

The South Australian Government's *National Resources Management Act 2004* provides

for an integrated and transparent system to ensure sustainable use of the State's resources.

Under the Act a *State National Resources Management (NRM) Plan* was established in 2006. Certain policies and strategies were outlined to assist managers in making effective and efficient decisions in the protection of the South Australia's natural systems. The plan identifies four goals:

Goal 1 – Landscape scale management that maintains healthy natural systems and is adaptive to climate change

Goal 2 – Prosperous communities and industries using and managing natural resources within ecologically sustainable limits

Goal 3 – Communities, governments and industries with the capability, commitment and connections to manage natural resources in an integrated way

Goal 4 – Integrated management of biological threats to minimise risks to natural systems, communities and industry

The goals are also linked to various state wide planning policies, including South Australia's Strategic Plan with the summary of this EIS providing an outcome that upholds the four goals noted above.

NATIVE TITLE ACT 1994

An application by Christine Abdulla & Ors (The *First Peoples of the River Murray and Mallee Region #2)* (Tribunal file no. SC2019/001, Federal Court no. SAD184/2019 was filed of 20 August 2018 and includes the subject land, in addition to spanning the Mid Murray Council, The DC of Karoonda East Murray, The DC of Loxton Waikerie, The Regional Council of Goyder, The Rural City of Murray Bridge, Pastoral Unincorporated Area.

It is my understanding that this matter is still before the Federal Court.

The applicant is aware of their requirements pertaining to the *Native Title Act* and *Native Title (Prescribed Bodies Corporate) Regulations 1999*.

ABORIGINAL HERITAGE ACT 1988

The Department of State Aboriginal Affairs (DoSAA) which administers *the Aboriginal Heritage Act 1988*, requires that in the event archaeological items are uncovered during earthmoving, it be contacted immediately.

As previously noted, the 'Mannum Waters' development was investigated during the original EIS. Subsequently, Tallwood Pty Ltd has liaised with representatives of Mannum Aboriginal Community Association Inc (MACAI) in accordance with agreed protocols.

During the construction of Stage 5, aboriginal remains were located and subject to detailed investigation and report by an approved archaeologist.

In that report, actions were outlined to identify the extent of the burial ground, to secure the remains and further asses the remaining areas of land to the west which include Stage 6 residential Area, the Holiday Village and the Adventure Water Park. All identified actions have been completed and a final walk-over of the areas has been completed by MACAI.

The original protocols for construction still stand. MACAI will monitor all excavations below ground level during construction activities excluding areas of floodplain.

The proponent will ensure all stakeholders maintain their awareness of the *Aboriginal Heritage Act 1988* during the construction of the Holiday Village and Adventure Water Park.

Further consideration of the *Aboriginal Heritage Act 1988* is included within Appendix F.

NATIONAL PARKS AND WILDLIFE ACT 1972

A Protected Matters Search was completed during the prior EIS to provide guidance on matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and to determine whether there are any relevant matters at or adjacent to the site.

The species listed under the *National Parks and Wildlife Act 1972* (South Australia; NP&W Act) that are recorded in the Mannum region were reviewed with 21 plant species identified as either vulnerable or endangered under the NP&W Act.

None of these species were identified in the development area which included the area where the Holiday Village and Adventure Water Parks are now proposed.

Noting that there are no significant areas of native habitat and vegetation species that will need to be cleared by the development of the two projects as both project areas have already been substantially cleared, excavated, farmed or otherwise subject to human occupation.

Accordingly, the requirements of the *National Parks and Wildlife Act 1972* will be achievable by the development.

COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is a Commonwealth Act that seeks to identify and protect matters of national environmental significance. The Act identifies seven matters of national environmental significance:

- World Heritage properties
- National Heritage places
- Wetlands of international importance (Ramsar wetlands)
- Theartened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining).

The Commonwealth Department of Environment and Heritage (DEH) provides a web based tool for assessing specific sites to determine if matters of national environmental significance are likely to be present in an area where development is proposed. During the prior EIS, the results of the use of this tool in the Mannum Waters area has shown that there are no relevant matters at or adjacent to the site.

Noting the prior clearing of the land, and containment of the proposed Holiday Village and Adventure Water Park within the original bounds of the prior "Mannum Waters" site, I anticipate this remains consistent.

STATE PLANNING POLICIES, 2019

Under the Act, all designated instruments should comply with the policies, objectives and principles prescribed by the relevant State Planning Policies (SPPs) during both the preparation and amendment phases of Regional Plans, Design Standards and the Planning and Design Code (the Code).

