Confidentiality order revoked under CEO delegation 21/11/2024

Alternative Water Supply Efficiency Measures Pilot Project: Seacliff Park Extension

Originating Officer	Water Resources Coordinator - Glynn Ricketts
Corporate Manager	Manager Engineering, Assets and Environment - Mathew Allen
General Manager	Acting General Manager City Services - Kate McKenzie
Report Reference	GC201124F01

Confidential

☑

Confidential Motion

That pursuant to Section 90(2) 3(b)(i) and (ii) of the Local Government Act 1999, the Council orders that all persons present, with the exception of the following persons: Acting Chief Executive Officer, General Manager City Development, General Manager Corporate Services, Acting General Manager City Services, Manager Engineering, Assets and Environment, Water Resources Coordinator, Manager Finance, Acting Manager Corporate Governance, Acting Team Leader Governance and Council Support, Catherine Miles (DEW) and Hannah Ellyard (DEW) be excluded from the meeting as the Council receives and considers information relating to the report Alternative Water Supply Efficiency Measures Pilot Project: Seacliff Park Extension, upon the basis that the Council is satisfied that the requirement for the meeting to be conducted in a place open to the public has been outweighed by the need to keep consideration of the matter confidential relating to matters pertaining to commercial operations of a confidential nature, the disclosure of which could reasonably be expected to prejudice the commercial position of the person who supplied the information and could reasonably be expected to confer a commercial advantage on a person with whom the council is conducting, or proposing to conduct, business, or prejudice the commercial position of the council.

REPORT OBJECTIVE

The objective of this report is to seek Council endorsement and funding for the extension of the Oaklands Wetland distribution network to the south of the Cities of Marion and Holdfast Bay.

EXECUTIVE SUMMARY:

SA Councils with stormwater projects and the Department of Environment and Water (DEW) have been working together to determine the feasibility of further extending the City of Marion's aquifer storage and recovery schemes to enable us to reduce our reliance on the River Murray to irrigate our parks, gardens and sports ovals.

This report presents a costed concept design, a demand assessment and financial analysis for the extension of the Oaklands Wetland distribution network to the south of the Cities of Marion and Holdfast Bay.

The full project cost is estimated at $2,595,164 (plus $12,000 for investigations) with the proposed funding being:

- Water Reserve $877,484
- SA Government/DEWR $800,000
- Asset Sustainability Reserve funding up to $917,680.

This report seeks Council endorsement to construct the extension, as presented, subject to the award of grant funding and the tender process delivering a cost below that modelled.

RECOMMENDATION

That Council:

1. **Endorses the allocation of up to $1.795m towards the extension of Oaklands Distribution network towards Seacliff Park, to be funded through Council's Asset Sustainability Reserve Fund (comprising $918k from the Asset Sustainability Reserve and $877k from the Water Reserve), subject to a commitment of $800k from the Federal Government's Water Efficiency Program.**

2. **Notes that the Water Business will transfer $917k to the Asset Sustainability Reserve over 3 years.**

3. **Notes that the modelled project payback period is 17 years without depreciation and 23 years with depreciation.**

4. **Delegates Authority to the Chief Executive Officer to execute Water Agreements with the City of Holdfast Bay and the Department of Education.**

5. **Notes that if after the competitive tender process the cost of capital is greater or grant contribution offered is less than modelled, a further report will be presented to Council.**

6. **In accordance with Section 91(7) and (9) of the Local Government Act 1999, orders that this report, the attachments and any minutes arising from this report having been considered in confidence under Section 90 (2) and (3)(b) (i) and (ii) of the Act, except when required to effect or comply with Council's resolution(s) regarding this matter, be kept confidential and not available for public inspection for a period of 12 months from the date of this meeting. This confidentiality order will be reviewed at the General Council Meeting in December 2020.**

DISCUSSION

At an Elected Member Forum in November 2019, staff presented 3 possible options to extend the Oaklands Wetlands Distribution network to leverage off the existing investment. Oaklands Wetland was designed to be "future proofed" and modular and has the capacity to supply more water than current demand.

The 3 options were:

- North towards the Morphettville Racecourse
- West towards the Coast
- South into Seaview Downs and Seacliff Park

Elected Members supported staff to further progress the south option and to actively seek grant funding. A business case for the extension of the Oaklands Wetland distribution network has been developed based on conservative assumptions, hence the financial analysis is considered robust. Other non-monetary benefits of the scheme are also discussed. A concept design has been developed and costed, a full demand assessment has been completed and financial analysis as been undertaken.

DEMAND ASSESSMENT

Staff have investigated the demand for alternative water, that would displace potable water, by extending the distribution network from Oaklands Wetland further south (Attachment 1; Oaklands Seacliff Extension Demand Report). There is the opportunity to supply an additional 13 sites (7 City of Marion, 4 Department of Education, and 2 City of Holdfast Bay) with recycled water for irrigation of 22.39 ha of open space. The demand report concludes that in a "median" irrigation season 74.48ML/a and in a hot dry year 114.7 ML/a will be required. All of these sites are currently irrigated using potable water and would qualify for the Commonwealth Grant funding (subject to due diligence assessment).

CONCEPT AND COSTINGS

A concept design for the scheme is provided in Attachment 2 (Hydroplan - Concept Design Report). The concept allows for a scheme that would not only provide water for the 13 sites identified in the demand report, but allows for an additional continuous flow of 20 l/s. This redundancy was selected to allow a future connection to the Seacliff Park Development and to provide a back up supply to Marion Golf Club in the event the existing bores fail or need repair. The extension and booster pipes are costed at $2.5M (which includes 20% for risk and contingency).

FUNDING AND GRANT

The Australian Government has established the Water Efficiency Program to fund upgrades to water infrastructure in the Murray–Darling Basin (the Basin) that will improve water use practices and save water for the environment. Over $1.5 billion is available to improve water efficiency across the Basin and deliver 450 GL of water for the environment by 2024, as part of the Sustainable Diversion Limit Adjustment Mechanism (SDLAM). The Seacliff project is considered a pilot case for the State Government in regard to accessing this funding. To progress the application for funding, first Council must approve the extension of Oaklands Distribution network towards Seacliff Park and $1.795m towards the project. If successful, other Councils within South Australia will be eligible to apply.

Commonwealth funding for an expansion of this scheme would offset a significant amount of the capital cost for extending the water supply network, and to connect additional irrigation sites. This funding opportunity is the rational for bringing forward the expansion of the distribution network. Details of the funding scheme are included in Attachment 3 (Summary of Financial Analysis for the Seacliff Park Extension, including proposed revenue stream).

Inside Infrastructure has been engaged to undertake a financial analysis of this scheme, investigating the impact of different components and assumptions. Subsequently, City of Marion's Finance Department reviewed the model and made several improvements. Attachment 4 provides a detailed project cost benefit analysis.

FINANCIAL ANAYLSIS

The results of this analysis are summarised in Table 1.

Table 1 Financial summary for project options

Option	Capital depreciation	NPV	IRR	Annual ROI	Payback period (years)
1	No capital depreciation included	$1,090,000	5%	3.8%	16.83

2	Capital depreciation included	$3,649	2.5%	1.8%	22.62

The financial modelling is sensitive to the demand profile. In the event more water is supplied, then the ROI increases and payback period reduces. It should be noted that a key assumption in the modelling is the conservative water supply of 74.49ML p/a based on median seasonal irrigation demand.

Funding Availability

The Water Reserve will have $877,484 after the first budget review and the savings transfers are approved. The project has been costed at $2,595,164 (considered a conservative cost assessment). Based on this there will be an additional funding requirement of $1,717,680 to be sourced between SA Government and City of Marion. DEW are seeking $800,000 from DEWR (subject to Council endorsement of the project). If successful this leaves approximately $917,000 to fund from within Council.

In summary the proposed project funding cost would be $2,595,164 (plus $12,000 for investigations). The proposed project will be funded by:

- Water Reserve $877,484
- SA Government/DEWR $800,000
- Asset Sustainability Reserve funding up to $917,680. The Water Business is to repay the amount required (estimated to take 3 years)

Based on the conservative analysis provided the scheme is marginal. However, the tender process is expected to yield a greater value proposition than estimated by the cost plan. A reduced capital cost will also increase IRR and reduce pay back periods significantly.

There exists other non-monetary benefits of extending the scheme south. The expansion proposed would end at the top tank within Marion Golf Club. This would enable the tank to be filled with treated storm water as a back up supply in the event the groundwater bores fail or during extended downtime due to repairs. This project will increase water security for the Golf Club.

The Golf Club top tank could provide a balancing storage for gravity feeding alternative water into the Seacliff Park Development. The pipe-work and pump set has been sized to future proof supply capacity for any future development within Seacliff Park, without any further investment in assets. Discussions on this opportunity have already commenced with the developer.

Providing alternative water supply to our reserves, local schools and into our neighbouring Council area increases water security (at a cheaper supply rate) and futures proofs the proposed connected irrigated green space against future water restrictions. Fit for purpose water supply is used rather then potable water that is potentially sourced from the River Murray.

The risk of not being able to execute water agreements with the Department of Education is considered low as the Department has a policy of connecting to alternative water schemes like Oaklands Wetland and have standard contract templates. City of Holdfast Bay officers have indicated a preference to displace potable water with treated stormwater for their reserves.

Oaklands Wetland has the design capacity to treat up to 400ML of stormwater per year. Our current internal demand is around the 100ML p/a. Council has contracted another maximum, (requires further Developer Capital contribution, secured under contract) of 180 ML p/a for Tonsley, leaving a surplus of 120M/L. Which is more than enough to service the estimated demand of 75ML p/a for this proposal. All environmental permits and licences have been secured to increase supply to 700 ML p/a but this would require additional capital investment. Hence ability to meet the extra demand is not considered a high risk.

Attachment

#	Attachment	Type
1	Attachment 1 Oaklands Seacliff Demand Report	PDF File
2	Attachment 2 Oaklands Seacliff Concept Design Report (002)	PDF File
3	Attachment 3 Summary of Finacial Analysis for Seacliff Park Extension	PDF File
4	Attachment 4 Financial Analysis Spreadsheet	PDF File

Attachment 1

OAKLANDS SEACLIFF EXTENSION DEMAND REPORT

City of Marion

HYDROPLAN

Client Name	City of Marion
Project Name	Oaklands Seacliff Extension
Description	Demand Report
Project ID	15348-02
Revision	1

Revision No.	Date	Description	Author	Reviewed By
0	27/04/2020	Final	JS	NR
1	21/05/2020	Revised Conclusion	JS	NR

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1 INTRODUCTION

This report follows on from the HydroPlan high level concept and budget report for the Oaklands extension to Seacliff project dated 01/10/2019.

The City of Marion has requested a peak demand audit and concept feasibility design for the project, to support securing funding by grant for the extension of the existing Oaklands Recycled Water Scheme to the proposed Seacliff Residential Estate on Ocean Boulevard, Seacliff Park..

The Department for Environment and Water is leading an Alternative Water Supply and Efficiency Measures project which encourages the return of River Murray water by 2024 to the Australian Government under the Murray Darling Basin Plan, through the reuse of stormwater and wastewater.

DEW is searching for non-drinking water projects that can exchange $10,000 for each ML of River Murray water returned.

2 SYSTEM DESCRIPTION

The project locality covers the City of Marion region with recycled water being pumped from the Council depot (Mitchell Park) to demands extending south towards Seacliff, John Mathwin Reserve. Refer Figure 1.

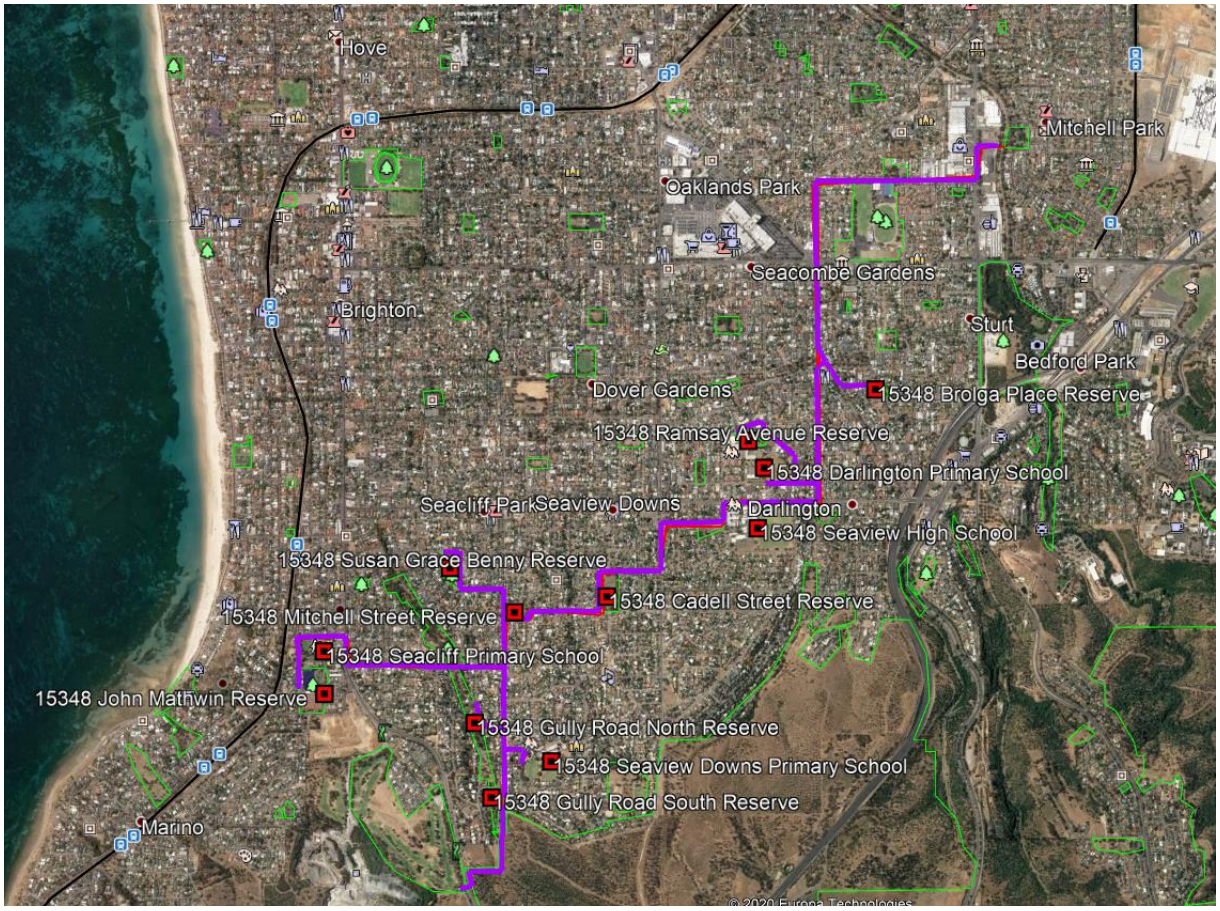


Figure 1: Project location.

The Oaklands Park stormwater harvesting scheme has capacity to capture, store and supply additional water.

There are 13 sites close to the proposed route with approximately 22.39ha of turf irrigated.

