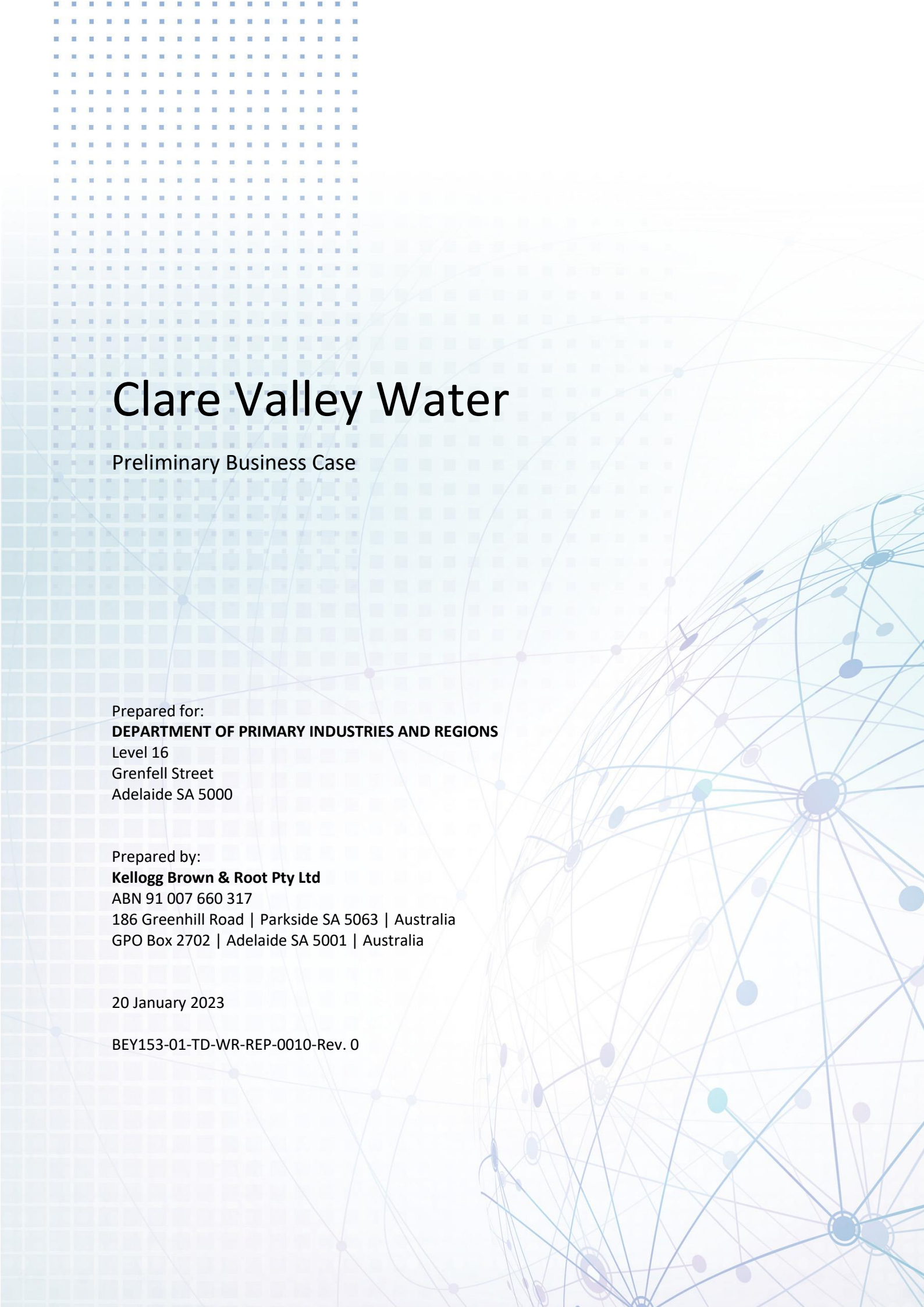




Clare Valley Water

Preliminary Business Case



Clare Valley Water

Preliminary Business Case

Prepared for:
DEPARTMENT OF PRIMARY INDUSTRIES AND REGIONS
Level 16
Grenfell Street
Adelaide SA 5000

Prepared by:
Kellogg Brown & Root Pty Ltd
ABN 91 007 660 317
186 Greenhill Road | Parkside SA 5063 | Australia
GPO Box 2702 | Adelaide SA 5001 | Australia

20 January 2023

BEY153-01-TD-WR-REP-0010-Rev. 0

Limitations Statement

The sole purpose of this report and the associated services performed by Kellogg Brown & Root Pty Ltd (KBR) is to provide advice to the South Australian and Commonwealth governments in accordance with the scope of services set out in the contract between KBR and the **Department of Primary Industries and Regions** ('the Client'). That scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

KBR derived the data in this report primarily from previous assessments, engagement with industry and other stakeholders and other analysis and investigations. The passage of time, manifestation of latent conditions or impacts of future events may require further exploration at the site and subsequent data analysis, and re-evaluation of the findings, observations and conclusions expressed in this report.

In preparing this report, KBR has relied upon and presumed accurate certain information (or absence thereof) provided by government officials and authorities, the Client and others identified herein. Except as otherwise stated in the report, KBR has not attempted to verify the accuracy or completeness of any such information.

This report has been prepared on behalf of the Client for use by the South Australian and Commonwealth governments and any non-government project partners and subject to the qualifications expressed above, may be relied upon by those parties

Revision History

Revision	Date	Comment	Signatures			
			Originated by	Checked by	Technical Approval	Project Approval
0	20 January 2023	Issued for Use - Final PBC	Luke Curtain	Angus MacDonald	Matt Bradbury	Phil Staniford
				 Digitally signed by Angus MacDonald Date: 2023.01.24 12:07:00 +1000	 Matt Bradbury 2023.01.24 10:23:38 +10'00'	

Contents

Section	Page	Section	Page
EXECUTIVE SUMMARY	XIII	5 OPTION ASSESSMENT	62
1 PROPOSAL CONTEXT	2	5.1 Economic assessment	62
1.1 Nature of proposal	2	5.2 Financial analysis	83
1.2 Strategic position	2	5.3 Affordability analysis	91
1.3 Government involvement	5	5.4 Social impact assessment	94
1.4 Proposal governance	5	5.5 Environmental assessment	108
1.5 Stakeholder engagement and input	6	5.6 Sustainability assessment	112
1.6 Structure of this preliminary business case	6	6 CONSIDERATION OF OTHER INFRASTRUCTURE OPTIONS	121
2 CASE FOR CHANGE	8	6.1 Background	121
2.1 Current state	8	6.2 Augmentation of the Clare Valley Water Supply Scheme – Lower Cost Option	121
2.2 Demand situation	12	6.3 Climate-independent recycled water solution	122
2.3 Initial input from grape irrigators	27	7 PROCUREMENT AND DELIVERY STRATEGY	125
2.4 Investment need problem statement	28	7.1 Introduction	125
2.5 Inaction consequences	28	7.2 Delivery strategy	125
3 OUTCOMES SOUGHT	29	7.3 Market considerations	126
3.1 Benefits and outcomes	29	7.4 Contracting model	131
3.2 Previous goals	29	8 PROJECT MANAGEMENT	143
3.3 Investment logic map	29	8.1 Project plan and schedule	143
3.4 Strategic alignment	31	8.2 Communications and stakeholder engagement	143
3.5 Other initiatives	36	8.3 Risk assessment and management	144
3.6 Critical success factors	36	9 KEY FINDINGS	153
4 OPTIONS DEVELOPMENT	39	APPENDIX A	
4.1 Base case definition	39	Stakeholder engagement plan	
4.2 Previous options	39	APPENDIX B	
4.3 Potential initiatives	40	Stakeholder engagement register	
4.4 Options development process	41		
4.5 Options longlist	43		
4.6 Scope of options shortlist	53		