The proposed developments consistency with the Murray and Mallee Region Plan (considered below) and the imminent Planning and Design Code, of which consistency was previously observed, is the ultimate test.

The following policies are pertinent to the proposal:

> **State Planning Policy 1: Integrated Planning**
> *1.2 Provide an orderly sequence of land development that enables the cost-effective and timely delivery of infrastructure investment commensurate with the rate of future population growth.*
>
> *1.4 Protect areas of rural, landscape character, environmental importance, mining or food production significance from the expansion of urban areas, towns and settlements.*

The provision of housing within Mannum Waters continues to provide a range of housing to support population growth within the region. Infrastructure costs are borne by the proponent and will be delivered in a coordinated approach to complete the development as required.

> **State Planning Policy 2: Design Quality.**
> *2.1 Promote best practice in the design of buildings, places and the public realm by applying the principles of Good Design*
>
> *2.3 The development of environmentally sustainable buildings and places by applying Water Sensitive Urban Design and energy efficiency design solutions.*
>
> *2.13 Provide a diverse range of high quality green public open spaces and streetscapes, particularly in areas of growth and renewal.*

The Water Sensitise Urban Design Principles have previously been noted within this EIS. The ability for 'Good Design' principles to be realised will be addressed within the upcoming built form application for for the reception office, store and manager's residence, recreation hall and associated buildings.

The provision of high quality recreation areas and streetscape is depicted with Figure 4:Water Park Proposed **Layout** and Figure 5: Holiday Village Concept Plan.

Figure 4: Water Park

Figure 5: Holiday Village Concept Plan

State Planning Policy 4: Biodiversity.
4.1 Minimise impacts of development on areas with recognised natural character and values, such as native vegetation and critical habitat so that critical life-supporting functions to our state can be maintained.

4.2 Recognise the value of modified landscapes and allow appropriately scaled development that can co-exist with and safeguard biodiversity values and critical functions.

4.3 Encourage the re-introduction of biodiversity or its components in development areas to provide life-supporting functions at low cost.

4.5 Where impacts to biodiversity cannot be avoided, these impacts should be minimised and where possible, offset.

4.6 Encourage nature-based tourism and recreation that is compatible with, and at an appropriate scale for, conserving the natural values of that landscape.

State Planning Policy 7: Cultural Heritage.
7.1 The sensitive and respectful use of our culturally and historically significant places.

7.2 Recognise and protect Indigenous cultural heritage sites and areas of significance.

7.3 Recognise and protect places and areas of acknowledged heritage value for future generations.

7.4 The appropriate conservation, continuing use, and as appropriate, adaptive reuse of our heritage places and heritage areas of value to the community

State Planning Policy 8: Primary Industry
8.4 Equitably manage the interface between primary production and other land use types, especially at the edge of urban areas.

State Planning Policy 9: Employment Lands.
9.1 Support the expansion and clustering of key economic growth areas including health; education; tourism; energy and resources; primary industry; defence; and knowledge and creative industries.

9.2 Enable opportunities for employment and encourage development of underutilised lands connected to, and integrated with, housing, infrastructure, transport and essential services.

9.5 Promote new, latent and alternative employment types and attract new business investment by enabling a diverse range of flexible land use opportunities.

9.9 Support sustainable tourism where the social, cultural and natural assets underpinning the tourism developments are protected in line with sustainability principles.

The Adventure Water Park construction costs are estimated to be $2.6M and providing employment to the equivalent of 15,000 hours during construction over several stages.

Once operational, a full day will require 18 persons (team members) for 7 hours per day and 102 days per year. It is anticipated that a smaller number of persons will be required for special events, school outings and corporate hire at other times. The full scope will become more obvious in time.

The projects are each expected to gross between $2M and $4M/annum. At this stage it is difficult to accurately assess the level of the tourist activity. Conservative assessments for each of the two projects are:

- Holiday Village – 54,000 visitors per annum
- Adventure Water Park – 50,000 visitors per annum

This represents an additional 79,000 visitors to Mannum assuming that 25,000 visitors to the Holiday Village are numbered among the visitors to the Adventure Water Park. This represents a total annual spend of $2.4M on accommodation once the Holiday Village is fully operational and an annual retail expenditure of $5.0M.