They are owned by the City of Marion (Brolga Place Reserve, Cadell Street Reserve, Gully Road North Reserve, Gully Road South Reserve, Mitchell Street Reserve and Ramsey Street Reserve), the RSL Bowling Club, State Government's Department for Education (Darlington Primary School, Seacliff Primary School, Seaview Downs Primary School and Seaview High School), the City of Holdfast Bay (John Mathwin Reserve and Susan Grace Benny Reserve) and a private developer (Seacliff Park Development). Collectively they use on average 78.1 ML/a (3.46 ML/ha/a) of drinking water purchased from SA Water for $320,000 per year.

3 WATER CONSUMPTION

3.1 Irrigated area

Each demand location was mapped in Google Earth and the area calculated for irrigation.

The images are contained in Appendix 1.

3.2 TQVS

The TQVS was estimated based on the IPOS 2015 classification matrix as shown below in Figure 2.

Table 7.2 TQVS classification matrix

TQVS classification	Description	Example	Turf quality	Aesthetics	Surface quality	TQVS example
TQVS 1	Elite sports turf Passive recreation/tourism sites of national or state significance	Adelaide Oval Botanic Gardens Veale Gardens Victoria Square	Highest turf quality High vigour and turf health	Highest visual quality Suitable for televised events	Highest surface quality Even coverage and density with no depressions or divots	
TQVS 2	Premier sports turf Passive recreation/tourism sites of state or regional significance	SANFL Oval A-grade cricket ground Premier-league soccer Glenelg foreshore	High turf quality High vigour and turf health Turf quality may be reduced with winter wear	Medium - high visual quality	High surface quality Even coverage and density Surface quality may be reduced with winter wear	
TQVS 3	Local sports turf Passive recreation sites of local community significance	Local sports ground Community park	Medium turf quality Medium vigour and turf health Turf quality may be reduced with winter wear	Medium visual quality Aesthetics have less importance Must be fit for purpose	Medium surface quality Even coverage and density Surface quality may be reduced with winter wear	
TQVS 4	Passive recreational turf	Local neighbourhood park Playground Surrounds Local picnic area	Low - medium turf quality Low - medium vigour and turf health	Lower visual quality Aesthetics have less importance Needs to be attractive to visit and use	Low surface quality Variable coverage and density but free from trip hazards	

Figure 2: IPOS TQVS Classification.

The Darlington Primary School, Seacliff Primary School, Seaview Downs Primary School, Seaview High School are allocated TQVS 3 due to sustained, high-levels of foot traffic and wear-and-tear, and the remaining irrigated areas are classified as TQVS 4.

A typical reserve and turf quality is shown by Gully Road Reserve in Figure 3 below

Figure 3: Gully Road South Reserve

3.3 Estimated Irrigation Water Demand

The Bureau of Meteorology annual evapotranspiration and rainfall data for the location of Adelaide was used to estimate the irrigation requirement per hectare.

Collectively the locations demand on average 74.48 ML/a (3.30 ML/ha/a) of drinking water purchased from SA Water for $320,000 per year.

It is assumed the existing distribution system from Oaklands Park has capacity to supply 30.8 L/s continuously to the Marion Road Depot where a booster pump can be installed, to pressurise the proposed new extension. The existing pipe from this location to Marion Sports Complex and Bowling Club can deliver 10 L/s and it is already utilised.

The demand for irrigation varies with many factors so the definition of Base Irrigation Requirement (BIR) is used to estimate the long term monthly average water demand for the desired TQVS performance.

The Irrigation Requirement (IR) varies continuously with the actual weather. Rainfall has an immediate effect on irrigation requirement, so irrigation schedules should be adjusted daily to maintain the moisture level available to the plant roots. Even with accurate daily scheduling, big differences between IR and BIR are expected each month and year.

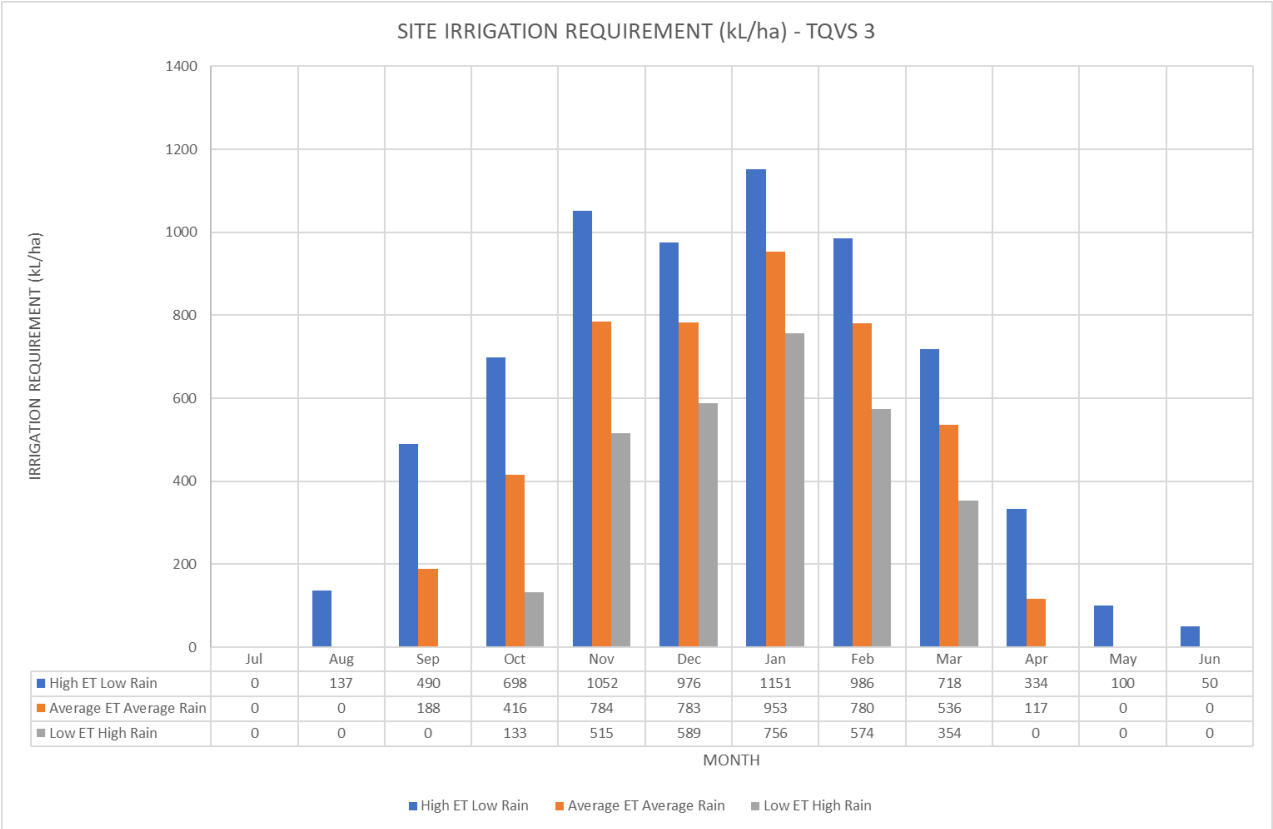
LocClim is a software developed by the Agrometeorology Group of the Food and Agriculture Organization of the United Nations. The software provides an estimate of climatic conditions at different location regardless of the availability of observations. This software is of great importance if you want to know the climatic conditions of certain location and you do not have available observation points. It is possible to modify the stations that provide the data, so you can control the accuracy of the estimates.

The determination of irrigation water demand requirements for three scenarios, 1) High ET Low Rain (i.e. a hot, dry year), 2) Average ET Average Rain (i.e. an average year), and 3) Low ET High Rain (i.e. a cooler, wet year) is summarised in Table 1.

	Area (ha)	**TQVS**	**High ET Low Rain (ML/a)**	**Ave. ET Ave. Rain (ML/a)**	**Low ET High Rain (ML/a)**
Brolga Place Reserve	1.88	4	9.57	6.21	3.75
Cadell Avenue Reserve	2.46	4	12.52	8.13	4.91
Darlington Primary School	1.46	3	7.43	4.82	2.92
Gully Road North Reserve	1.97	4	10.02	6.51	3.93
Gully Road South Reserve	3.00	4	15.25	9.91	5.99
John Mathwin Reserve	2.68	4	13.64	8.85	5.35
Mitchell Street Reserve	0.86	4	4.40	2.86	1.73
Ramsay Avenue Reserve	0.38	4	1.93	1.26	0.76
RSL Bowling Club	0.61	4	3.10	2.02	1.22
Seacliff Primary School	0.55	3	2.80	1.82	1.10
Seaview Downs Primary School	1.69	3	8.60	5.58	3.37
Seaview High School	3.53	3	17.96	11.66	7.05
Susan Grace Benny Reserve	1.47	4	7.48	4.86	2.94
Seacliff Park Development		4			
TOTAL	**22.54**		**114.70**	**74.48**	**45.02**

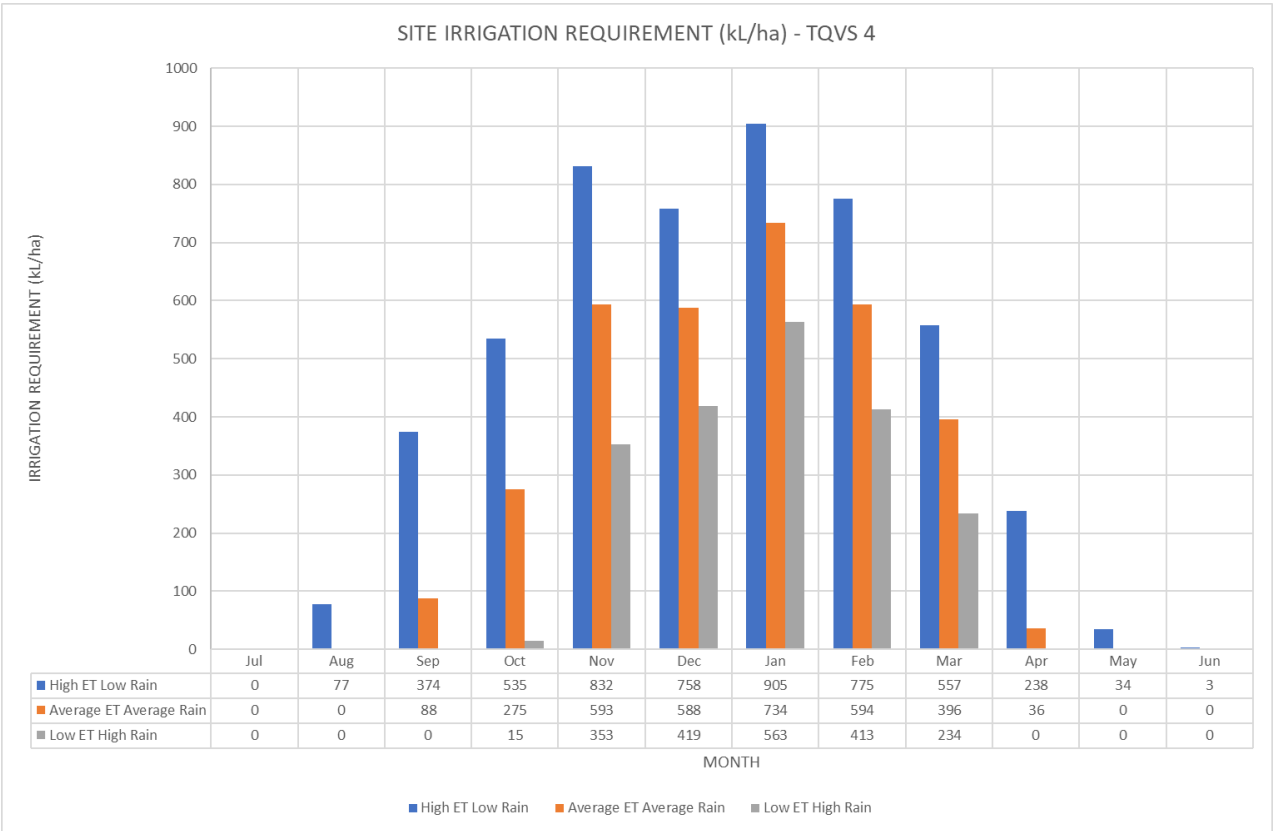
Table 1: Irrigation Water Demand Summary

The IR was calculated for each irrigated area and is shown in Figure 4 below . The average net irrigation requirement was 25.5 mm , confirming the application rate assumptions used in the concept report. The irrigation requirements are summarised in Figure 4 and Figure 6.



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
High ET Low Rain	0	137	490	698	1052	976	1151	986	718	334	100	50
Average ET Average Rain	0	0	188	416	784	783	953	780	536	117	0	0
Low ET High Rain	0	0	0	133	515	589	756	574	354	0	0	0

Figure 4: TQVS 3 Irrigation requirement



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
High ET Low Rain	0	77	374	535	832	758	905	775	557	238	34	3
Average ET Average Rain	0	0	88	275	593	588	734	594	396	36	0	0
Low ET High Rain	0	0	0	15	353	419	563	413	234	0	0	0

Figure 5: TQVS 3 Irrigation requirement

The average flow during a 9-hour irrigation window to the 13 sites will need to be 28.8 L/s to deliver 2.6ML in 6 nights. In this time window, 25mm/week could be applied, and the daily consumption would be 933kL.

The private development at Seacliff requires a continuous flow of 20 L/s. They will be required to accumulate the water and pressurise their infrastructure with their own pump to suit their usage patterns. The daily consumption would be 1,728 kL which is 65% of the total required.

To maximise utilisation of the proposed pipeline, it would be operated near its peak capacity of 29 L/s all day. For example, the Seacliff developer would accumulate 5.4L/s during the 9-hour irrigation window when 23.4L/s is being consumed by the irrigation sites, and it would accumulate 28.8 L/s for 15 hours when the irrigation sites are turned off.

The proposed pump duty of the system is 29 L/s @ 120m Head.

4 INFRASTRUCTURE

A booster pump is recommended to be located at the Marion Council depot (935 Marion Road) to boost the existing recycled water pressure to 12 bar .

The pipeline schematic and concept are shown in Figure 6.

Figure 5: Marion Golf Course Storage Tank

To avoid purchasing a new tank to manage this sharing, it is proposed to utilise the existing 300 kL tank at the south end of the Marion Golf Course. By feeding in/out of the bottom of the tank, the storage can 'back-feed' to the reserves if the demand is temporarily higher than average. This is the same principle used by SA Water and it avoids the cost and operational burden of intervention using central controllers with 'flow management'.

However, utilising this existing storage tank is reliant on the upgrading of the current golf course irrigation system.

Currently, this tank is used as part of the water balancing of the golf course irrigation, but as part of the irrigation design completed for the golf course completed in 2019, this tank will not be needed as part of the new irrigation system.