APPENDIX C

Round 1—Demand assessment for
Clare Valley

APPENDIX D

Benefits register

APPENDIX E

Engineering design report

APPENDIX F

Environment desktop assessment

APPENDIX G

Risk assessment and register

List of figures

Section	Page
Figure 1 Project location and potential sources of water	xiv
Figure 2 Opportunities arising from funding a Clare Valley Water detailed business case	xv
Figure 3 Clare Valley grape production (tonnes)	xv
Figure 4 Clare Valley water-related problems	xvi
Figure 5 Possible solutions to Clare Valley's water-related problems	xvi
Figure 6 Target benefits and strategic responses from ILM with the community	xvi
Figure 7 Options long-list	xvii
Figure 8 Two preferred infrastructure solutions for further investigation in Stage 1 of the detailed business case	xix
Figure 9 Likely demand at different capital prices and annual charges (ML)	xx
Figure 10 Customer capital revenue at different prices (\$ million)	xxi
Figure 11 Economic benefits and costs of Option 1: Augmented CVWSS	xxii
Figure 12 Economic benefits and costs of Option 2: Bundaleer Dam/Augmented CVWSS	xxii
Figure 13 Option 1 – job summary (incl. ongoing and construction Full-time equivalent (FTEs))	xxiii
Figure 14 Option 2 – job summary (incl. ongoing and construction FTEs)	xxiii
Figure 15 Next steps for the Clare Valley Water project	xxvii
Figure 16 South Australian Government's 2022 Water Security Statement strategic priorities	4
Figure 17 Elements of the business case	7
Figure 18 Clare Valley	8
Figure 19 Clare Valley grape production	9
Figure 20 Volume of grapes produced and price relationship	10
Figure 21 Wine exports by value and volume (Clare Valley)	11
Figure 22 Wine value by price segment	12
Figure 23 Grape production and rainfall in Clare Valley	13
Figure 24 Monthly rainfall average in Clare Valley	13
Figure 25 Water volumes by categories (Clare Valley)	14
Figure 26 Total non-rainfall water demand – Clare Valley	15
Figure 27 River Murray – SA Class 3 water entitlements – weighted average price (\$/ML)	18
Figure 28 Monthly volume-weighted allocation prices for River Murray water in South Australia (\$/ML)	18
Figure 29 Pre-feasibility study demand assessment – December 2020	20
Figure 30 Likely demand for new water at different prices – annual charge (ML)	21
Figure 31 Permanent entitlements – weighted average annual price (\$/ML)	22
Figure 32 Permanent entitlement prices and Tanunda (Barossa) and Clare annual rainfall	22
Figure 33 Temporary allocation prices (\$/ML)	23
Figure 34 Temporary allocation prices and Tanunda (Barossa) and Clare annual rainfall	23
Figure 35 Projected percentage change in mean annual runoff under 2.2°C global average warming	24
Figure 36 River Murray Class 3 entitlements – forecast based on average growth rate since 2016 (\$/ML)	25
Figure 37 Water allocation forecast (\$/ML) – 30 year assessment period	26
Figure 38 Entitlement and allocation prices (\$/ML)	27
Figure 39 Initial investment logic map	30
Figure 40 ISA's key principles for infrastructure planning and delivery	41
Figure 41 Order of priority of effective solutions	41

Figure 42	Initial long-list overview	43
Figure 43	Project location and potential sources of water	53
Figure 44	Overview map of Option 1 CVWSS upgrade	55
Figure 45	Example of an HDPE lined turkey nest irrigation storage – Auburn Terra Rossa storage	56
Figure 46	Customer demand parcels and proposed supply zoning under Option 1	57
Figure 47	Overview map of Option 2 Bundaleer supply	59
Figure 48	Bundaleer Dam – water source for Option 2	60
Figure 49	Forecast new grape production (tons per annum) excluding substitution for Option 1 and 2	63
Figure 50	Average current water use by source of all respondents versus the average current water use of respondents who requested water for substitution	68
Figure 51	Water use by source – current average water use, Option 1 and Option 2	71
Figure 52	Change in water source use – current use, Option 1 and Option 2	71
Figure 53	Proposed water uses	73
Figure 54	Forecast new grape production (tonnes per annum) excluding substitution for Option 1 and 2	82
Figure 55	Likely demand for new water at different prices – Capital price focus (ML)	88
Figure 56	Likely demand for new water at different prices – Capital price focus (ML)	92
Figure 57	Likely demand for new water at different prices – Annual charge focus (ML)	93
Figure 58	Infrastructure costs by sector	129
Figure 59	Next steps for the Clare Valley Water project	143
Figure 60	Project risk planning process	145
Figure 61	Key project periods	145
Figure 62	Risk workshop process	145
Figure 63	Risk categories	146

List of tables

Section	Page
Table 1 Infrastructure options long-list	xviii
Table 2 Clare Valley shortlisted options – design and demand details	xviii
Table 3 Round 1 capital prices (subject to change)	xx
Table 4 Key risks relating to next steps – drive recommendations of the preliminary business case	xxv
Table 5 ISA gateway approvals	5
Table 6 Top 5 industries by employment – Clare and Gilbert Valleys	9
Table 7 Clare Valley grape production – 2021	10
Table 8 Wine volumes by price segment	11
Table 9 Class 3 water entitlement volumes and allocations	17
Table 10 Indicative water charges for a customer with a 10 ML allocation within the Clare Valley scheme	19
Table 11 Australian Government strategies and plans	31
Table 12 South Australian Government strategies and plans	33
Table 13 Local government strategies and plans	36
Table 14 Initial longlist of options	44
Table 15 Options considered for further investigations	50
Table 16 Ten water demand scenarios considered	51
Table 17 High-level cost estimates of four option under the ten demand scenarios	52
Table 18 Scheme and infrastructure summary of Clare Valley shortlisted options	54
Table 19 Proposed new storages and volumes under Option 1 CVWSS upgrade	56
Table 20 Pipeline quantities by diameter under Option 1	58
Table 21 Pump stations under Option 1	58
Table 22 Option 2 transfer main alignment	60
Table 23 Distribution pipeline quantities by diameter under Option 2	61
Table 24 Distribution pump stations under Option 2	61
Table 25 Economic analysis results (7% discount rate and medium costs)	62
Table 26 Agricultural and wine FTE positions at full production	63
Table 27 Maximum direct employment (FTE's) – Infrastructure Australia approved method	63
Table 28 Starting year and assessment period	64
Table 29 Discount rate scenarios	64
Table 30 Alignment of key economic assumptions	64
Table 31 Reliability of water products	65
Table 32 Class 3 water entitlement volumes and allocations	66
Table 33 Reliability-adjusted supply (ML)	66
Table 34 Substitution volumes	67
Table 35 Nominal supply vs. supply for growth (ML)	67
Table 36 Option water volumes (ML)	67
Table 37 Water use by source – Round 1 demand assessment – 'average year water use'	67
Table 38 Substitution volumes (nominal supply)	68
Table 39 Nominal supply vs. supply for growth (ML)	68
Table 40 Indicative substitution volumes by source, percentage of substitution volume and percentage of total volume	69
Table 41 Water use by source: Round 1 demand assessment 'average year water use', potential substitution volume and after-substitution volumes (ML)	69