State Planning Policy 14: Water Security and Quality
14.2 Protect and recognise water supply catchments, including:
• Water Protection Areas under the Environment Protection Act 1993 (including those located in the Mount Lofty Ranges, South East and River Murray)
• The River Murray Protection Areas under the River Murray Act 2003
• Prescribed water resources and wells under the Natural Resources Management Act 2004.

14.6 Support development that does not adversely impact on water quality

State Planning Policy 15: Natural Hazards

15.1 Identify and minimise the risk to people, property and the environment from exposure to natural hazards including extreme heat events; bushfire; terrestrial and coastal flooding; soil erosion; drought; dune drift; acid sulfate soils; including taking into account the impacts of climate change.

15.6 Avoid development in high or extreme hazard risk areas (such as bushfire risk areas) that will necessitate the removal of native vegetation.

Further consideration of the natural hazards, including acid sulfate soils is provided with Appendix G.

MURRAY AND MALLEE REGION PLAN

The Murray and Mallee Region Plan seeks to guide future development in the region by providing a strategic link between the broad state-wide policies and Council level policies.

The Murray and Mallee Region Plan seeks to retain the character and ensure the future of the region as a productive and pleasant area for residents, businesses and visitors. The following principles and policies are recognised within The Murray and Mallee Region Plan:

1. Recognise, protect and restore the region's environmental assets;
2. Create conditions for the region to become resilient to the impacts of climate change;
3. Protect people, property and the environment from exposure to hazards;
4. Identify and protect places of heritage and cultural significance, and desired town character;
5. Protect and build on the region's strategic infrastructure;
6. Retain and strengthen the economic potential of primary production land;
7. Reinforce the region as a preferred tourism destination;
8. Provide and protect serviced and well-sited industrial land to meet projected demand;
9. Focus commercial development in key centres and ensure it is well sited and designed;
10. Strategically plan and manage the growth of towns;
11. Design towns to provide safe, healthy, accessible and appealing environments; and
12. Provide residential land for a supply of diverse, affordable and sustainable housing to meet the needs of current.

The proposed development will reinforce these desired outcomes, with each "outcome" previously considered within the EIS inclusive of the reports prepared by Sonus, MFY, Eco-Management Services Pty Ltd.

1. Ensuring that the development is undertaken without negatively impacting the environment or adjoining land uses;
2. Consideration of the ongoing environmental impact pertinent to the locality;
3. Adherence to the *Construction Environmental Management and Monitoring Plan* and consideration of the environmental impact both pre and post development;
4. Consideration and consultation with traditional land owners and retention of Aboriginal Heritage;
5. Provision of infrastructure (at the cost of the developer) where required;
6. Provide business opportunities for increased daily and overnight visitation;
7. Provide business opportunities that seek to increase of river-based recreation;
8. Consideration of and retention of primary production capacity of adjoining land;
9. Increase in employment during construction and for the ongoing operation of the Holiday Park and Adventure Water park;
10. Retention of housing and population within the Mannum Waters development for permanent residents;
11. Reinforce the area as an attractive area for tourism; and

12. The ongoing protection of regions environmental assets.

The proposed Adventure Water Park and Holiday Village is therefore consistent with the Murray and Mallee Region Plan and therefore in alignment with South Australian Planning Strategy.

ENVIRONMENT PROTECTION ACT

The *Environment Protection Act 1993* serves a fundamental role to provide for the protection of the environment. The Acts objectives include the promotion of ecologically sustainable development to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the quality of the environment.

A general environment duty is imposed on all persons not to undertake activities on land that pollute or might pollute the environment unless all reasonable and practicable measures are taken to prevent or minimise any resulting environmental harm.

Both the Holiday Village and the Adventure Water Park do not require dredging with the "earthworks" already undertaken. All works will be undertaken behind protective embankments in the dry.

In considering the *Environment Protection (Noise) Policy, 2007,* Sonus have been engaged to consider the acoustic impact of the proposal. With particular regard to the *Environment Protection (Noise) Policy, 2007,* the following extract is pertinent:

> *The noise at the sensitive receivers has been predicted for the proposed water park operation. Based on the predictions, the requirements of the Environment Protection (Noise) Policy 2007 will be achieved at the closest sensitive receivers without any specific acoustic treatment measures.*

The *Environment Protection (Water Quality) Policy, 2015* will be upheld via the adoption of water sensitive urban design measures and generally preventative approach in design.

The extent of constructed wetlands, particularly permanent wetland and the Western Ephemeral Wetland, which then flows into the Baseby Linear Wetland before reaching the main channel of the river. The OEMMP prepared for the Mannum waters, which includes specific management plans for waste management, wetlands and vegetation and a spill management plan will continue.