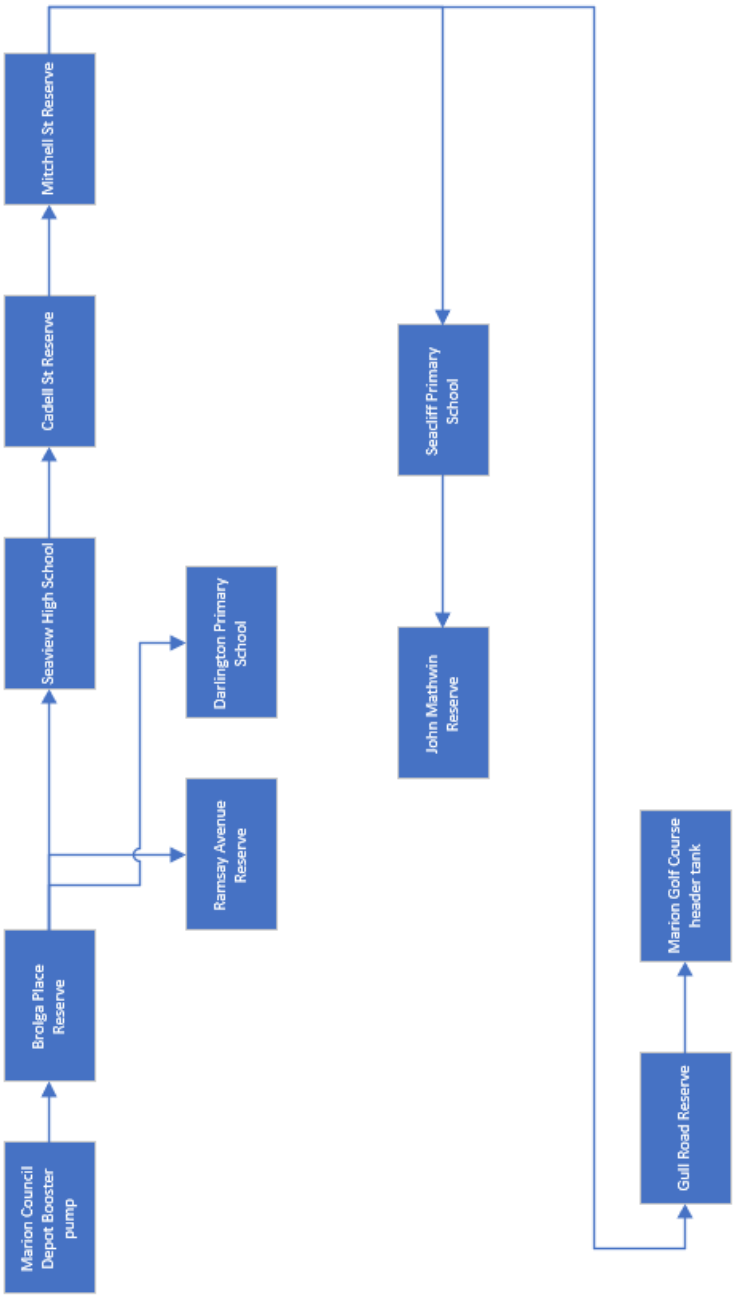


Figure 6: System Schematic Design.

Should the Seacliff extension occur prior to the upgrading of the golf course irrigation system, then a new storage tank will be required.

The tank is high enough to provide pressure (without tanks and pumps) to all irrigation sites except Seaview Downs and possibly the higher end of Gully Road South. The pump at the Depot would start/stop according to water level in the tank. No other controls are necessary. The irrigation sites would start/stop whenever they want using existing irrigation controllers. Their demands would be predicted in advance through proper design and consultation process and monitored by low-cost dataloggers. This lowers the overall cost of entry to the scheme.

5 CONCLUSION

The scheme will save users $320,000 per annum and return a capital benefit of $770,000 in the return of River Murray Water. This is a total annual benefit of $1,089,000 in Year 1, reducing to $320,000, and resulting in a simple payback period of 5.7 years, excluding the weighted average cost of capital.