Table 42	Substitution volumes by source and five year average water consumption by source from Clare Valley PWRA assessments	70
Table 43	Water volumes by source – Option 1 and 2	70
Table 44	Existing grape vine net margins	73
Table 45	Vineyard establishment costs and production uptake per hectare	74
Table 46	New vine net margins	74
Table 47	Non grape agricultural and other enterprise net margins	74
Table 48	2022 wine prices for Clare Valley (\$/L)	75
Table 49	Wine gross costs per facility size – processing, storing and packaging	75
Table 50	Weighted average wine premiums (\$/ML)	75
Table 51	Water use and salinity	76
Table 52	Relationship between yield and salinity for grapes	76
Table 53	Residual value at year 30	77
Table 54	Economic benefits summary - two options – (Present value, \$ million, 7% discount rate)	77
Table 55	Medium capital costs – (\$million, real)	78
Table 56	Operating costs (\$million, real)	78
Table 57	Opportunity cost calculations for both options	79
Table 58	Economic analysis results (7% discount rate and medium costs)	79
Table 59	Economic analysis results (4% discount rate and medium costs)	79
Table 60	Economic analysis results (10% discount rate and medium costs)	80
Table 61	Option sensitivity analysis – medium costs and 7% discount rate	81
Table 62	Gross revenue of project at full production (\$ million)	82
Table 63	Agricultural and wine FTE positions at full production	83
Table 64	Maximum direct employment (FTE's) – Infrastructure Australia approved method	83
Table 65	Timing assumptions	84
Table 66	Financial assumptions	85
Table 67	Capital costs (\$million, real)	85
Table 68	Operating costs (\$ millions, real)	86
Table 69	Renewals annuity assumptions	87
Table 70	Renewals annuity (\$million, real)	87
Table 71	Capital contribution percentages - \$4,000 per ML Upfront Charge	88
Table 72	Customer contribution scenarios – Option 1	89
Table 73	Customer contribution scenarios – Option 2	89
Table 74	Option 1- Funding scenario for medium capital costs	89
Table 75	Option 2- Funding scenario for medium capital costs	89
Table 76	Infrastructure levy payment schedule	90
Table 77	Clare Valley charges (\$/ML) – (medium costs)	90
Table 78	Financial NPV (\$million, real)	91
Table 79	Net present value of ongoing government support scenario analysis over 30 years	91
Table 80	Clare Valley charges (\$/ML) – (medium costs)	92
Table 81	Water charges within the Clare Valley scheme	93
Table 82	Option 1- Funding scenario for medium capital costs	94
Table 83	Option 2- Funding scenario for medium capital costs	94
Table 84	The three-step process for undertaking a social impact evaluation	96
Table 85	Clare and Gilbert Valley Council population 2011-2020	97
Table 86	Clare and Gilbert Valley Council median age of population	98
Table 87	Clare and Gilbert Valley Council income breakdown in 2020	98
Table 88	Clare and Gilbert Valley Council housing in 2016	99
Table 89	Clare and Gilbert Valley housing tenure type in 2016	99
Table 90	Clare and Gilbert Valley median mortgage and rent	99
Table 91	Clare and Gilbert Valley resident education in 2016	99

Table 92	Clare and Gilbert Valley resident employment by category (2016), ranked by proportion of study area (%)	100
Table 93	Clare and Gilbert Valley resident place of birth	101
Table 94	Summary of social benefits and impacts resulting from the project	104
Table 95	Pathway 4 C - Other activities requirements	110
Table 96	Process to undertake Clearance for 4C 'Other activities'	111
Table 97	Matters of National Environmental Significance in the study area	112
Table 98	Potential Project Sustainability Initiatives	114
Table 99	Summary of assessment	116
Table 100	Governance assessment	116
Table 101	Environmental assessment	117
Table 102	Social assessment	118
Table 103	Economic assessment	119
Table 104	Key actions	119
Table 105	Features of tier one, two and three construction companies	128
Table 106	Delivery models	132
Table 107	Assessment of delivery models against evaluation criteria	138
Table 108	Key engagement activities and purpose	144
Table 109	Extreme and High Project risks pre-control measure	147

List of abbreviations

ABS	Australian Bureau of Statistics
BCR	Benefit cost ratio
BOM	Bureau of Meteorology
BOO	Build, own, operate
CBA	Cost–benefit analysis
CPI	Consumer Price Index
CSIRO	Commonwealth Scientific and Industrial Research Organization.
CVWGA	Clare Valley Wine and Grape Association
CVWSS	Clare Valley Water Supply Scheme
CWMS	Community Wastewater Management Systems
DBC	Detailed business case
DCMO	Design, construct, maintain and operate
DEW	Department for Environment and Water
DTF	Department of Treasury and Finance
ECI	Early contractor involvement
EIS	Environmental Impact Statement
ETI	Early tenderer involvement
FNPV	Financial Net Present Value
FTE	Full-time equivalent
GCS	Guaranteed construction sum
GI	Graphical indicator
HDPE	High-density polyethylene
IBRA	Interim Biogeographic Regionalisation for Australia
ILM	Investment logic mapping
ILUA	Indigenous Land Use Agreement
ISA	Infrastructure SA
ISCA	Infrastructure Sustainability Council of Australia
KBR	Kellogg Brown & Root Pty Ltd
LGA	Local government area
MCA	Multi-criteria analysis
MNES	Matters of National Environmental Significance

MSCL	Mild steel cement lined
NAIS	Northern Adelaide Irrigation Scheme
NPV	Net present values
NVC	Native Vegetation Council
NWGA	National Water Grid Authority
NWI	National Water Initiative
PIRSA	Department of Primary Industries and Regions
PPI	Producer Price Index
ppm	Parts per million
PPP	Public private partnership
PRG	Project Reference Group
PVC	Polyvinyl chloride
PWRA	Prescribed Water Resources Area
SEB	Significant Environmental Benefit
SOP	Standard Operating Procedure
SPV	Special Purpose Vehicle
TDS	Total dissolved solids
WAA	Water Affecting Activity
WAP	Water Allocation Plan
WSS	Water supply scheme
WWTP	Wastewater Treatment Plant

Executive Summary

THIS PRELIMINARY BUSINESS CASE

This Preliminary Business Case (PBC) demonstrates the importance of advancing the Clare Valley Water project by investing in a detailed business case.

The Clare Valley in South Australia is a rich wine-growing area with the potential for strong growth in a variety of sectors. An inadequate water supply is, however, holding the region back. It is vital to ensure the availability of a high-quality, affordable water source that meets demand in order to lift investment and enable industries to flourish.

A detailed business case will lay the foundation to meet the community's identified water and other service needs while minimising costs and maximising economic, social and environmental benefits. It will narrow down four identified options for a new Clare Valley water supply to one reference project. It will also progress several cost-effective, complementary non-infrastructure solutions.

The South Australian and Australian governments' support of \$5 million in funding from the National Water Grid Authority (NWGA) is necessary for the detailed business case to proceed. This PBC aims to provide the information on which to base such a decision.

THE CLARE VALLEY

The Clare Valley is in the Yorke and Mid North region of South Australia, about 150 kilometres north of Adelaide. The valley is a moderately warm, low-rainfall region compared with other premium wine-producing regions in Australia.¹ The summers are warm and dry, while the winters are cold and normally rain can be expected. However, recently the Clare Valley has experienced a series of droughts.

Clare Valley is famous for its Riesling, but also produces exceptional Shiraz and Cabernet Sauvignon. These three varietals comprise 80% of Clare Valley's wine production, grown on about 5,000 hectares of vineyards, which is about half the area of the Barossa Valley vineyards. The valley also produces high-value horticulture, annual crops and livestock.² It supports tourism and is an employment hub.³

The drought has seen low rainfall, diminishing ground water and reduced viability of surface water sources, resulting in water to be in short supply. A new water source is needed to support economic stability and growth, and boost agriculture sector productivity in the region.

DIFFICULTIES FOR GROWERS

Clare Valley has almost 60 winemakers and more than 80 grape growers. However, fewer than 10 grape growers (excluding winemakers) can support themselves by growing only grapes. Most such businesses need to earn off-farm income (a second job) and/or operate annual crop, livestock, or horticultural enterprises to supplement farmgate revenue from the sale of wine grapes.

Local water supplies are constrained, and potable water supplied by the Clare Valley Water Supply Scheme (CVWSS) is twice as expensive as water in competing South Australian grape-growing areas.⁴ Clare Valley grape growing, and wine making are less profitable than elsewhere; therefore, in recent years all but one corporate

¹ Wine Australia, [Australian wine regions and varieties](#), Wine Australia website, 2021, accessed 29 July 2022.

² Department of Primary Industries and Regions, Government of South Australia, [New water for Clare in the pipeline](#), 17 February 2022, PIRSA website, 2022, accessed 29 July 2022.

³ Clare Valley Wine & Grape Association, [Our story](#), CVWGA website, 2022, accessed 29 July 2022.