The *Environment Protection (Air Quality) Policy, 2016* provides a legislative basis for air quality regulation and management in the state, including criteria for developing effective conditions to assist businesses and industries to improve their performance in minimising risk from air emissions through a system of licensing.

The proposal does not require 'burning off' that may contravene the *Environment Protection (Air Quality) Policy, 2016. I have no reason to consider that the proposal will create environmental harm as a result of* the emission to the environment of ash or other residual matter.

Finally, turning to the *Environment Protection (Waste to Resources) Policy, 2010*, during both the construction and operation of the Holiday Village and Adventure Water Park, and consistent with the work to date for 'Mannum Waters' the proponent will continue to minimise landfill, increase resource recovery and avoid environmental harm rom waste management.

BUILDING CODE OF AUSTRALIA.

The *Building Code of Australia* (BCA), in the National Construction Code series, contains technical provisions for the design and construction of buildings and other structures.

The BCA addresses the following matters:

- structural adequacy
- fire resistance
- access and egress
- services and equipment
- energy efficiency and sustainability
- provisions for the health and amenity of occupants.

All future buildings and structures will need to comply with the requirements of the BCA.

HERITAGE ACT 1993

The *Heritage Act 1993* (and *Regulations 1993*) provides for the conservation of places of heritage value (as Amended 24 November 2003). There are no features of significance under the Act within the development site or its surrounds.

HISTORIC SHIPWRECKS ACT 1981

The *Historic Shipwrecks Act 1981* (and *Regulations 1999*) relates to the protection of certain shipwrecks and relics of historic significance (As Amended 24 November 2003).

No shipwrecks are impacted the development, while two shipwrecks (Saddler and the Mary Ann) are observed approximately 2 kilometres and 4 kilometres northeast of the proposed development (See Figure 6: Location of Shipwrecks).

The Mary Ann was built in 1852 in the Mount Lofty Ranges and was left at its current location near the old ferry crossing at Mannum in 1863. The ship was a 20 tonne wooden paddle steamer 16.8 metres in length and was one of the original paddle steamers on the River Murray. The Mary Ann was used for animal transport on the River Murray. It is considered a protected item.

The Saddler which was built at the port Echuca in April 1877. It is now situated in Mannum on the opposite side of the River Murray to the town, where it was left in the year 1961. It is uncertain how the barge was wrecked and it is not considered a protected item. In its original form it was 21.5 metres in length and 45 tonnes in weight and is made of wood.

The *Historic Shipwrecks Act 1981* will be upheld by the proposed development.

Figure 6: Location of Shipwrecks
Source: Mannum Waters EIS Volume 1

GUIDELINES

NHMRC GUIDELINES FOR MANAGING RISKS IN RECREATIONAL WATER, 2008

The Australian Government publication *"Australian Guidelines for Recreational Water"* aims to protect the health of humans from threats posed by the recreational use of coastal, estuarine and fresh waters. The risks have extracted from the guideline, tabulated and summarised where relevant below:

Characteristic	Guideline	Response
Physical hazards	Recreational water bodies and adjacent areas should be free of physical hazards, such as floating or submerged objects that may lead to injury. Where permanent hazards exist, for example rips and sandbars, appropriate warning signs should be clearly displayed.	The Adventure Water park will be "newly constructed" to ensure physical structures are not submerged. The site will be monitored by trained staff which an identify and remedy any physical hazards such as floating debris that may be introduced into the area.
Sun, heat and cold water temperature	The temperature of recreational water bodies should be in the range 16–34°C. Recreational water users should be educated to reduce exposure to ultraviolet radiation (UVR), particularly during the middle of the day.	Cold water concerns will largely self-regulate, for example wetsuits may be worn in colder period for water park activities. Sunscreen and 'sun smart' messages will be able to be portrayed to visitors to encourage reduce UVR exposure.
Microbial quality	Preventive risk management practices should be adopted to ensure that designated recreational waters are protected against direct contamination with fresh faecal material, particularly of human or domesticated animal origin.	All building work will require a wastewater application to be lodged. It is therefore anticipated that concerns pertaining to wastewater contamination will be appropriately resolved.
Cyanobacteria and algae in fresh waters	Fresh recreational water bodies should not contain: • ≥10 µg/L total microcystins; ≥50 000 cells/mL toxic Microcystis aeruginosa; or biovolume equivalent of ≥4 mm3 /L for the combined total of all cyanobacteria where a known	All water used for the various water activities in the Adventure Water Park, excluding the lake, will be mains water. The proponent will adhere to the requirements of the Australian Public Health (general) Regulations 2013. All pools and waterslide pool water quality will be monitored and maintained by a trained Aquatic