6 APPENDIX 1 – LOCATION IMAGES

Figure 7: Cadell Street Reserve irrigated area

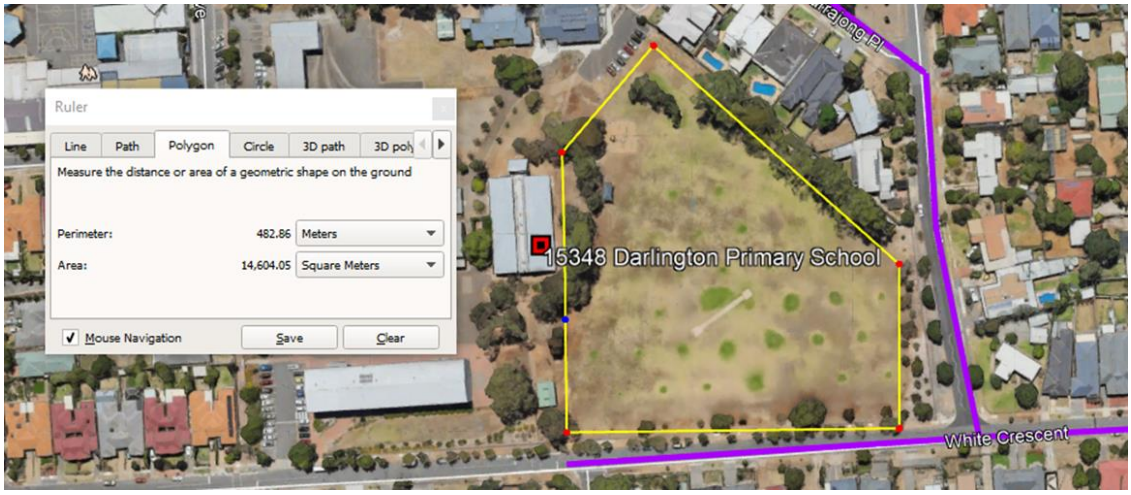


Figure 8: Darlington Primary School irrigated area

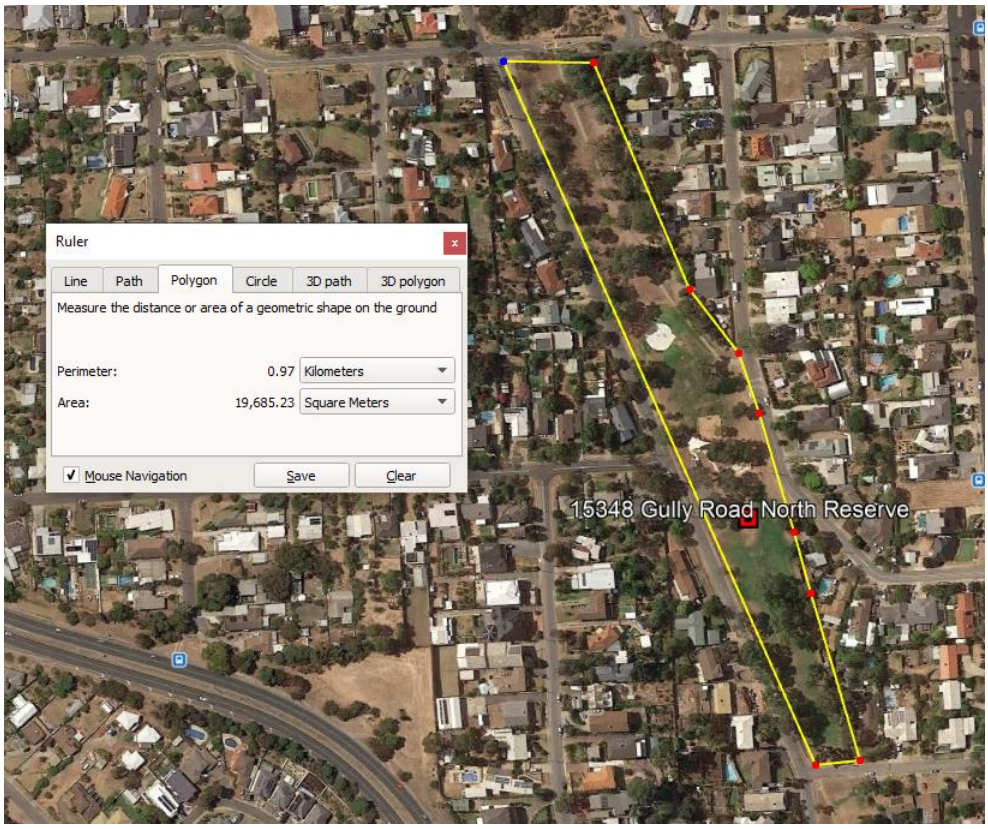


Figure 9: Gully Road North Reserve irrigated area

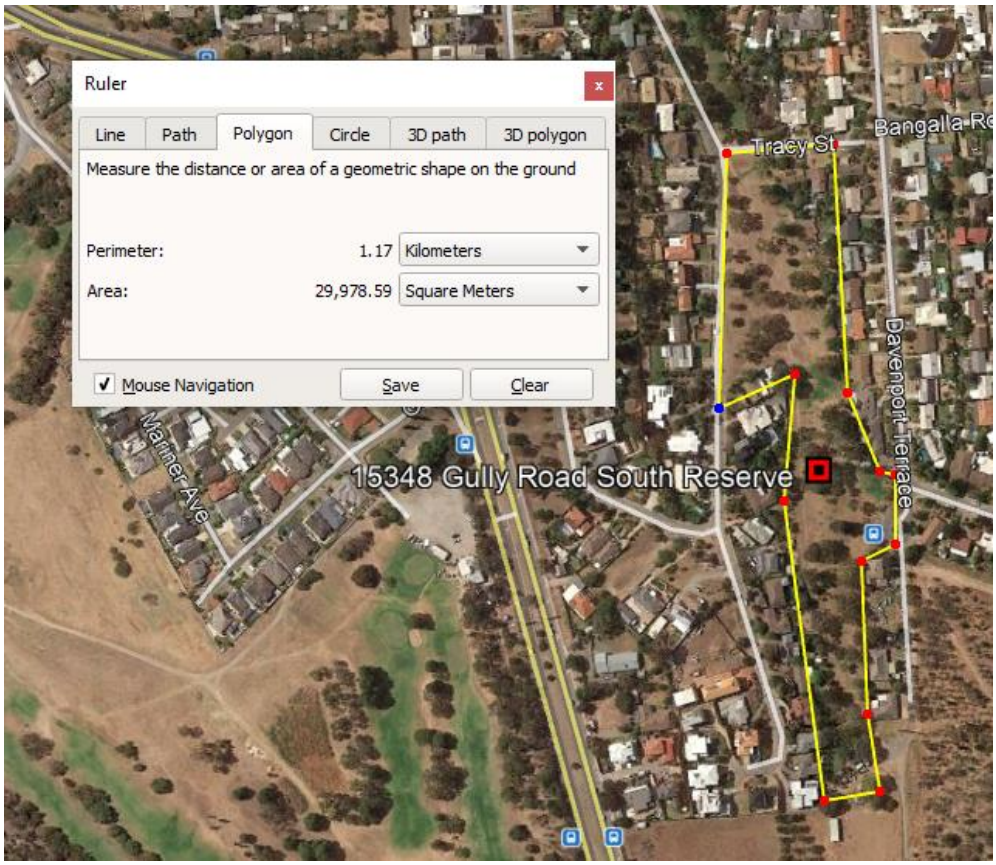


Figure 10: Gully Road South Reserve irrigated area

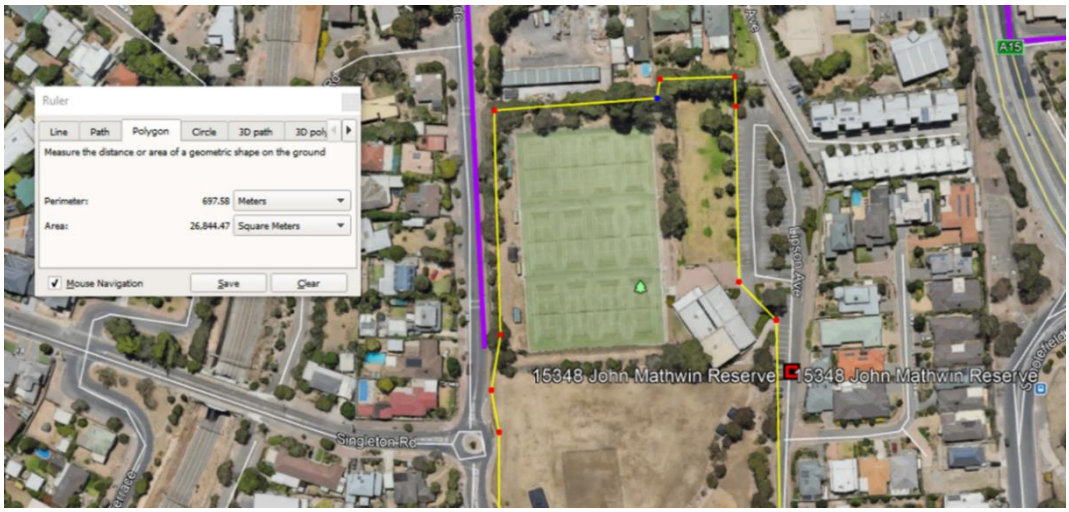


Figure 11: John Mathwin Reserve irrigated area

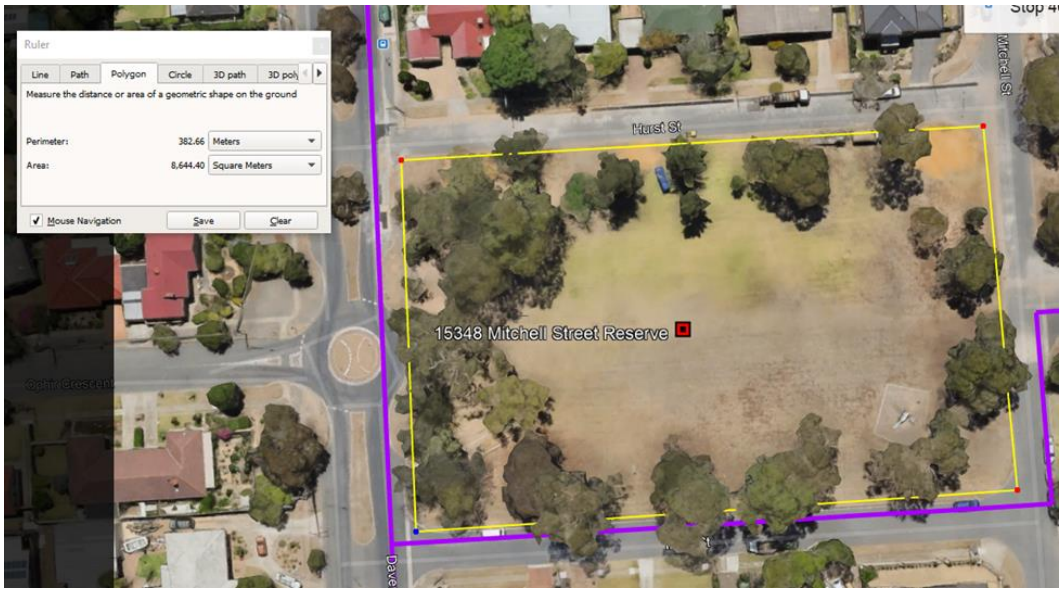


Figure 12: Mitchell Street Reserve irrigated area

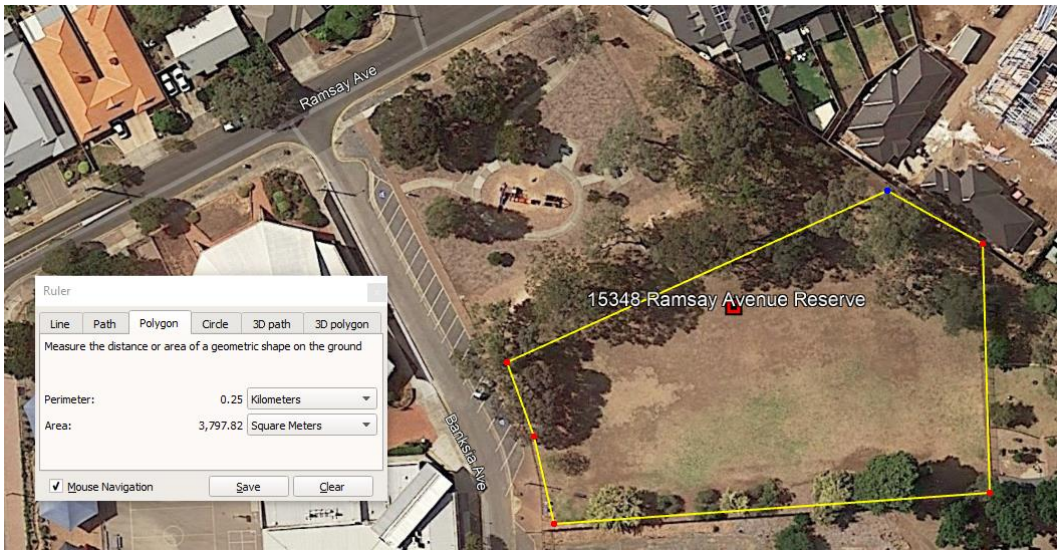


Figure 13: Ramsay Avenue Reserve irrigated area

Figure 14: RSL Area #1 irrigated area

Figure 15: RSL Area #2 irrigated area

Figure 16: Seacliff Primary School irrigated area

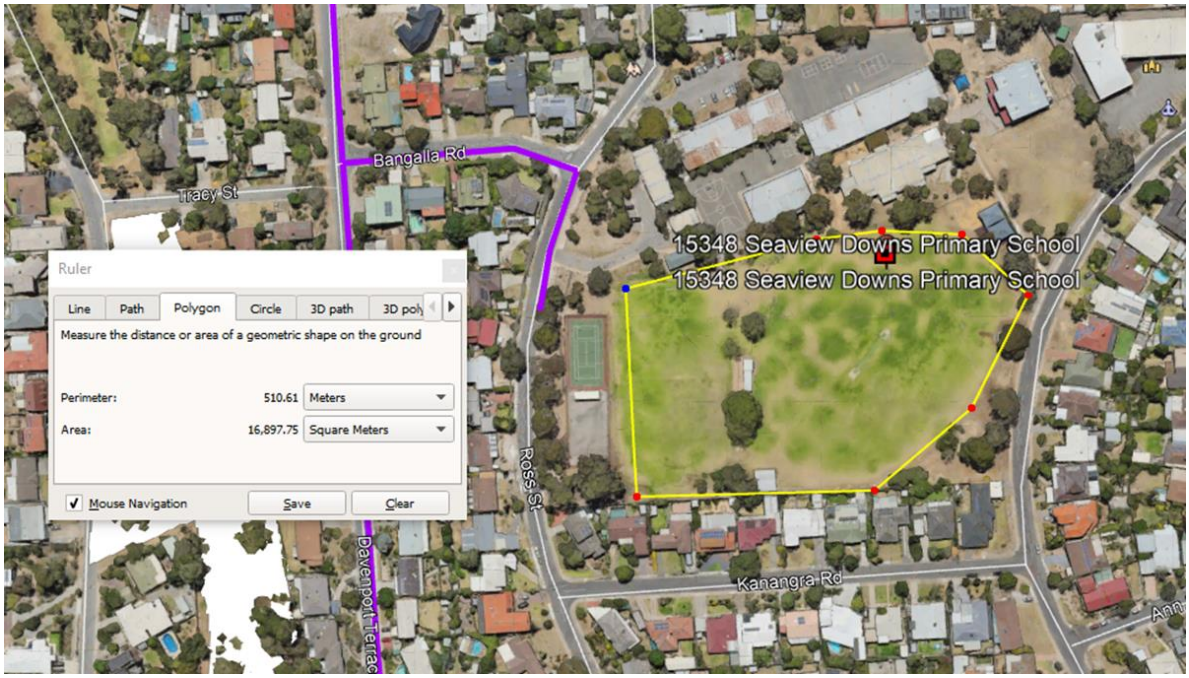


Figure 17: Seaview Downs Primary School irrigated area

Figure 18: Seaview High School irrigated area

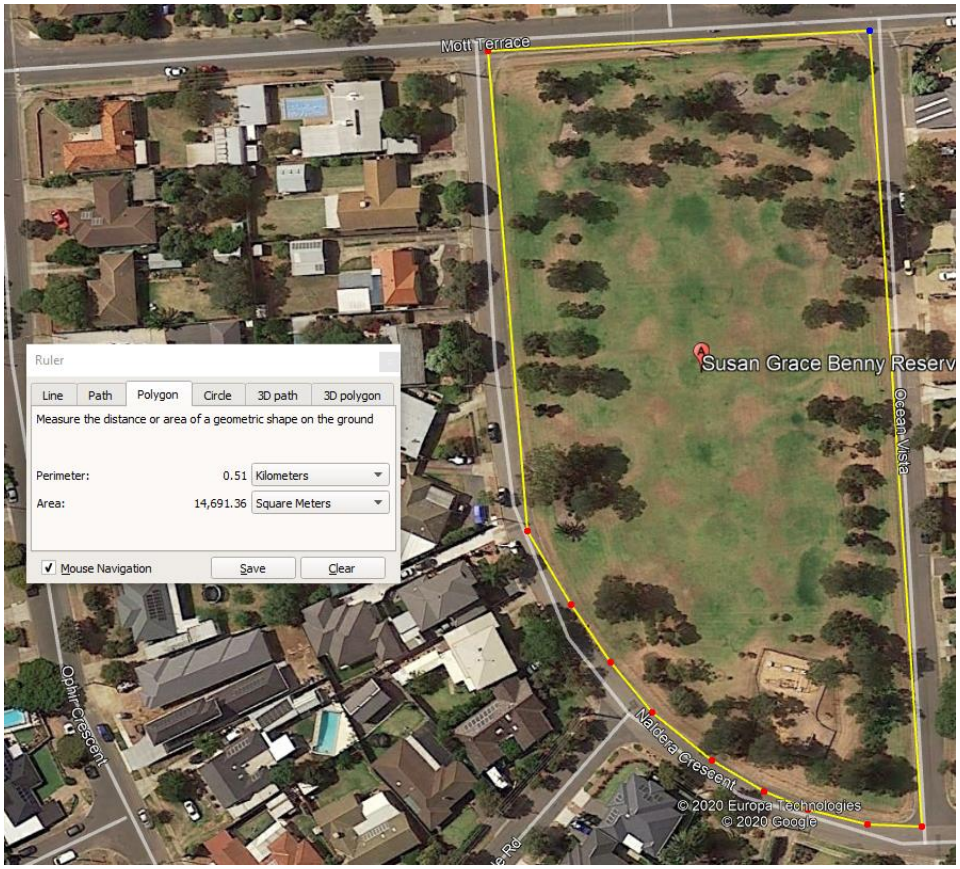


Figure 19: Susan Grace Benny Reserve irrigated area

Attachment 2

OAKLANDS SEACLIFF EXTENSION CONCEPT DESIGN REPORT

City of Marion

HYDROPLAN

Client Name	City of Marion
Project Name	Oaklands Seacliff Extension
Description	Concept Design Report
Project ID	15348-03
Revision	1

Revision No.	Date	Description	Author	Reviewed By
0	27/4/2020	Final	NR	JS
1	21/05/2020	Revised Conclusion	NR	JS

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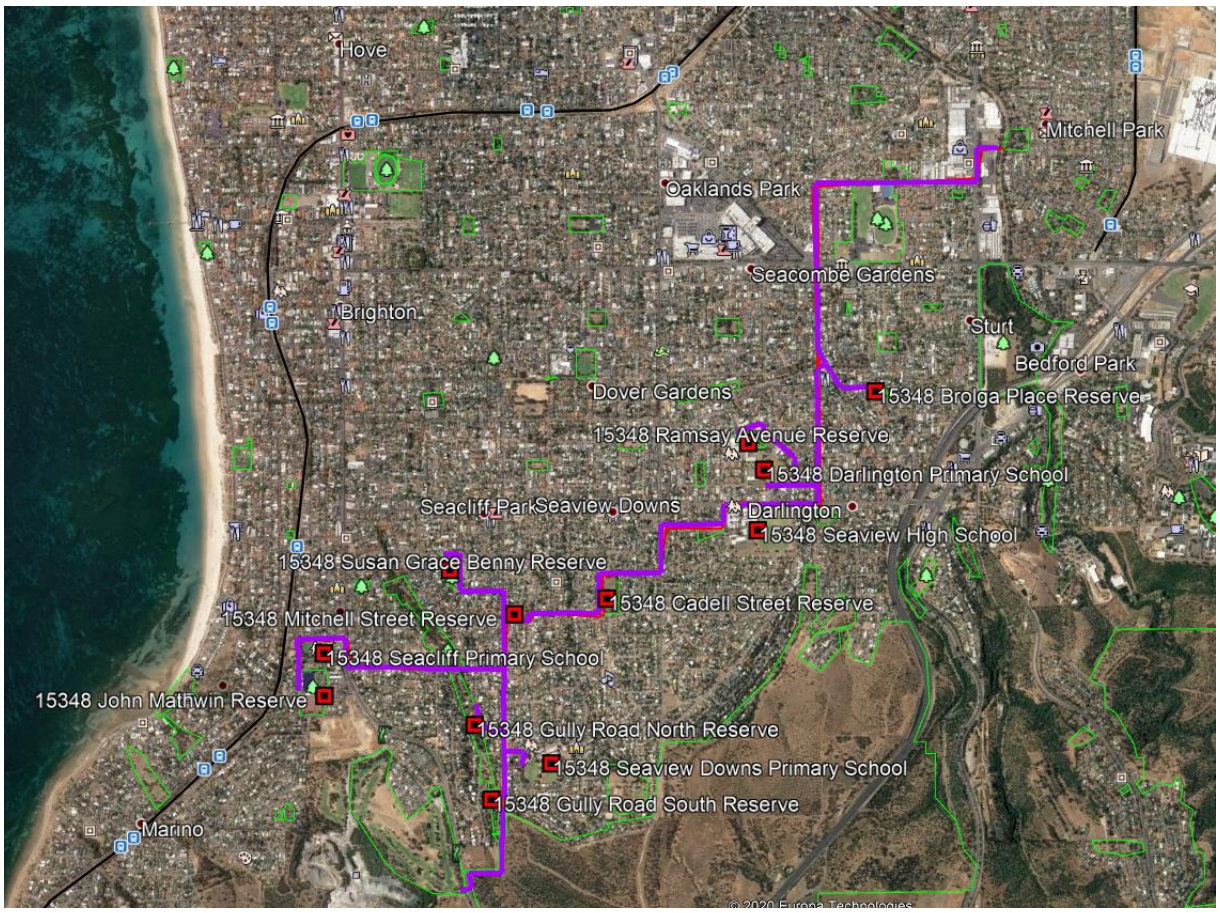

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The Oaklands Park stormwater harvesting scheme has capacity to capture, store and supply additional water.

There are 13 sites close to the proposed route with approximately 22.54 ha of turf irrigated.

They are owned by the City of Marion (Brolga Place Reserve, Cadell Street Reserve, Gully Road North Reserve, Gully Road South Reserve, Mitchell Street Reserve and Ramsey Street Reserve), the RSL Bowling Club, State Government's Department for Education (Darlington Primary School, Seacliff Primary School, Seaview Downs Primary School and Seaview High School), the City of Holdfast Bay (John Mathwin Reserve and Susan Grace Benny Reserve) and a private developer (Seacliff Park Development). Collectively they use 74.48 ML/a (3.30 ML/ha/a) of drinking water purchased from SA Water for $319,750 per year.

3 WATER CONSUMPTION

3.1 Irrigated area

Each demand location was mapped in Google Earth and the area calculated for irrigation.

The images of individual sites are contained in Appendix 1.

3.2 TQVS

The TQVS was estimated based on the IPOS 2015 classification matrix as shown below in Figure 2.

Table 7.2 TQVS classification matrix

TQVS classification	Description	Example	Turf quality	Aesthetics	Surface quality	TQVS example
TQVS 1	Elite sports turf Passive recreation/tourism sites of national or state significance	Adelaide Oval Botanic Gardens Veale Gardens Victoria Square	Highest turf quality High vigour and turf health	Highest visual quality Suitable for televised events	Highest surface quality Even coverage and density with no depressions or divots	
TQVS 2	Premier sports turf Passive recreation/tourism sites of state or regional significance	SANFL Oval A-grade cricket ground Premier-league soccer Glenelg foreshore	High turf quality High vigour and turf health Turf quality may be reduced with winter wear	Medium - high visual quality	High surface quality Even coverage and density Surface quality may be reduced with winter wear	
TQVS 3	Local sports turf Passive recreation sites of local community significance	Local sports ground Community park	Medium turf quality Medium vigour and turf health Turf quality may be reduced with winter wear	Medium visual quality Aesthetics have less importance Must be fit for purpose	Medium surface quality Even coverage and density Surface quality may be reduced with winter wear	
TQVS 4	Passive recreational turf	Local neighbourhood park Playground Surrounds Local picnic area	Low - medium turf quality Low - medium vigour and turf health	Lower visual quality Aesthetics have less importance Needs to be attractive to visit and use	Low surface quality Variable coverage and density but free from trip hazards	

Figure 2: IPOS TQVS Classification.

The Darlington Primary School, Seacliff Primary School, Seaview Downs Primary School, Seaview High School are allocated TQVS 3 due to sustained, high-levels of foot traffic and wear-and-tear, and the remaining irrigated areas are classified as TQVS 4.

A typical reserve and turf quality are shown by Gully Road South Reserve in Figure 3 below.

Figure 3: Gully Road South Reserve.

3.3 Estimated Irrigation Water Demand

LocClim is a software developed by the Agrometeorology Group of the Food and Agriculture Organization of the United Nations. The software provides an estimate of climatic conditions at different location regardless of the availability of observations. This software is of great importance if you want to know the climatic conditions of certain location and you do not have available observation points. It is possible to modify the stations that provide the data, so you can control the accuracy of the estimates.

Using this data, it enables the determination of irrigation water use requirements for three scenarios, 1) High ET Low Rain (i.e. a hot, dry year), 2) Average ET Average Rain (i.e. an average year), and 3) Low ET High Rain (i.e. a cooler, wet year).