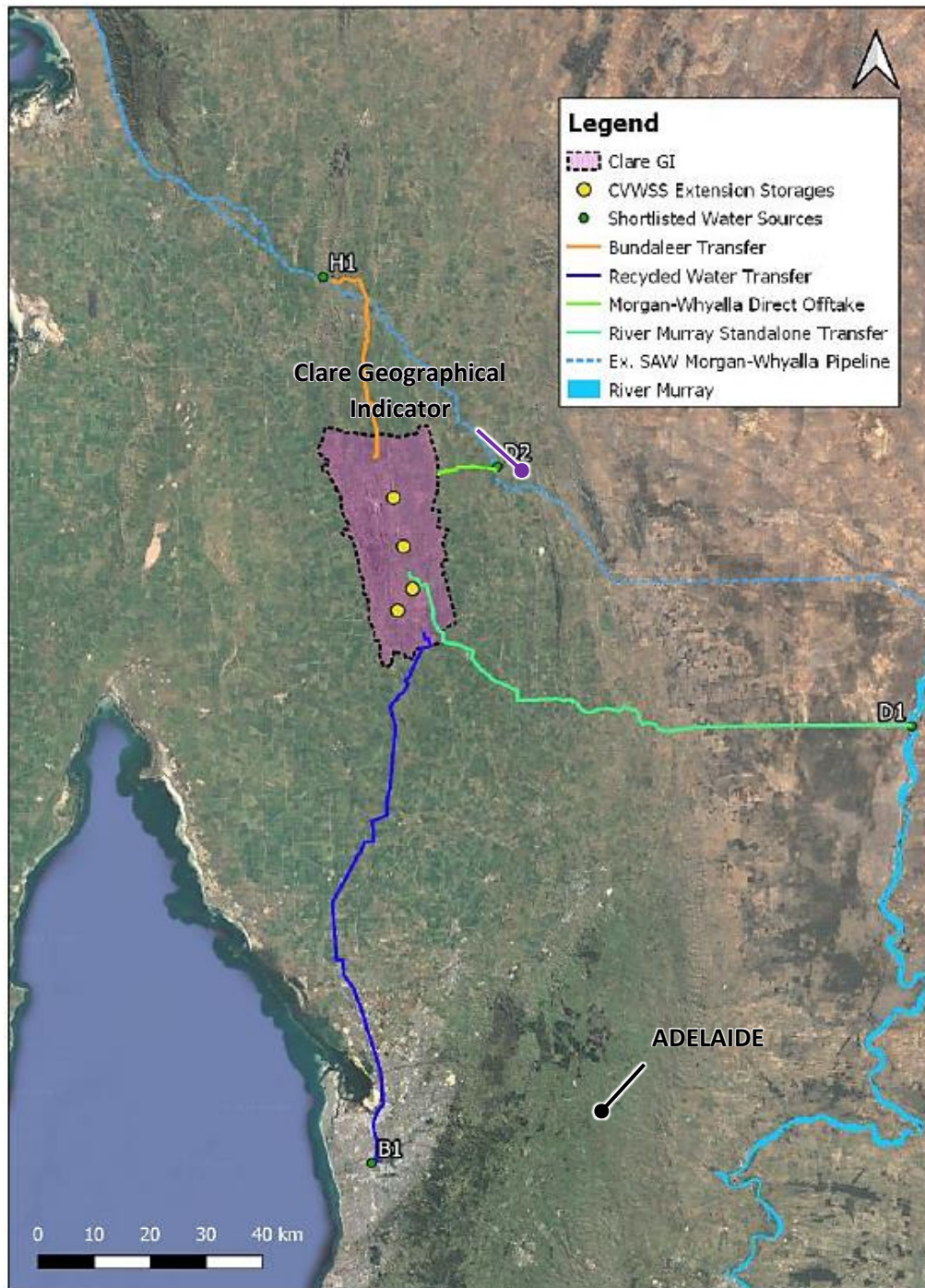
⁴ Prices include treating River Murray water to drinking quality and lifting it 475 meters above sea level while transporting it about 100 km from Morgan to the Clare Valley, plus the cost of entitlements and operating/maintaining the CVWSS.

winemaker have left the Clare Valley and moved to areas with lower-cost water and higher returns. With some notable exceptions, the challenge of achieving returns on Clare Valley wine and grapes – combined with the decline in the availability and quality of an affordable local water source, plus the material capacity constraints experienced within the CVWSS during peak demand periods – have resulted in underinvestment and forgone development in the valley.

CLARE VALLEY WATER PROJECT LOCATION

This project is in the Clare Geographical Indicator (GI), which encompasses the Clare Valley and surrounding area. A map of the Clare GI and potential pipeline connection routes to nearby water supplies is at Figure 1.

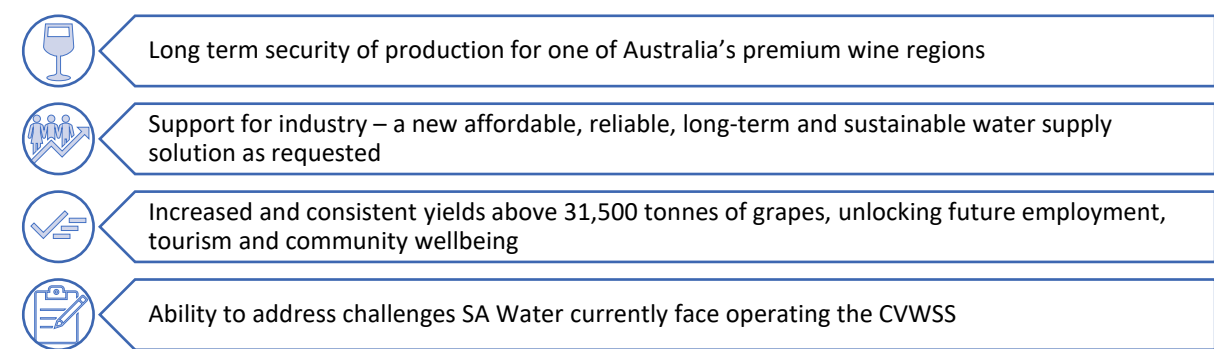
Figure 1 Project location and potential sources of water



OPPORTUNITIES

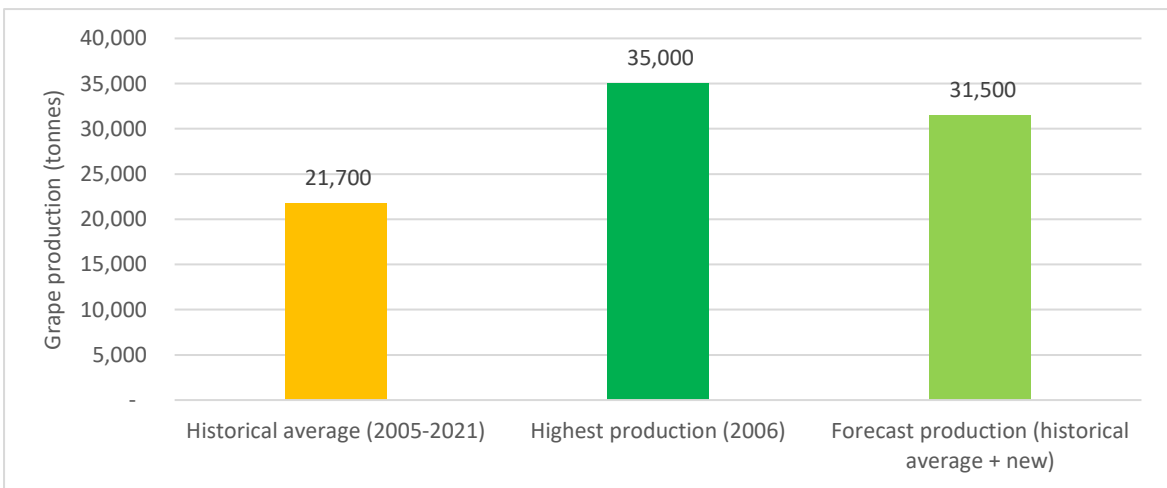
A Clare Valley detailed business case will show the several opportunities related to the project Figure 2.

Figure 2 Opportunities arising from funding a Clare Valley Water detailed business case



Notable opportunities include that an additional secure water supply will smooth out the boom–bust burden that recent droughts (2018, 2019) have imposed in the Clare Valley. This will allow consistent production of 31,500 tonnes of grapes annually. Such a level of production has been reached before (Figure 3), but it is rare and short lived. Producing this tonnage of wine grapes consistently will be new and a significant improvement on the historical average of 21,700 tonnes annually, increasing investment and underpinning the valley’s viable future.