	toxin producer is dominant in the total biovolume; or • ≥10 mm3 /L for total biovolume of all cyanobacterial material where known toxins are not present; or • cyanobacterial scums consistently present	Technical Operator that will be employed and on call with the relevant qualifications, who will: SISCAQU001 - Test pool water quality SISCAQU005 - Develop and implement Aquatic Facility maintenance Procedures SISCAQU003 - Develop and implement Pool Water Maintenance procedures BSBRSK401 - Identify Risk and Apply Risk Management Processes
Dangerous aquatic organisms	Direct contact with venomous or dangerous aquatic organisms should be avoided. Recreational water bodies should be reasonably free of, or protected from, venomous organisms (e.g. box jellyfish and bluebottles). Where risks associated with dangerous aquatic organisms are known, appropriate warning signs should be clearly displayed.	Appropriate warning signs should be clearly displayed to warn users of the presence of snakes or other dangerous or venomous organisms.
Aesthetic aspects	Recreational water bodies should be aesthetically acceptable to recreational users. The water should be free from visible materials that may settle to form objectionable deposits: • floating debris; • oil, scum and other matter; • substances producing objectionable colour, odour, taste or turbidity; and • substances and conditions that produce undesirable aquatic life.	The aesthetic aspects of the The Adventure Water park will be regulated by the market.

Water quality regulating systems will be adjusted and updated as the Adventure Water Park attendees grow to ensure a balanced water chemistry.

All water in the pools will pass through the filter as often as necessary to ensure that the water is maintained in a clean and clear condition and in any event a volume equivalent to the total volume of the pool at least once in every six hours for a swimming pool, once every hour for a waterslide pool and once every two hours for a wading pool as mentioned below.

Accordingly, the 'best practice' of employing trained operators who implement, testing, ongoing procedures, maintenance programs and risk management will enable the *Australian Guidelines for Recreational Water* to be achieved.

STORMWATER POLLUTION PREVENTION CODE OF PRACTICE FOR THE BUILDING AND CONSTRUCTION INDUSTRY, 1999

The Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry, 1999 Code of Practice is complemented by legislation aimed at protecting the environment. The existing *Construction Environmental Management and Monitoring Plan* remains relevant for 'Mannum Waters" with amendments for the Adventure Park and Holiday Village construction stage to identify:

- Measures to control runoff and soil erosion by incorporating a soil erosion and drainage management plan (SEDMP). Also, as previously mentioned, the sites will remain isolated from the waterways by embankments during the construction phase, so any stormwater runoff is contained on site.
- Measures to avoid drag out on to the road will be specified, and will likely include vehicle washdown and a shaker at the exit to Belvedere Road.
- Dust control measures will be specified, including:
    - Dust suppression by watering, and not working on high wind days. This was the approach previously taken for the existing development construction.
    - Noise is not an issue as previously discussed, refer Sonus report.

- The only activity that could cause vibration would be road compaction, but effects would be localised, as was the case for the existing residential development.
- It is to be noted that for the existing Mannum Waters development, construction methods and activities will be similar for the proposed developments, and no problems were reported or complaints received from nearby residents.
- There are no waterbodies on the development site, so there will be no issues with aquatic plant debris.

More specifically, the appropriate environment impact of the proposal will be governed by legislation referenced within this report.

GUIDE FOR APPLICATIONS TO CLEAR NATIVE VEGETATION, 2017

There are no significant areas of native habitat and vegetation species that will need to be cleared by the development of the two projects. Both project areas have already been substantially cleared, excavated, farmed or otherwise subject to human occupation.

The proponent is required to abide by the Native Vegetation Act 1991 as previously addressed within this EIS.

EPA CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLANS GUIDELINES, 2018

Construction work and the regulation of the environmental impacts will be primarily governed by the Local Nuisance and Litter Control Act 2016 (LNLC Act) and the Environment Protection Act 1993.

The details pertaining to the mitigation of adverse effects on the amenity via noise, vibration, odour, smoke, fumes, pollution and duct for both the Adventure Water Park and the Holiday Village will be considered within the Construction Environmental Management and Monitoring Plan (CEMMP) as an amendment to the Mannum Waters CEMMP.