	Area (ha)	**TQVS**	**High ET Low Rain (ML/a)**	**Ave. ET Ave. Rain (ML/a)**	**Low ET High Rain (ML/a)**
Brolga Place Reserve	1.88	4	9.57	6.21	3.75
Cadell Avenue Reserve	2.46	4	12.52	8.13	4.91
Darlington Primary School	1.46	3	7.43	4.82	2.92
Gully Road North Reserve	1.97	4	10.02	6.51	3.93
Gully Road South Reserve	3.00	4	15.25	9.91	5.99
John Mathwin Reserve	2.68	4	13.64	8.85	5.35
Mitchell Street Reserve	0.86	4	4.40	2.86	1.73
Ramsay Avenue Reserve	0.38	4	1.93	1.26	0.76
RSL Bowling Club	0.61	4	3.10	2.02	1.22
Seacliff Primary School	0.55	3	2.80	1.82	1.10
Seaview Downs Primary School	1.69	3	8.60	5.58	3.37
Seaview High School	3.53	3	17.96	11.66	7.05
Susan Grace Benny Reserve	1.47	4	7.48	4.86	2.94
Seacliff Park Development		4			
TOTAL	**22.54**		**114.70**	**74.48**	**45.02**

Table 1: Irrigation Water Requirements.

As outlined in Table 1, it is shown collectively that in an average year, the 13 locations consume 74.5 ML per year, or 3.30 ML/ha/year, of drinking water in an average year, purchased from SA Water for approximately $320,000 per year.

The High ET Low Rain (Hot, dry year) and the Low ET High Rain (Cool, wet year) are included here for information only, as an indication to the wide range of irrigation use requirement depending on environmental conditions.

It is assumed the existing distribution system from Oaklands Park has capacity to supply 30.8 L/s continuously to the Marion Road Depot where a booster pump can be installed, to pressurise the proposed new extension.

The option of extending the Seacliff extension from the existing pipeline from the Marion Sports Complex was investigated. However, it was found that the existing pipeline to this location can deliver 10 L/s and it is already utilised.

The average flow during a 9-hour irrigation window to the 12 sites will need to be 28.9 L/s to deliver 2.6ML in 6 nights. In this time window, 25mm/week could be applied, and the daily consumption would be 933kL.

The proposed future private development at Seacliff requires a continuous flow of 20 L/s. They will be required to accumulate the water and pressurise their infrastructure with their own pump to suit their usage patterns. The daily consumption would be 1,728 kL which is 65% of the total required.

To maximise utilisation of the proposed pipeline, it would be operated near its peak capacity of 29 L/s all day. For example, the developer would accumulate 5.4L/s during the 9-hour irrigation window when 23.4L/s is being consumed by the irrigation sites, and it would accumulate 28.8 L/s for 15 hours when the irrigation sites are turned off.

The proposed pump duty of the system is 29 L/s @ 120m Head.

4 INFRASTRUCTURE

4.1 Booster pump

A booster pump is recommended to be located at the Marion Council depot (935 Marion Road) to boost the existing recycled water pressure to 12 bar .

The pipeline schematic is shown in Figure 4, with the concept layout in the accompanying drawing.

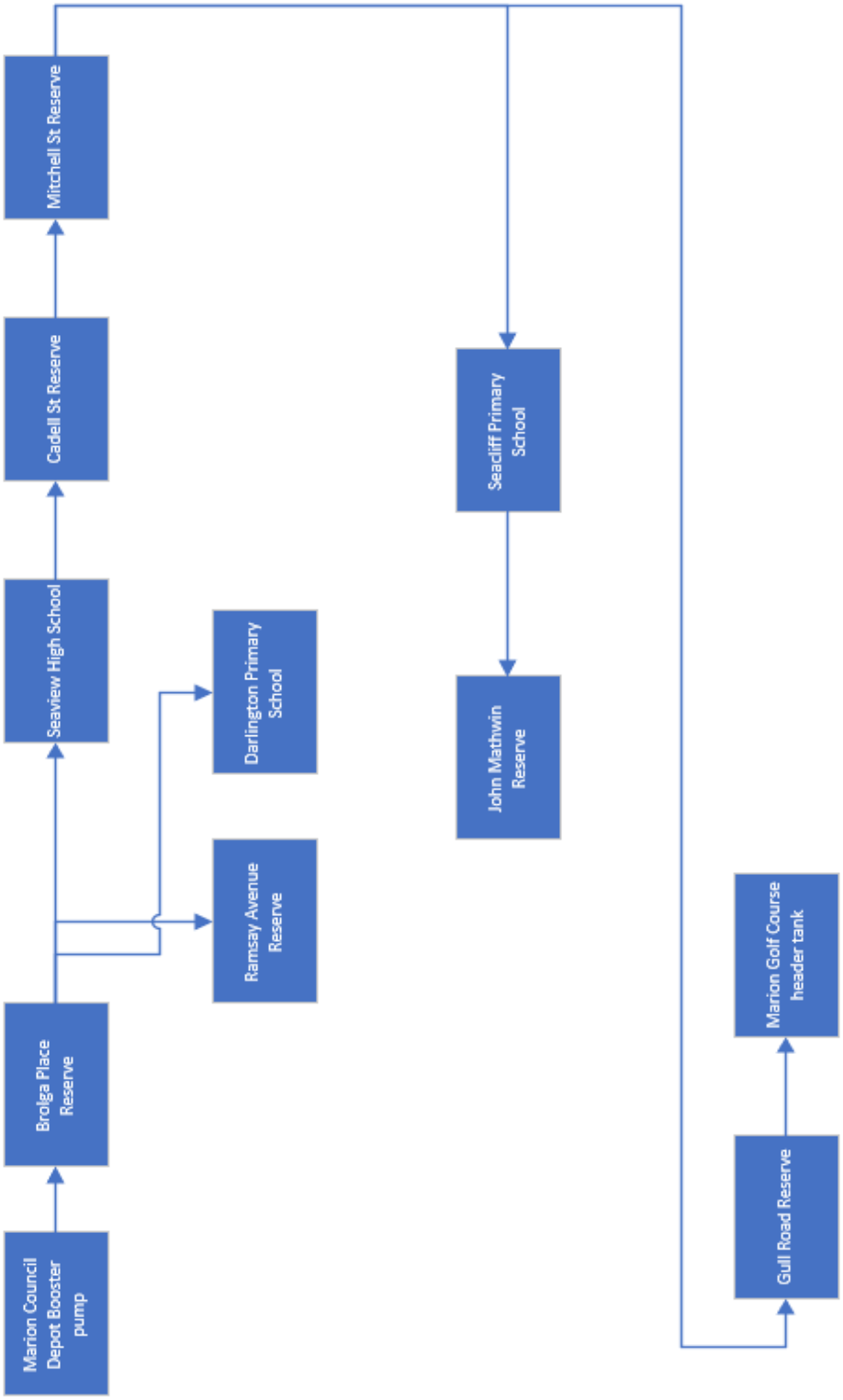


Figure 4: System Schematic.

The proposed pipeline routes were checked for static lift to the highest elevation at the Marion Golf Course, and Kingston Park (refer to Figure 5 and Figure 6).

Figure 5: Route and elevation change to Marion Golf Course.

Figure 6: Route and elevation change to Kingston Park.

The pipe friction losses are summarised in the hydraulic summary in Table 2, and are based on PE pressure pipe rated for PN12.5 (1250kPa, or 12.5 bar) and PN16 (1600kPa, or 16 bar). The maximum system pressure requirement is 12 Bar, at the pump (located at the Marion Council depot).

Based on a maximum static lift of 113m, and friction loss of 7m, the duty is 29 L/s @ 120m.

Pipe	PN	ID (mm)	Q (L/s)	Length (m)	Hf (m)
DN225	16	234.2	29	6,380	7
DN225	12.5	240.3	29	6,380	6

Table 2: Hydraulic Summary.

To provide this duty, the concept design has determined that a Grundfos CR95-5 (or similar) booster pump would be appropriate (refer to Figure 7) to deliver this duty. This is subject to further investigation during the detailed design phase of the project.

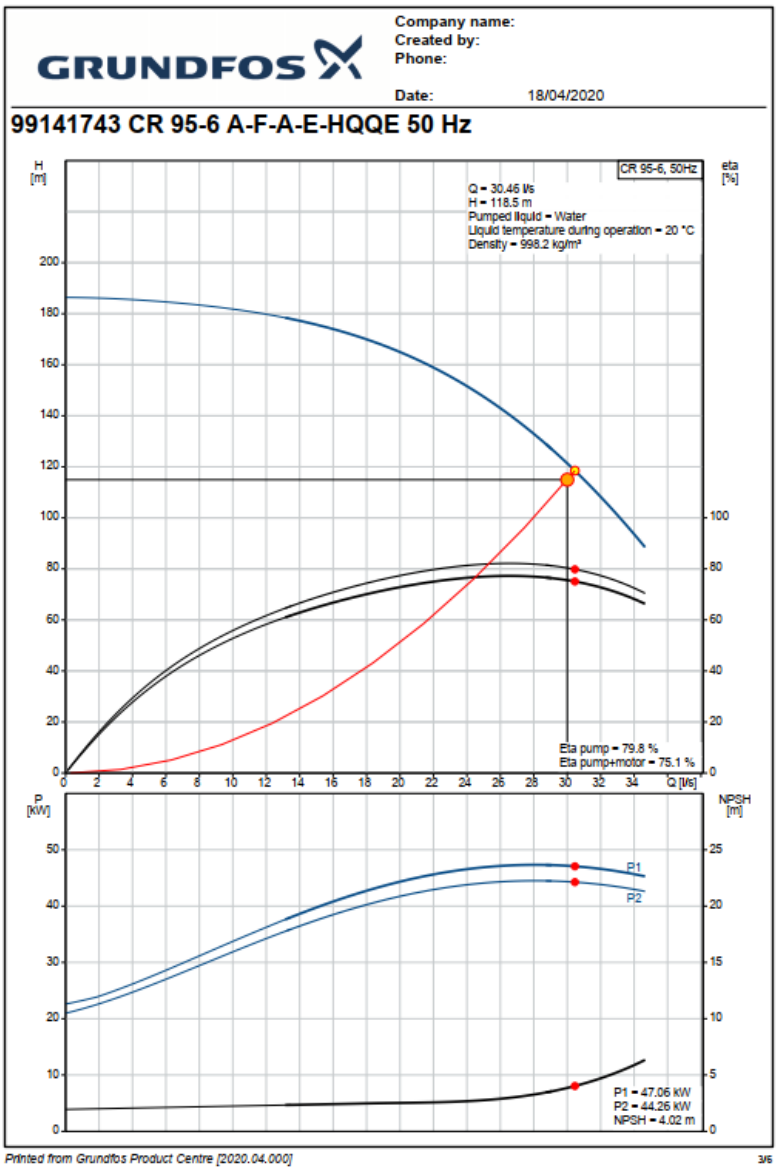


Figure 7: Duty detail for the Grundfos CR95-6 Pump.

4.2 Header tank

To avoid the purchasing a new tank for this project, it is proposed to utilise the existing 300kL tank at the south end of the Marion Golf Course. By feeding in/out of the bottom of the tank, the storage can 'back-feed' to the reserves if the demand is temporarily higher than average. This is the same principle used by SA Water and it avoids the cost and operational burden of intervention using central controllers with 'flow management'.

However, utilising the existing storage tank is reliant on the scheduling of the upgrading of the current golf course irrigation system.

Currently, this tank is used as part as an integral component of the water balancing of the golf course irrigation, but as part of the irrigation design completed for the golf course in 2019, this tank will not be needed as part of the new irrigation system.

Should the Seacliff extension occur prior to the upgrading of the golf course irrigation system, then a new storage tank would be required.

Figure 8: Existing 300kL Marion Golf Course storage tank.

The tank is high enough to provide pressure (without additional tanks and pumps) to all irrigation sites except Seaview Downs Primary School and possibly the higher end of the Gully Road South. The pump at the Depot would start/stop according to water level in the tank. No other controls are necessary. The irrigation sites would start/stop whenever they want using existing irrigation controllers. Their demands would be predicted in advance through proper design and consultation process and monitored by low-cost dataloggers. This lowers the overall cost of entry to the scheme.

An alternative tank location at a lower level is technically feasible and will eliminate the need for a high-pressure pipeline from Gully Road South Reserve to the Marion Golf Course. This would save $150,000 in pipeline construction costs but would be offset by the capital cost (approx. $100,000), plus operating costs of another pump station, and locating the tank in one of the reserves.

4.3 Capital

4.3.1 Capital summary

The capital was estimated in consultation with civil construction contractors experienced in directional drilling, with the budget cost estimate for capital expenditure being summarised in Table 3 below. This cost estimate will be consolidated through the detailed design process.

Description	Unit	Qty	Rate	Subtotal
DN225 PN16 PE100	m	3900	$ 227	$ 885,300
DN225 PN12.5 PE100	m	2600	$ 202	$ 525,200
DN90 PN12.5 PE100	m	2270	$ 90	$ 204,300
Fittings, valves, preliminaries, surveys	ea	1	$161,480	$ 161,480
Additional storage tank (if required)	ea	1	$ 50,000	$ 50,000
Connections at each site	ea	14	$ 5,000	$ 70,000
Pump Station, nominal demand 30L/s	ea	1	$100,000	$ 100,000
Sub Total				**$1,996,280**
Engineering, procurement, PM (10% of Sub Total)	ea	1	$199,628	$ 199,628
Risk (10% of Sub Total)	ea	1	$199,628	$ 199,628
Contingency (10% of Sub Total)	ea	1	$199,628	$ 199,628
Total				**$2,595,164**

Table 3: Capital Expenditure Budget, based on current concept design.

4.3.2 Qualifications

HydroPlan recommends detailed design of the scheme before procurement and construction, to achieve the most cost-effective installation cost.

Detailed "As Constructed" irrigation drawings and historical water use data were not available at the time of concept design for the reserve and sporting field areas. As such HydroPlan has included a number of assumptions in our calculations, such as irrigation areas and distribution uniformities of 65% (higher than likely for older systems but lower than likely for newer systems).

Detailed design and replacement of existing reserve and sporting field irrigation (controllers, sprinklers, solenoid valves, lateral pipes, etc.) is excluded.