Figure 3 Clare Valley grape production (tonnes)

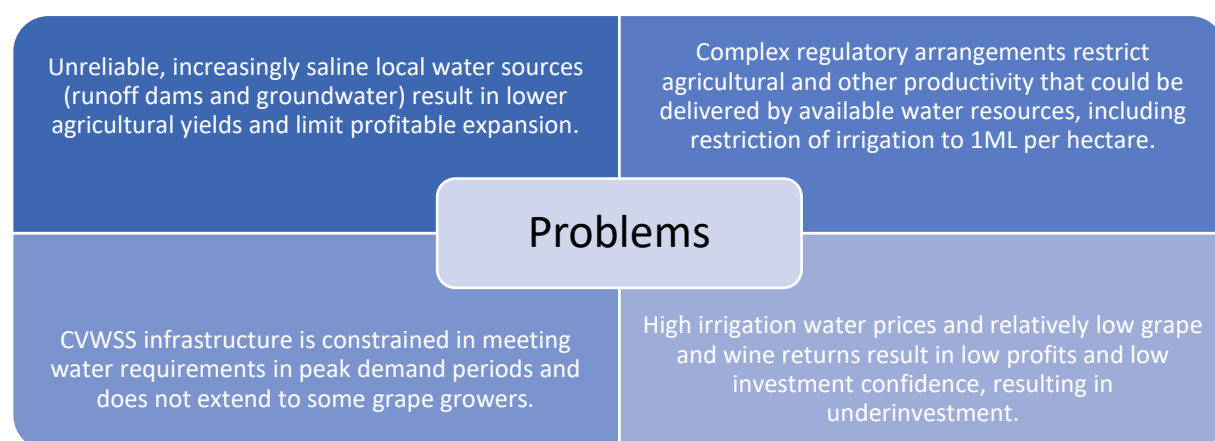


PROBLEMS

The PBC included two ‘building block’ or immersion phases that focused on understanding the water source and infrastructure, water pricing and water-related ‘service needs’ of the water-using community. The focus was on winemakers, grape growers, council, tourism businesses and other landholders who could, in future, rely on enhanced water supply arrangements. Over 40 one-on-one interviews were conducted by KBR commercial leads, to understand the nuances of historical and existing water capital charges and annual charges, water quality and mix enterprises conducted in the study area.

The first phase (early February 2022) emphasised larger water users and those connected to CVWSS. The second phase (late February 2022) related to smaller water users and those not connected to the CVWSS.

The result of the immersion was an articulated service need, investment logic map and an initial options assessment report, key elements of which are included in the preliminary business case. The Clare Valley Wine and Grape Association (CVWGA) used its member list and local knowledge (to include non-members) to facilitate these in-depth interviews. Immersion revealed challenges/problems faced by Clare Valley water users (Figure 4).

Figure 4 Clare Valley water-related problems

These problems/service needs suggested to KBR some possible solutions, set out in broad terms in Figure 5:

Figure 5 Possible solutions to Clare Valley's water-related problems

Declining local water sources

- introduce a new and reliable source of water.

Insufficient flow rates/volumes from CVWSS for some connected customers (usually larger customers including wineries)

- upgrade the network with duplicate pipelines and/or more pumps to increase water pressure and flow rates.

CVWSS does not extend to the majority of the grape growing businesses (mostly small to medium vineyards plus some large primary producers some distance from the network)

- extend the reach of the network.

High average potable water prices

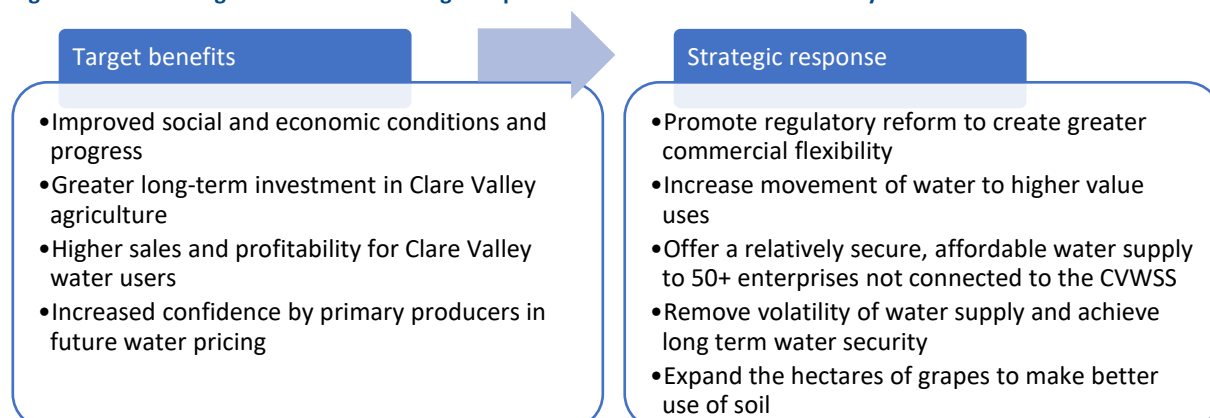
- the new source needs to be cost-effective, ensuring the annual charges do not excessively exceed the current cost of water of approximately \$2,000/ML paid by CVWSS customers on average (individual customer costs vary widely).

Complex regulatory arrangements

- simplify regulations, improve water-user education and enable water trading to reallocate this scarce resource to higher-value uses. There is scope for non-infrastructure solutions to contribute meaningfully.

INVESTMENT LOGIC

The investment logic mapping (ILM) process was based on extensive consultation with Clare Valley businesses leaders, local council and state government. The ILM process generally moves from problem statements (above) to target benefits and strategic responses (Figure 6) as well as a longlist of possible solutions.

Figure 6 Target benefits and strategic responses from ILM with the community

OPTIONS LONG-LIST

After reviewing all previous reports, and undertaking technical analysis and more consultation, KBR developed an options long-list that includes non-infrastructure and infrastructure solutions, divided into four categories. The options are colour-coded according to the scale/volume of demand that they could meet (Figure 7).

Figure 7 Options long-list

1. Reform	2. Better use	3. Improve existing	4. New
A1. Increasing the maximum irrigation application rate from 1ML per hectare under the Water Allocation Plan A2. Increasing the support to current (and new) water users in the Clare Valley A3. Additional marketing and branding to increase the sale price for wine (and grapes) from the Clare Valley A4. Increasing the simplicity, flexibility and understanding of water trading A5. Increasing the certainty and transparency of pricing frameworks of existing water products A6. Improving the access to and flexibility of groundwater entitlements	B1. Purchasing capacity in SA Water's potable water storages (e.g., Upper Wakefield Reservoir) B2. Using underutilised dams for storage between growers B3. An on-farm infrastructure program to support and winter water and summer nights water	C1. Expanding the Clare Community Wastewater Management System (CWMS) C2. Developing community storage/s to support delivery during peak periods C3. Extending the reach of the Clare Valley Water Supply Scheme (CVWSS) distribution network C4. Increasing the delivery capacity of existing CVWSS distribution network C5. Utilising the current operating capacity of Bundaleer Dam	D1. Local stormwater system D2. Treated water from Bolivar wastewater treatment plant (WWTP) D3. Treated water from Glenelg WWTP D4. New pipeline from River Murray D5. Returning the capacity of Bundaleer Dam and supplement storage from River Murray D6. A new direct offtake from the Morgan-Whyalla pipeline
Key: Less than 1 GL of additional water Between 1 GL to 3 GL of additional water Greater than 3 GL of additional water			

There are 8 infrastructure options, in two categories as shown in Table 1.

Table 1 Infrastructure options long-list

Improve existing infrastructure	New infrastructure
Community storage to take advantage of winter water/lowest-cost available delivery from CVWSS.	Standalone raw water network for Clare Valley supplied by Morgan-Whyalla pipeline (incl. storage).
Increase capacity (flow rates and volumes) of CVWSS network (incl. new potable water storage).	Dam safety upgrade for Bundaleer Dam, water from Morgan-Whyalla pipeline plus raw water network.
Extend the CVWSS network to new customers.	River Murray to Clare Valley pipeline (incl. delivery to Barossa and Eden valleys).
Current capacity of Bundaleer Dam with natural inflows, supplemented from Morgan-Whyalla pipeline. Add a raw water network within Clare Valley.	Bolivar (or Glenelg) Wastewater Treatment Plant (WWTP) + desalination – recycled water transport and distribution in Clare Valley (incl. south only or the whole Clare Valley network).