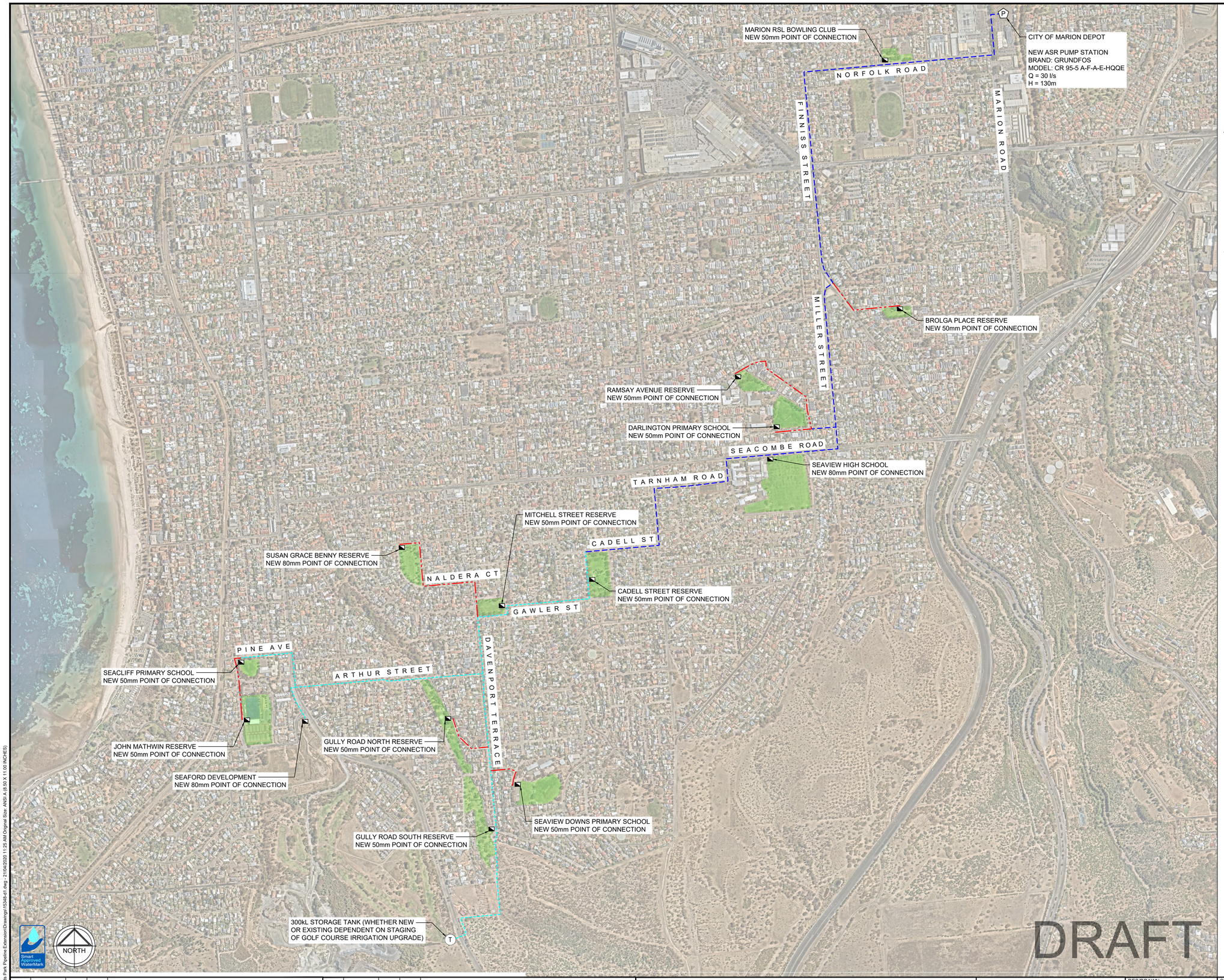
The pipeline detail design will need to consider directional drilling potential pipeline route clashes with other services including gas, electricity and communications. The capital estimate excludes the costs and risk of damage and pavement reinstatement to unknown services during construction. This could be in the order of $ 30,000.

Traffic management is excluded from the estimate and assumed to be free issued by the Council. Traffic control would be approximately $ 100,000 in value.

5 CONCLUSION

The scheme will save users $320,000 per annum and return a capital benefit of $770,000 in the return of River Murray Water. This is a total annual benefit of $1,089,000 in Year 1, reducing to $320,000, and resulting in a simple payback period of 5.7 years, excluding the weighted average cost of capital.

6 APPENDIX 1 CONCEPT DESIGN



LEGEND

- NEW DN225 PE100 PN16 ASR TRANSFER MAINLINE(SOLID LILAC PIPE)
- NEW DN225 PE100 PN12.5 PE ASR TRANSFER MAINLINE(SOLID LILAC PIPE)
- NEW DN90 PE100 PN12.5 PE ASR TRANSFER MAINLINE(SOLID LILAC PIPE)
- (P) NEW GRUNDFOS PUMP, MODEL CR 95-5 A-F-A-E-H-QQE.
- (T) 300 kl WATER TANK
- NEW CITY OF MARION ASR POINT OF CONNECTION (SIZE AS NOTED) (COUNCIL STANDARD ASSEMBLY APPLIES)
- INDICATIVE IRRIGATED AREA

IRRIGATED SITES

- BROLGA PLACE RESERVE
- CADELL STREET RESERVE
- DARLINGTON PRIMARY SCHOOL
- GULLY ROAD NORTH RESERVE
- GULLY ROAD SOUTH RESERVE
- JOHN MATHWIN RESERVE
- MARION RSL BOWLING CLUB.
- MITCHELL STREET RESERVE
- RAMSAY AVENUE RESERVE
- SEACLIFF PRIMARY SCHOOL
- SEACLIFF DEVELOPMENT
- SEAVIEW DOWNS PRIMARY SCHOOL
- SEAVIEW HIGH SCHOOL
- SUSAN GRACE BENNY RESERVE

CONCEPT DESIGN NOTES

CONCEPT DESIGN ONLY. DETAILED DESIGN WILL REQUIRE FURTHER SITE INVESTIGATIONS OF EACH IRRIGATED SITE TO DETERMINE EXISTING IRRIGATION CONDITIONS AND REQUIREMENTS.

ALL ROAD INSTALLATIONS TO BE UNDERTAKEN IN ACCORDANCE WITH DPTI AND COUNCIL REQUIREMENTS AS APPROPRIATE.

IRRIGATED SITE'S POINT OF CONNECTION TO BE CONFIRMED DURING DETAILED DESIGN, WITH POINT OF CONNECTION HEADWORKS TO BE CONSTRUCTED TO CITY OF MARION STANDARDS.

-80 0 80 160 240 320 400 800m

SCALE 1:8000 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
0	20/04/2020	CI	JS	CONCEPT PLAN

HYDROPLAN

http://hydroplan.com.au

PERTH ADELAIDE MELBOURNE SYDNEY BRISBANE BEIJING

DES/DRAWN:	CI
CHECKED:	JS
APPROVED:	JS
DATE:	20/04/2020
DRAFT REF:	2-MAR-d1

CLIENT: CITY OF MARION
SOUTH AUSTRALIA

PROJECT: OAKLANDS PARK PIPELINE EXTENSION
INDICATIVE PIPELINE LAYOUT

DRAWING No. 15348-000 | SHEET 1 OF 1 | REVISION 0

7 APPENDIX 2 PUMP DATA

GRUNDFOS

Company name:
Created by:
Phone:

Date: 18/04/2020

Qty.	Description
1	**CR 95-6 A-F-A-E-HQQE**

Note! Product picture may differ from actual product

Product No.: 99141743

Vertical, multistage centrifugal pump with inlet and outlet ports on same the level (inline). The pump head and base are in cast iron – all other wetted parts are in stainless steel. The Grundfos cartridge shaft seal ensures high reliability, safe handling, and easy access and service. Power transmission is via a rigid split coupling. Pipe connection is via DIN flanges.

The pump is fitted with a 3-phase, fan-cooled asynchronous motor.

Liquid:

Pumped liquid:	Water
Liquid temperature range:	-20 .. 120 °C
Selected liquid temperature:	20 °C
Density:	998.2 kg/m³
Kinematic viscosity:	1 mm2/s

Technical:

Pump speed on which pump data are based:	2966 rpm
Actual calculated flow:	30.46 l/s
Resulting head of the pump:	118.5 m
Pump orientation:	Vertical
Shaft seal arrangement:	Single
Code for shaft seal:	HQQE
Curve tolerance:	ISO9906:2012 3B

Materials:

Base:	Ductile cast iron EN 1563 EN-GJS-500-7
Impeller:	Stainless steel EN 1.4301
Bearing:	WC/WC
Support bearing:	Graflon
Material certified according to:	European standards

Installation:

Maximum ambient temperature:	55 °C
Maximum operating pressure:	25 bar
Max pressure at stated temp:	25 bar / 120 °C
Type of connection:	DIN
Size of inlet connection:	DN 100

GRUNDFOS

Company name:
Created by:
Phone:

Date: 18/04/2020

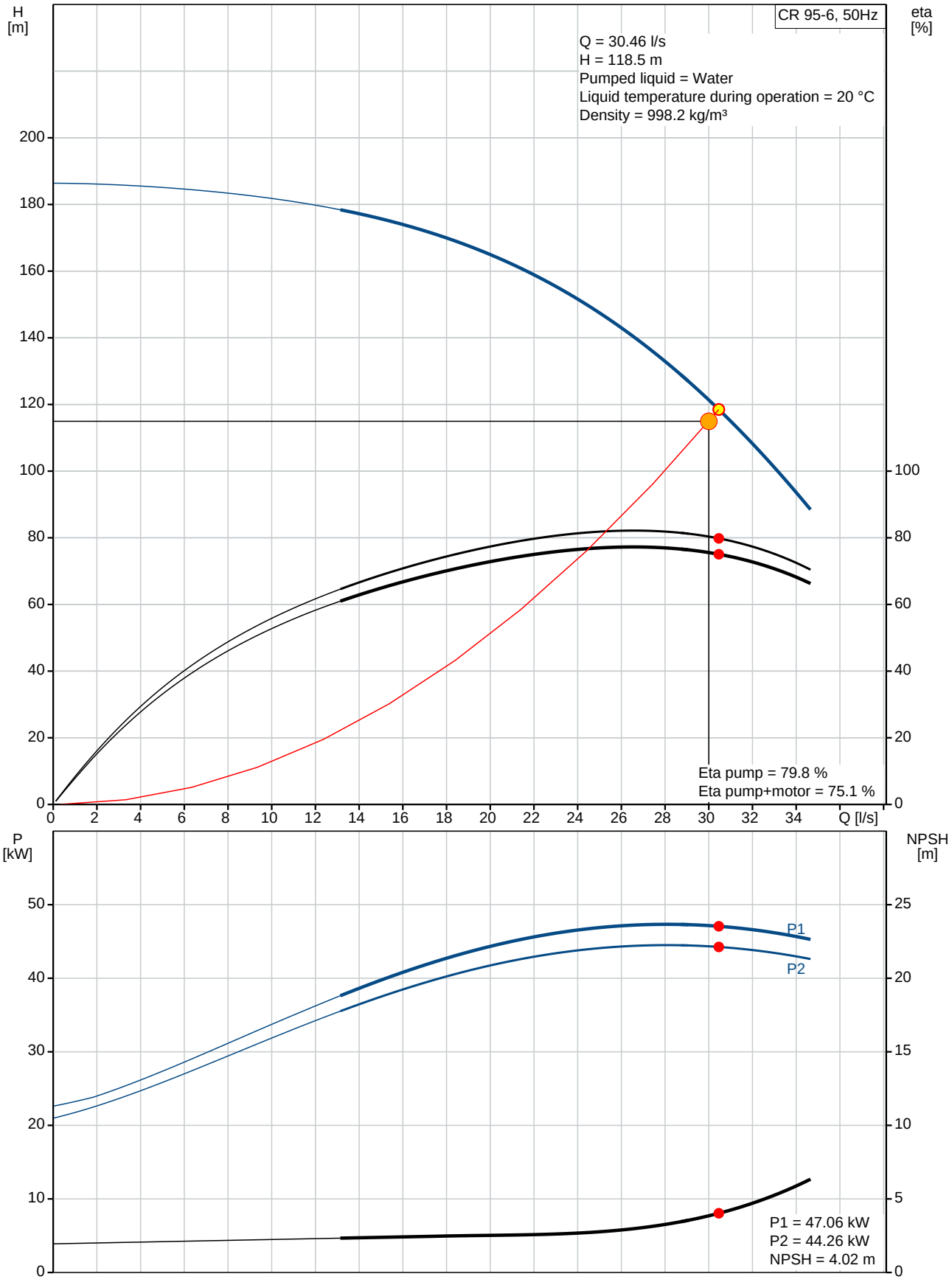
Qty.	Description	
	Size of outlet connection:	DN 100
	Pressure rating for connection:	PN 25/40
	Flange size for motor:	FF400
	Electrical data:	
	Motor standard:	IEC
	Motor type:	SIEMENS
	IE Efficiency class:	IE3
	Rated power - P2:	45 kW
	Power (P2) required by pump:	45 kW
	Mains frequency:	50 Hz
	Rated voltage:	3 x 380-420D/660-725Y V
	Rated current:	81,0-74,0/47,0-43,0 A
	Starting current:	690-690 %
	Cos phi - power factor:	0.89
	Rated speed:	2960 rpm
	Efficiency:	IE3 94,0%
	Motor efficiency at full load:	94.0-94.0 %
	Motor efficiency at 3/4 load:	94.5-94.5 %
	Motor efficiency at 1/2 load:	94.4-94.4 %
	Number of poles:	2
	Enclosure class (IEC 34-5):	IP55
	Insulation class (IEC 85):	F
	Motor No:	81U15336
	Controls:	
	Frequency converter:	NONE
	Others:	
	Net weight:	480 kg
	Gross weight:	625 kg
	Shipping volume:	2.04 m^3
	Finnish LVI No.:	4925540
	Thrust handling device:	N
	Approvals:	CE, EAC, ACS, WRAS

GRUNDFOS

Company name:
Created by:
Phone:

Date: 18/04/2020

99141743 CR 95-6 A-F-A-E-HQQE 50 Hz

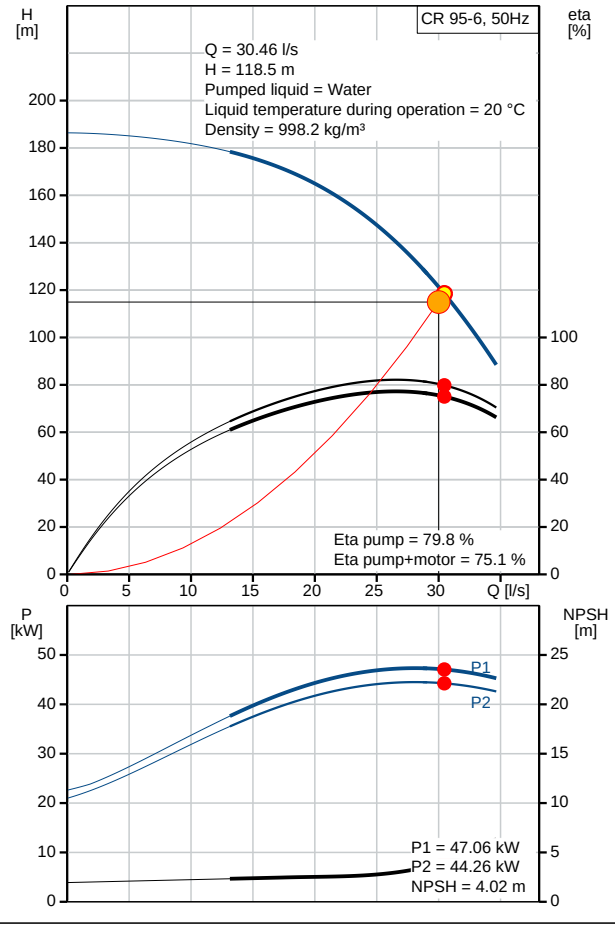


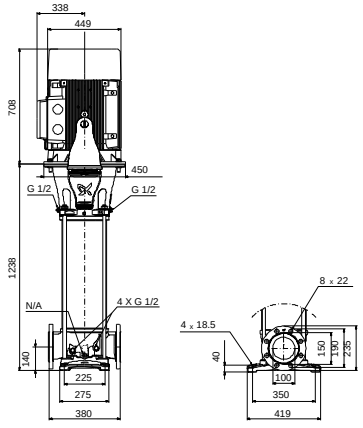
GRUNDFOS

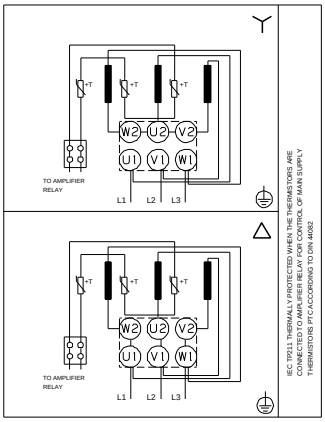
Company name:
Created by:
Phone:

Date: 18/04/2020

Description	Value
General information:	
Product name:	CR 95-6 A-F-A-E-HQQE
Product No:	99141743
EAN number:	5712607527297
	5712607527297
Technical:	
Pump speed on which pump data are based:	2966 rpm
Actual calculated flow:	30.46 l/s
Resulting head of the pump:	118.5 m
Maximum head:	186.3 m
Stages:	6
Impellers:	6
Low NPSH:	N
Pump orientation:	Vertical
Shaft seal arrangement:	Single
Code for shaft seal:	HQQE
Curve tolerance:	ISO9906:2012 3B
Pump version:	A
Model:	A
Cooling:	IC 411
Materials:	
Base:	Ductile cast iron
	EN 1563 EN-GJS-500-7
Impeller:	Stainless steel
	EN 1.4301
Material code:	A
Code for rubber:	E
Bearing:	WC/WC
Support bearing:	Graflon
Material certified according to:	European standards
Installation:	
Maximum ambient temperature:	55 °C
Maximum operating pressure:	25 bar
Max pressure at stated temp:	25 bar / 120 °C
Type of connection:	DIN
Size of inlet connection:	DN 100
Size of outlet connection:	DN 100
Pressure rating for connection:	PN 25/40
Flange size for motor:	FF400
Connect code:	F
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	-20 .. 120 °C
Selected liquid temperature:	20 °C
Density:	998.2 kg/m³
Kinematic viscosity:	1 mm2/s
Electrical data:	
Motor standard:	IEC
Motor type:	SIEMENS
IE Efficiency class:	IE3
Rated power - P2:	45 kW
Power (P2) required by pump:	45 kW
Mains frequency:	50 Hz
Rated voltage:	3 x 380-420D/660-725Y V
Rated current:	81,0-74,0/47,0-43,0 A







GRUNDFOS

Company name:
Created by:
Phone:

Date: 18/04/2020

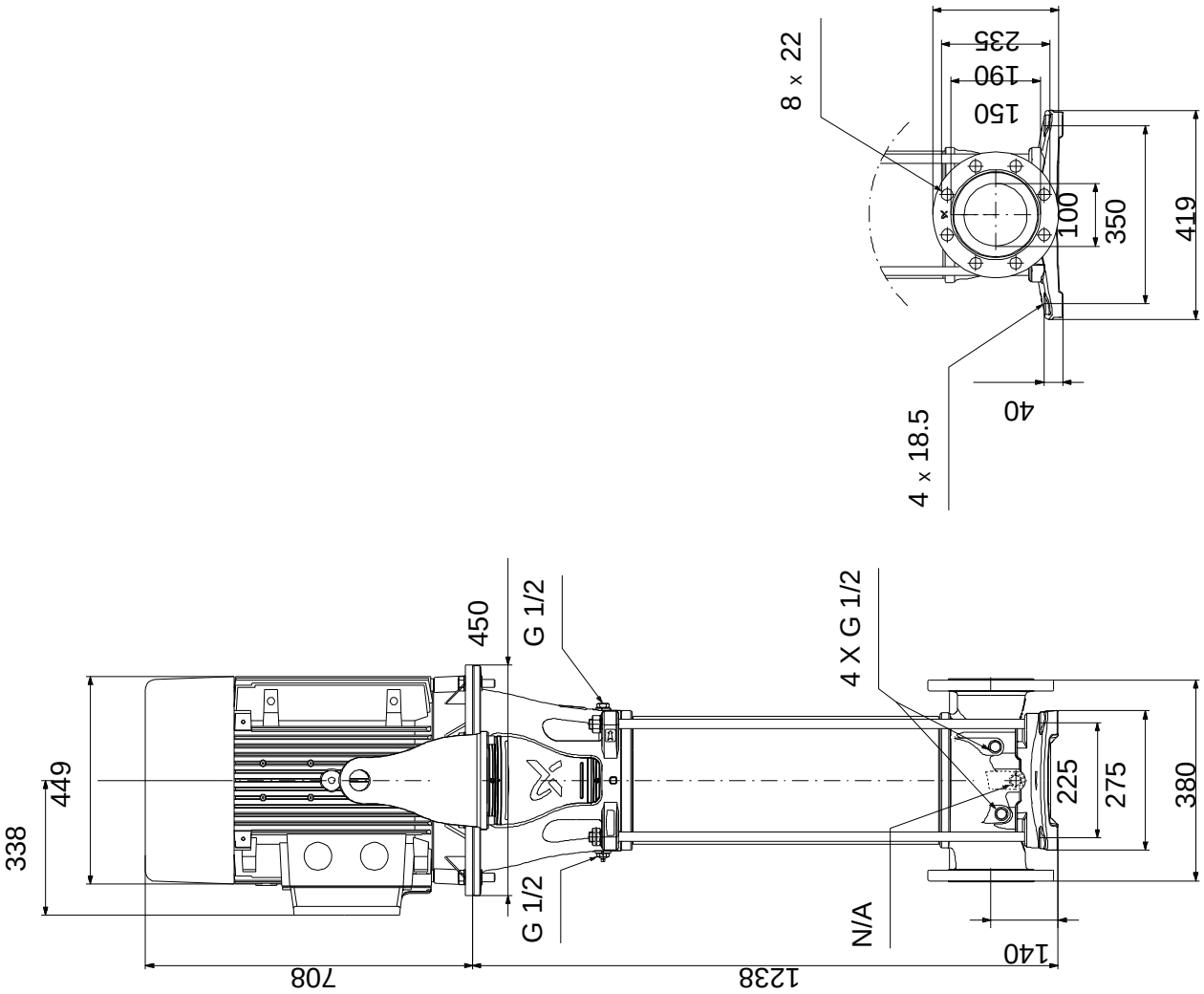
Description	Value
Starting current:	690-690 %
Cos phi - power factor:	0.89
Rated speed:	2960 rpm
Efficiency:	IE3 94,0%
Motor efficiency at full load:	94.0-94.0 %
Motor efficiency at 3/4 load:	94.5-94.5 %
Motor efficiency at 1/2 load:	94.4-94.4 %
Number of poles:	2
Enclosure class (IEC 34-5):	IP55
Insulation class (IEC 85):	F
Motor protec:	PTC
Motor No:	81U15336
Controls:	
Frequency converter:	NONE
Others:	
Net weight:	480 kg
Gross weight:	625 kg
Shipping volume:	2.04 m^3
Finnish LVI No.:	4925540
Thrust handling device:	N
Approvals:	CE, EAC, ACS, WRAS

GRUNDFOS

Company name:
Created by:
Phone:

Date: 18/04/2020

99141743 CR 95-6 A-F-A-E-HQQE 50 Hz



Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

ATTACHMENT 3

Summary of Financial Analysis for Seacliff Extension

Background

The Australian Government has established the Water Efficiency Program to fund upgrades to water infrastructure in the Murray–Darling Basin (the Basin) that will improve water use practices and save water for the environment. Over $1.5 billion is available to improve water efficiency across the Basin and deliver 450 GL of water for the environment by 2024, as part of the Sustainable Diversion Limit Adjustment Mechanism (SDLAM).

Basin state governments are responsible for the development and assessment of SDL adjustment projects under the Basin Plan. In South Australia, DEW is currently assessing the potential for alternative water supply schemes across urban centres to reduce the take from the River Murray for consumptive use. Although not located in the Basin, DEW is investigating sites across metropolitan Adelaide for this project, due to the large volumes of water supplied from the River Murray to Adelaide for potable use.

An expansion of the Oakland Park Stormwater Harvesting and Reuse Scheme is one project to which DEW may offer support to obtain Commonwealth funding, as part of the SDLAM. The City of Marion has investigated the potential to expand this scheme to supply additional sites with recycled water for irrigation of public open space. Commonwealth funding for an expansion of this scheme would offset the capital cost for extending the water supply network, and to connect additional irrigation sites. Inside Infrastructure has been engaged to undertake a financial analysis of this scheme, investigating the impact of different components and assumptions. Subsequently, the financial model developed by Inside Infrastructure was reviewed and further refined by the City of Marion Finance Department.

Assumptions

The analysis was undertaken using the following assumptions:

- Total annual scheme demand was assumed to be 74.49 ML/a, based on a “median” year as detailed in the HydroPlan Concept Design Report
- A total Commonwealth grant of $800,000 to be provided to the project
- Long term NWI compliant Price would need to be guaranteed at no less than **$2.22/KL** indexed
- Long term operating cost of supply would need to be **$0.58c/KL** indexed.
- Long term CPI is held at **2.5%** over 30 years.
- Weighted Average Cost of Capital (WACC) does not exceed **2.5% in 30 years**
- Depreciation over 50 years is consistent with required asset renewal spend (Over 90% Asset Renewal Ratio CoM KPI)
- All sites to be supplied with recycled water under expanded scheme assumed to be irrigated currently with potable water, supplied by SA Water
- The supply charge for third-party customers, and non-residential potable supply fees, are assumed to increase by 2.5% p.a
- Total capital cost of the expanded scheme assumed to be $2,595,164 (as per the HydroPlan Concept Design Report)

- Costs associated with irrigation upgrades at project sites were ignored.
- Capital depreciation was ignored in the first option, but included in the second option, assuming straight-line depreciation Total capital cost assumed to be accrued in Year 0, and full scheme demand starts from Year 1.

Results

The financial analysis of the two options included the calculation of the following metrics:

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Return on Investment (ROI) – calculated as the ratio between the total benefits accruing from the option to the total investment, divided by the number of years analysed (30)
- Payback period – the length of time to recover an initial investment

The results of this analysis are summarised in Table 1.

Table 1 Financial summary for project options

					SUMMARY				
Option	Total demand (ML/a)	Operating Cost ($/kL)	Commonwealth Grant ($/ML)	Capital Depreciation (Y/N)	NPV	IRR	ROI	Annual ROI	Payback Period
1	74.49	$0.58	$800,000 total	N	$1,090,000	5.0%	113%	3.8%	16.83 years
2	74.49	$0.58	$800,000 total	Y	$3,649	2.5%	53%	1.8%	22.62 years

These results demonstrate that Council's preferred scheme arrangement (Option 1) delivers a positive NPV ($1.09M) over a 50-year analysis period. The inclusion of asset depreciation in Option 2 produces a scheme with positive NPV ($3.6K).

Any decision by Council to invest in public infrastructure such as this scheme may be more greatly influenced by the payback period (the length of time taken to recover upfront costs, ignoring the time value of money), which is 17 years under Option 1. A consideration of asset depreciation increases this payback period to 23 years.

The quantum of annual demand is a major factor in determining the financial performance of this investment for the City of Marion. Higher irrigation demands, such as those described for a "dry" year in the HydroPlan Concept Design Report, will contribute to significant improvements in overall financial performance, with a large increase in NPV and a reduction in payback period. Similarly, any future connection to the Seacliff Precinct will result in an increased NPV and reduced payback period.

CITY OF MARION

OAKLANDS PARK STORMWATER HARVESTING SCHEME- SEACLIFF EXTENSION

FINANCIAL ANALYSIS

INSIDE INFRASTRUCTURE
23-Oct-20

Author: JW
Checked: CH
Rev2

ATTACHMENT 4

City of Marion - Oaklands Park Storwater Harvesting and Reuse Scheme Extension
Financial Analysis

Inputs/Assumptions	INPUTS			**Reference**
Commonwealth funding	$800,000	total	New funding scenario	
Total capital estimate	$2,595,164			HydroPlan design report

Demand scenarios (ML/a)	City of Marion	Third party	Total demand	
Avg ET, Avg Rain	34.88	39.61	**74.49**	"Average" scenario
	53.71	60.99	**114.7**	
% of total demand	46.8%	53.2%		

No. of irrigation sites to be supplied in expanded scheme	City of Marion	6
	Other	7

Revenue from third-party customers	80%	of SA Water Supply Fee
	$2.22	**per kL**
CPI increase for revenue and opex	2.50%	
Discount rate (WACC)	2.50%	
Period of analysis	30	years
Depreciation (straight line)	50	years
Opex (cost of supply)	$0.58	per kL

SA Water supply rates (Residential, 2020/21)		Daily threshold
Tier 1	$1.945 per kL	0 to 383.6 L/d
Tier 2	$2.775 per kL	383.6 to 1424.7 L/d
Tier 3	$3.007 per kL	over 1424.7 L/d
SA Water rates (Non-Residential, 2020/21)		
Annual Connection Fee	$271.40 per meter	
Supply Fee	$2.775 per kL	

ATTACHMENT 4

City of Marion - Oaklands Park Storwater Harvesting and Reuse Scheme Extension
Financial Analysis

					SUMMARY				
Option	**Total demand (ML/a)**	**Operating Cost ($/kL)**	**Commonwealth Grant ($/ML)**	**Capital Depreciation (Y/N)**	**NPV**	**IRR**	**ROI**	**Annual ROI**	**Payback Period**
1	74.49	$0.58	$800,000 total	N	$1,090,000	5.0%	113%	3.8%	16.83 years
2	74.49	$0.58	$800,000 total	Y	$3,649	2.5%	53%	1.8%	22.62 years

Original Analyis

					SUMMARY			
Option	**Total demand (ML/a)**	**Operating Cost ($/kL)**	**Commonwealth Grant ($/ML)**	**Capital Depreciation (Y/N)**	**NPV**	**IRR**	**ROI**	**Annual ROI**
1	74.49	$1.00	$800,000 total	N	$611,038	7.2%	203%	6.8%
2	74.49	$1.00	$800,000 total	Y	-$186,842	4.3%	116%	3.9%

The following risks and assumptions are used in the analysis

1. Long term NWI compliant Price would need to be guaranteed at no less than **$2.22/KL** indexed – subject to pricing model to be developed
2. Long term operating cost of supply would need to be **$0.58c/KL** indexed - needs to be verified against the supply model to be developed in light of annual supply volumes
3. Long term CPI is held at **2.5%** over 30 years – very generous rate
4. Weighted Average Cost of Capital (WACC) does not exceed **2.5% in 30 years**
5. Full demand at all sites in achieved in year 1 and maintained at estimated 'average' levels for the term (more likely year 2 or 3)
6. Depreciation over 50 years is consistent with required asset renewal spend (Over 90% Asset Renewal Ratio CoM KPI)
7. No allowance has been made for the initial cost of treatment or analysis of the impact of this into the cost of supply to maintain the water at this level of quality.