KBR developed the Round 1 demand assessment information for prospective customers based on the above infrastructure options, water trading values elsewhere, historical capital prices paid in Clare Valley, and an early estimate of capital costs, funding scenarios and operating costs. The expression of interest form sent to potential customers sought customer demand at a range of capital prices and annual charges.

ENGINEERING SOLUTIONS – TWO PREFERRED OPTIONS

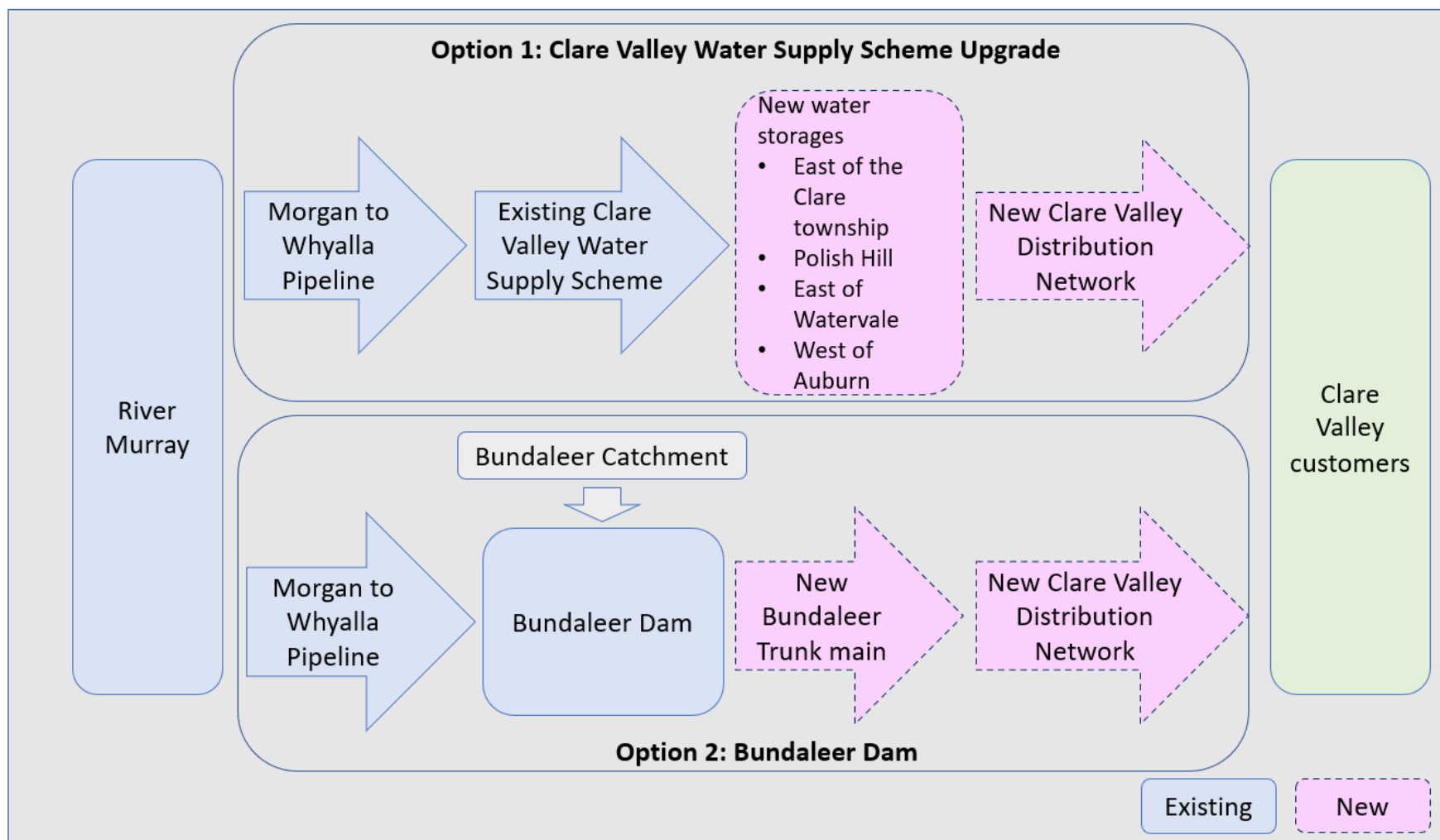
After extensive, multifaceted analysis, the PBC has whittled the options long-list down to two preferred infrastructure options. These two options have elements in common (see Table 2 and Figure 8).

Table 2 Clare Valley shortlisted options – design and demand details

	Option 1 – Augmented CVWSS	Option 2 – Bundaleer Dam & augmented CVWSS
Water source	CVWSS	Bundaleer Dam
Customer demand (ML/year)	3,000	3,000
Number of property outlets	102	102
Length of pipeline (km)	107	155
Number of pump stations	4	1
Total pump station size (kW)	78	1,762
Number of storages	4	1
Storage volume (ML)	2,200	100
Guaranteed pressure at customer connection (m)	10	10

These options have been developed having regard to demand expressed in Round 1. The network design (preliminary only) supplies water to as many of the customers, and meets as much of their expressed demand, as possible. The infrastructure can be funded affordably, and annual charges will be similar to the current cost of water and arguably be affordable. Outer-lying customers that were excluded due to high infrastructure costs will be engaged in further talks in order to seek cost-effective solutions where practical. The proposed networks were modelled using WaterGEMS software to assess hydraulic and operational performance.

Figure 8 Two preferred infrastructure solutions for further investigation in Stage 1 of the detailed business case



In addition, selected complementary non-infrastructure solutions from the options longlist (Figure 7 further above) should proceed as part of the proposed detailed business case.

DEMAND ASSESSMENT METHOD

Customer capital price

A customer capital contribution demonstrates 'skin in the game' and can attract government capital funding. The Round 1 demand assessment tested three capital price options (Table 3).

Table 3 Round 1 capital prices (subject to change)

Customer capital price scenario	Initial deposit – Year 1 (\$/ML)	Annual capital infrastructure charge – Year 2 + (\$/ML)	No. of annual payments	Total customer capital price (\$/ML)
Low	1,000	1,000	4	4,000
Medium	1,000	1,000	7	7,000
High *	1,000	1,000	10	10,000

* For comparison, the customer capital price for the Barossa New Water detailed business case is \$10,000/ML.

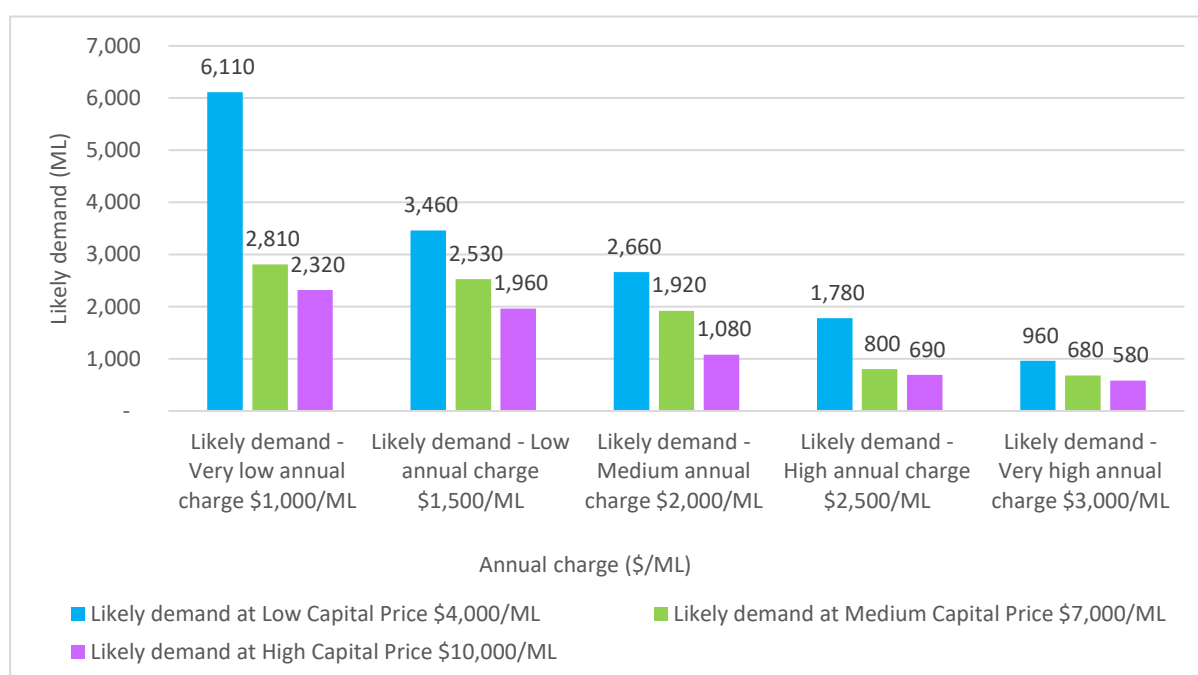
Customer annual charges

Consistent with National Water Initiative pricing principles, customers pay 100% of scheme operating costs via annual charges. The supply option was unknown at the time of the demand assessment and customers were informed that annual charges had therefore not been costed. Indicative Round 1 annual charges ranged from \$1,000 to \$3,000/ML over five intervals. The respondent was asked to provide minimum, likely and maximum future demand at each combination of annual charge and capital price. They were also asked to distinguish between the volume of water required for substituting existing sources and the volume for growth in demand.

DEMAND ASSESSMENT RESULTS

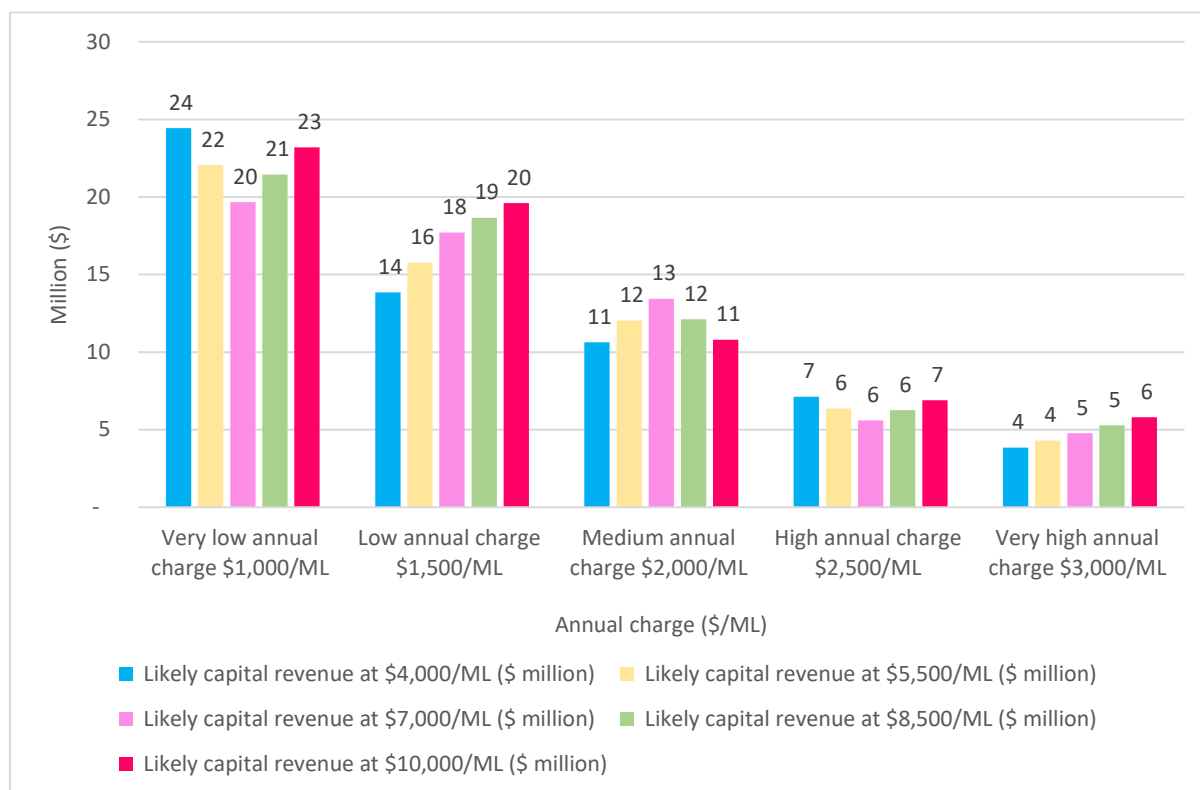
There is a strong case for a detailed business case to proceed, based on the volume and the number of customers that expressed demand at a range of prices (Figure 9). The demonstrated willingness to pay and scale of volume lends itself to a coordinated regional project, rather than individual properties implementing stand-alone solutions.

Figure 9 Likely demand at different capital prices and annual charges (ML)



Moreover, all 75 prospective customers have expressed a willingness to make a material contribution to both the capital and operating costs of the project (Figure 10). Customers will pay a capital contribution towards construction costs and will pay 100% of ongoing scheme costs.

Figure 10 Customer capital revenue at different prices (\$ million)



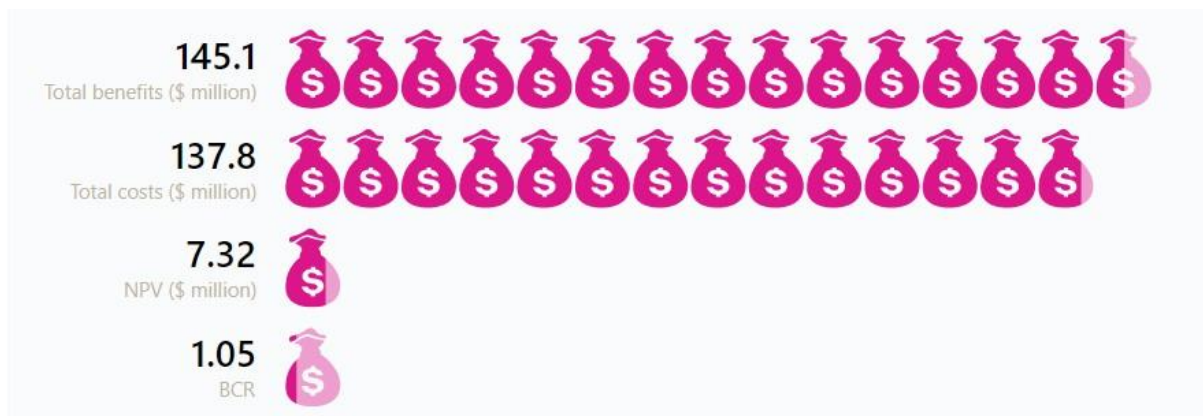
Over the life of the project, customers pay the majority of the project's costs through their capital contribution and all ongoing operating costs. The important role of government, however, is to significantly fund the project's capital costs, to unlock the economic and employment benefits of the project.

DIRECT ECONOMIC COSTS AND BENEFITS

Wine production across the state represents 10–15% of South Australia's exports by dollar value, making the grape and wine industry a very significant asset, worthy of future-proofing and further investment.

There is an opportunity for government to progress a modest investment in that asset in the Clare Valley, where a critical input and constraining factor in the valley – water – has been identified. Options identified during this PBC have demonstrated economic viability, justifying further government investment.

KBR has assessed the economic costs and benefits of two preferred infrastructure options (Figure 11 and Figure 12).

Figure 11 Economic benefits and costs of Option 1: Augmented CVWSS**Figure 12** Economic benefits and costs of Option 2: Bundaleer Dam/Augmented CVWSS

The benefit cost ratio (BCR) of Option 1 (1.18) is slightly more favourable than the BCR of Option 2 (1.05), making it a frontrunner. However, given the relatively preliminary nature of the engineering costings for both options – and each option’s subtle but noteworthy differences – further detailed investigations are required for government to choose one as a reference project.

Should the Chinese Government remove or reduce tariffs in future, that would likely substantially increase the value the project will create. The project’s economic benefits may thus prove to be understated, over time if this were to eventuate.

INDIRECT ECONOMIC BENEFITS – EMPLOYMENT OPPORTUNITIES CREATED BY THE OPTIONS

Figure 13 and Figure 14 set out the employment benefits of the two options. The point of difference is the number of construction jobs.