If any of these is not correct the payback within 30 years will not be achieved. If WACC is 5% it just exceeds 30 years. Currently it sits at 22.62 years.

ATTACHMENT 4

City of Marion - Oaklands Park Storwater Harvesting and Reuse Scheme Extension
Financial Analysis - Option 1 **0.025**

		Assumptions		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Costs										
	Capital Costs			-$ 2,595,164	-	-	-	-	-	-
	Grants - Federal ($/ML)	$ 800,000		$ 800,000	-	-	-	-	-	-
	Total demand (ML/a)	74.49			74.49	74.49	74.49	74.49	74.49	74.49
	Operating Costs ($/ML)	$ 0.58	($/kL)		$ 580	$ 595	$ 609	$ 625	$ 640	$ 656
	Total Opex				-$ 43,204	-$ 44,284	-$ 45,391	-$ 46,526	-$ 47,689	-$ 48,882
	Total Cost			-$ 1,795,164	-$ 43,204	-$ 44,284	-$ 45,391	-$ 46,526	-$ 47,689	-$ 48,882
Benefits										
	Third-party sales (ML/a)	39.61			39.61	39.61	39.61	39.61	39.61	39.61
	Recycled water supply charge ($/ML)	$ 2.220	($/kL)		2,276	2,332	2,391	2,450	2,512	2,575
	Total third-party supply revenue				$ 90,133	$ 92,386	$ 94,696	$ 97,063	$ 99,489	$ 101,977
	City of Marion demand (ML/a)	34.88			34.88	34.88	34.88	34.88	34.88	34.88
	CoM potable water use price ($/ML)	$ 2.775	($/kL)		2,844	2,915	2,988	3,063	3,140	3,218
	CoM potable water annual connection fee ($/site)	$ 271.40			278	285	292	300	307	315
	Total CoM potable water irrigation cost				$ 100,881	$ 103,403	$ 105,988	$ 108,638	$ 111,354	$ 114,137
	Total CoM benefit from irrigating with recycled water				$ 78,981	$ 80,956	$ 82,980	$ 85,054	$ 87,181	$ 89,360
	Total Benefit				$ 169,114	$ 173,342	$ 177,675	$ 182,117	$ 186,670	$ 191,337
Capital Depreciation										
	Annual straight-line depreciation (50 years)	$ -			$ -	$ -	$ -	$ -	$ -	$ -
Net Cash Flow				-$ 2,595,164	$ 125,910	$ 129,057	$ 132,284	$ 135,591	$ 138,981	$ 142,455
Cumulative Cash Flow				-$ 2,595,164	-$ 2,469,254	-$ 2,340,197	-$ 2,207,913	-$ 2,072,322	-$ 1,933,341	-$ 1,790,886

NPV	$1,090,000
IRR	5.0%
ROI	113%
Annual ROI	3.8%

ATTACHMENT 4

	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49
$	673	$ 689	$ 707	$ 724	$ 742	$ 761	$ 780	$ 800	$ 820	$ 840	$ 861	$ 883	$ 905	$ 927	$ 950
-$	50,104	-$ 51,356	-$ 52,640	-$ 53,956	-$ 55,305	-$ 56,688	-$ 58,105	-$ 59,557	-$ 61,046	-$ 62,573	-$ 64,137	-$ 65,740	-$ 67,384	-$ 69,068	-$ 70,795
-$	50,104	-$ 51,356	-$ 52,640	-$ 53,956	-$ 55,305	-$ 56,688	-$ 58,105	-$ 59,557	-$ 61,046	-$ 62,573	-$ 64,137	-$ 65,740	-$ 67,384	-$ 69,068	-$ 70,795
	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61
	2,639	2,705	2,772	2,842	2,913	2,986	3,060	3,137	3,215	3,296	3,378	3,462	3,549	3,638	3,729
$	104,526	$ 107,139	$ 109,818	$ 112,563	$ 115,377	$ 118,262	$ 121,218	$ 124,249	$ 127,355	$ 130,539	$ 133,802	$ 137,147	$ 140,576	$ 144,090	$ 147,693
	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88
	3,299	3,381	3,466	3,552	3,641	3,732	3,825	3,921	4,019	4,120	4,222	4,328	4,436	4,547	4,661
	323	331	339	347	356	365	374	383	393	403	413	423	434	445	456
$	116,991	$ 119,916	$ 122,914	$ 125,986	$ 129,136	$ 132,364	$ 135,674	$ 139,065	$ 142,542	$ 146,106	$ 149,758	$ 153,502	$ 157,340	$ 161,273	$ 165,305
$	91,594	$ 93,884	$ 96,231	$ 98,637	$ 101,103	$ 103,630	$ 106,221	$ 108,877	$ 111,599	$ 114,389	$ 117,248	$ 120,180	$ 123,184	$ 126,264	$ 129,420
$	196,120	$ 201,023	$ 206,049	$ 211,200	$ 216,480	$ 221,892	$ 227,439	$ 233,125	$ 238,954	$ 244,927	$ 251,051	$ 257,327	$ 263,760	$ 270,354	$ 277,113
$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$	146,017	$ 149,667	$ 153,409	$ 157,244	$ 161,175	$ 165,205	$ 169,335	$ 173,568	$ 177,907	$ 182,355	$ 186,914	$ 191,587	$ 196,376	$ 201,286	$ 206,318
-$	1,644,869	-$ 1,495,202	-$ 1,341,793	-$ 1,184,549	-$ 1,023,374	-$ 858,169	-$ 688,835	-$ 515,267	-$ 337,360	-$ 155,005	$ 31,909	$ 223,496	$ 419,872	$ 621,158	$ 827,475

ATTACHMENT 4

	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49
$	974	$ 999	$ 1,023	$ 1,049	$ 1,075	$ 1,102	$ 1,130	$ 1,158	$ 1,187
-$	72,565	-$ 74,379	-$ 76,239	-$ 78,145	-$ 80,098	-$ 82,101	-$ 84,153	-$ 86,257	-$ 88,413
-$	72,565	-$ 74,379	-$ 76,239	-$ 78,145	-$ 80,098	-$ 82,101	-$ 84,153	-$ 86,257	-$ 88,413
	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61
	3,822	3,917	4,015	4,116	4,219	4,324	4,432	4,543	4,657
$	151,385	$ 155,170	$ 159,049	$ 163,025	$ 167,101	$ 171,278	$ 175,560	$ 179,949	$ 184,448
	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88
	4,777	4,897	5,019	5,145	5,273	5,405	5,540	5,679	5,821
	467	479	491	503	516	529	542	555	569
$	169,438	$ 173,674	$ 178,016	$ 182,466	$ 187,028	$ 191,703	$ 196,496	$ 201,408	$ 206,443
$	132,656	$ 135,972	$ 139,371	$ 142,856	$ 146,427	$ 150,088	$ 153,840	$ 157,686	$ 161,628
$	284,041	$ 291,142	$ 298,420	$ 305,881	$ 313,528	$ 321,366	$ 329,400	$ 337,635	$ 346,076
$	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$	211,476	$ 216,763	$ 222,182	$ 227,736	$ 233,430	$ 239,265	$ 245,247	$ 251,378	$ 257,663
$	1,038,951	$ 1,255,714	$ 1,477,895	$ 1,705,632	$ 1,939,061	$ 2,178,327	$ 2,423,574	$ 2,674,952	$ 2,932,615

ATTACHMENT 4

City of Marion - Oaklands Park Storwater Harvesting and Reuse Scheme Extension
Financial Analysis - Option 2 **0.025**

		Assumptions		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Costs										
	Capital Costs			-$ 2,595,164	-	-	-	-	-	-
	Grants - Federal ($/ML)	$ 800,000		$ 800,000	-	-	-	-	-	-
	Total demand (ML/a)	74.49			74.49	74.49	74.49	74.49	74.49	74.49
	Operating Costs ($/ML)	$ 0.58	($/kL)		$ 580	$ 595	$ 609	$ 625	$ 640	$ 656
	Total Opex				-$ 43,204	-$ 44,284	-$ 45,391	-$ 46,526	-$ 47,689	-$ 48,882
	Net CoM Funding			-$ 1,795,164	-$ 43,204	-$ 44,284	-$ 45,391	-$ 46,526	-$ 47,689	-$ 48,882
Benefits										
	Third-party sales (ML/a)	39.61			39.61	39.61	39.61	39.61	39.61	39.61
	Recycled water supply charge ($/ML)	$ 2.220	($/kL)		2,276	2,332	2,391	2,450	2,512	2,575
	Total third-party supply revenue				$ 90,133	$ 92,386	$ 94,696	$ 97,063	$ 99,489	$ 101,977
	City of Marion demand (ML/a)	34.88			34.88	34.88	34.88	34.88	34.88	34.88
	CoM potable water use price ($/ML)	$ 2.775	($/kL)		2,844	2,915	2,988	3,063	3,140	3,218
	CoM potable water annual connection fee ($/site)	$ 271.40			278	285	292	300	307	315
	Total CoM potable water irrigation cost				$ 100,881	$ 103,403	$ 105,988	$ 108,638	$ 111,354	$ 114,137
	Total CoM benefit from irrigating with recycled water				$ 78,981	$ 80,956	$ 82,980	$ 85,054	$ 87,181	$ 89,360
	Total Benefit				$ 169,114	$ 173,342	$ 177,675	$ 182,117	$ 186,670	$ 191,337
Capital Depreciation										
	Annual straight-line depreciation (50 years)	-$ 51,903.28			-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903
Net Cash Flow				-$ 2,595,164	$ 74,006	$ 77,154	$ 80,381	$ 83,688	$ 87,078	$ 90,552
Cumulative Cash Flow				-$ 2,595,164	-$ 2,521,158	-$ 2,444,003	-$ 2,363,623	-$ 2,279,935	-$ 2,192,857	-$ 2,102,305

NPV	$3,649	$	125,910
IRR	2.5%	$	74,006
ROI	53%		
Annual ROI	1.8%		
Years where Cumulative Cash Flow is negative	22 years	8 months	

ATTACHMENT 4

	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49
$	673	$ 689	$ 707	$ 724	$ 742	$ 761	$ 780	$ 800	$ 820	$ 840	$ 861	$ 883	$ 905	$ 927	$ 950
-$	50,104	-$ 51,356	-$ 52,640	-$ 53,956	-$ 55,305	-$ 56,688	-$ 58,105	-$ 59,557	-$ 61,046	-$ 62,573	-$ 64,137	-$ 65,740	-$ 67,384	-$ 69,068	-$ 70,795
-$	50,104	-$ 51,356	-$ 52,640	-$ 53,956	-$ 55,305	-$ 56,688	-$ 58,105	-$ 59,557	-$ 61,046	-$ 62,573	-$ 64,137	-$ 65,740	-$ 67,384	-$ 69,068	-$ 70,795
	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61
	2,639	2,705	2,772	2,842	2,913	2,986	3,060	3,137	3,215	3,296	3,378	3,462	3,549	3,638	3,729
$	104,526	$ 107,139	$ 109,818	$ 112,563	$ 115,377	$ 118,262	$ 121,218	$ 124,249	$ 127,355	$ 130,539	$ 133,802	$ 137,147	$ 140,576	$ 144,090	$ 147,693
	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88
	3,299	3,381	3,466	3,552	3,641	3,732	3,825	3,921	4,019	4,120	4,222	4,328	4,436	4,547	4,661
	323	331	339	347	356	365	374	383	393	403	413	423	434	445	456
$	116,991	$ 119,916	$ 122,914	$ 125,986	$ 129,136	$ 132,364	$ 135,674	$ 139,065	$ 142,542	$ 146,106	$ 149,758	$ 153,502	$ 157,340	$ 161,273	$ 165,305
$	91,594	$ 93,884	$ 96,231	$ 98,637	$ 101,103	$ 103,630	$ 106,221	$ 108,877	$ 111,599	$ 114,389	$ 117,248	$ 120,180	$ 123,184	$ 126,264	$ 129,420
$	196,120	$ 201,023	$ 206,049	$ 211,200	$ 216,480	$ 221,892	$ 227,439	$ 233,125	$ 238,954	$ 244,927	$ 251,051	$ 257,327	$ 263,760	$ 270,354	$ 277,113
-$	51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903
$	94,113	$ 97,764	$ 101,506	$ 105,341	$ 109,272	$ 113,301	$ 117,431	$ 121,665	$ 126,004	$ 130,452	$ 135,010	$ 139,683	$ 144,473	$ 149,382	$ 154,415
-$	2,008,192	-$ 1,910,428	-$ 1,808,922	-$ 1,703,582	-$ 1,594,310	-$ 1,481,009	-$ 1,363,577	-$ 1,241,913	-$ 1,115,909	-$ 985,457	-$ 850,447	-$ 710,763	-$ 566,290	-$ 416,908	-$ 262,494

ATTACHMENT 4

Year 22	Year 23	Year 24	Year 25	Year 26	Year 27	Year 28	Year 29	Year 30
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49	74.49
$ 974	$ 999	$ 1,023	$ 1,049	$ 1,075	$ 1,102	$ 1,130	$ 1,158	$ 1,187
-$ 72,565	-$ 74,379	-$ 76,239	-$ 78,145	-$ 80,098	-$ 82,101	-$ 84,153	-$ 86,257	-$ 88,413
-$ 72,565	-$ 74,379	-$ 76,239	-$ 78,145	-$ 80,098	-$ 82,101	-$ 84,153	-$ 86,257	-$ 88,413
39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61	39.61
3,822	3,917	4,015	4,116	4,219	4,324	4,432	4,543	4,657
$ 151,385	$ 155,170	$ 159,049	$ 163,025	$ 167,101	$ 171,278	$ 175,560	$ 179,949	$ 184,448
34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88	34.88
4,777	4,897	5,019	5,145	5,273	5,405	5,540	5,679	5,821
467	479	491	503	516	529	542	555	569
$ 169,438	$ 173,674	$ 178,016	$ 182,466	$ 187,028	$ 191,703	$ 196,496	$ 201,408	$ 206,443
$ 132,656	$ 135,972	$ 139,371	$ 142,856	$ 146,427	$ 150,088	$ 153,840	$ 157,686	$ 161,628
$ 284,041	$ 291,142	$ 298,420	$ 305,881	$ 313,528	$ 321,366	$ 329,400	$ 337,635	$ 346,076
-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903	-$ 51,903
$ 159,572	$ 164,859	$ 170,278	$ 175,833	$ 181,526	$ 187,362	$ 193,344	$ 199,475	$ 205,759
-$ 102,921	$ 61,938	$ 232,217	$ 408,050	$ 589,576	$ 776,938	$ 970,282	$ 1,169,757	$ 1,375,516