Figure 13 Option 1 – job summary (incl. ongoing and construction Full-time equivalent (FTEs))

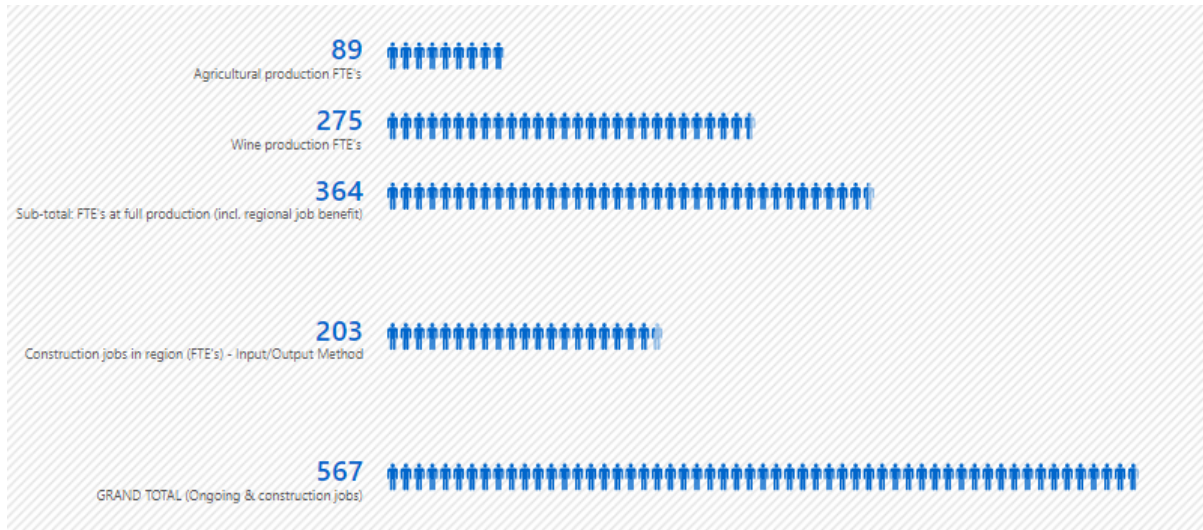


Figure 14 Option 2 – job summary (incl. ongoing and construction FTEs)



Both options will create around 360 ongoing FTE jobs in agriculture and wine production. Option 1 and 2 will create 200 or 300 construction jobs, respectively. Both will create around 560 to 660 full-time jobs.

CONSIDERATION OF OTHER INFRASTRUCTURE OPTIONS

During the initial options shortlisting process, the upgrade of the CVWSS and the Bundaleer Dam options were identified as the leading two options. This assessment was predominantly based on affordability for customers, funding scenarios, and economic criteria. Further analysis was undertaken in these two preferred options which is outlined in the above sections of this executive summary.

Additional stakeholder engagement was undertaken following the completion the initial shortlisting process and the additional analysis. Feedback was received advocating for two other long-list options to come under further consideration as part of the detailed business case, specifically:

- A lower cost augmentation of the CVWSS.
- A climate-independent recycled water solution.

The CVWSS upgrade considered in the PBC is a simple approach which has focused on developing four community storages and a new non-potable delivery network. This option could be a conservative approach when estimating the capital and operating costs of an upgrade of the CVWSS. There could be several elements which may reduce the capital and operating costs of an upgrade with further investigation, including consultation with industry and SA Water.

Elements which may reduce capital and operating costs of an upgrade include:

- Augmentation of the existing CVWSS potable delivery network to increase capacity to meet customers' irrigation requirements during peak delivery periods.
- Extension of the existing CVWSS potable delivery network to those potential customers who are not currently connected.
- Incentives for the private construction of on-farm storage to increase customers' capacity to receive water during off-peak periods.

Notwithstanding, the option as it is currently presented delivers a positive economic case which would only be improved with lower capital and operating costs.

A climate-independent solution based on recycled water from the Bolivar WWTP was identified for further investigations as part of the initial long-list option screening. The assessment of this option identified several challenges around capex and opex affordability for Clare Valley water users.

However, there is a strategic position to include this option on the short-list for further investigation as part of a detailed business case based on several factors, including:

- A strong community preference for a climate-independent source for the region's long-term sustainability and viability. This was demonstrated through industry's responses in the Round 1 demand assessment process.
- The potential for increased demand over 3 GL for water in the Clare Valley with a climate-independent source.
- The potential for the Barossa New Water project (supplying recycled water to the Barossa and Eden valleys) to grow in capacity and/or reduce initial cost estimates, to provide an affordable climate-independent solution for the Clare Valley.

This engagement with stakeholders led to the lower cost augmentation of the CVWSS and a climate-independent recycled water option being discussed further and being recommended to be considered as part of a future detailed business case.

RISK

The focus of this risk summary is the risk relating to our recommendation that this project proceed (Table 4). A further comprehensive risk assessment of other aspects of the project is in Section 7.

The grape and wine industry and other businesses in the valley face several limitations on water supply that could be addressed by a detailed business case and its outcomes, which would avoid the current and ongoing economic and financial detriment borne by the community.

The Clare Valley is a major wine-producing area in South Australia, but its annual production is volatile, due to a lack of security of affordable water and constrained existing distribution options. Production and investment are also curbed by the high cost of water relative to other wine-growing areas and by low profitability.

There is a perception by landowners that only 1 ML per hectare of irrigation water can be applied. This low application rate makes agricultural production vulnerable to prolonged drought as soil moisture plummets, leading to severely reduced output by the second or third year of a drought, as recently occurred in the valley.

KBR has assessed the economic costs and benefits of two preferred infrastructure options. Both options are promising with the benefits exceeding the costs of both options ($BCR > 1$) which is not always achieved with large-scale water infrastructure project. However, both options require further work. Stage 1 of the proposed detailed business case would examine them in detail – investigating and mitigating key risks to government

and customer-investors – and the best option would be chosen as the reference project for Stage 2. Once given the green light, preconstruction activities could proceed, with a view to start construction in 2024.

Table 4 Key risks relating to next steps – drive recommendations of the preliminary business case

Risk	Post-control rating
Project inaction – not doing something to meet community/prospective customers' service needs and demand. The Clare Valley economy continues to decline/there are further departures of large wine corporations / ongoing forgone investment.	High (22)
Incorrect DBC proponent – the absence of a community-based DBC proponent. The lack of a trusted project champion in the project area will jeopardise the success.	High (18)
Unaffordable charges – the annual water supply charge becoming unaffordable for customers. It is necessary to place downward pressure on annual charges with customer-investors at the heart of the DBC. The scope of the DBC needs to allow high-confidence capital and operating cost estimates to be developed.	High (18)
Insufficient customer demand – the Round 1 demand provides moderate confidence at range of prices. Governance informs demand certainty. More work is needed to secure demand – the DBC must develop governance and an operating model, engineering attributes of scheme, water products and prices to inform Round 2 demand assessment, which will increase confidence in private sector investment.	High (18)
Unaffordable capital investment required by government – if the wrong project is constructed or capital costs are higher than expected. Requires a cost-conscious DBC proponent with irrigation experience. There is the risk that if geotechnical field investigations are delayed until after the DBC, they could reveal worse than expected conditions (capital cost 'blowout'). The DBC scope should properly fund geotechnical investigations throughout network.	High (18)
Insufficient DBC funding – The Australian Government does not provide adequate funding for the Clare Valley Water DBC. Without proper funding, the project cannot proceed and, for example, SA Water is not able to make the Clare Valley Water project a high priority.	High (18)
Inadequate governance and scale of scheme – risk of not creating an efficient operating model; that is, relatively modest demand volumes does not provide the scale to affordable fund appropriate scheme governance and operational support. After the DBC, SA Water is likely to be critical to engineering and delivery.	High (18)
Lack of an appropriate DBC prior to project proceeding – The project proceeds without a DBC/does not secure Australian Government grant funding. This would adversely impact affordability to government and customers and reduces volume and certainty of customer demand. May make it difficult to meet the demonstrated service needs, problems and opportunities.	High (18)

KEY FINDINGS

In summary, the PBC provides a robust body of evidence to progress the project to a detailed business case – the next phase of investigations.

The project is vital to improve the availability and security of water to underpin the important wine and grape growing industries in one of Australia's premium wine regions. This improvement to the region's water supply will smooth out the boom–bust burden that recent droughts (2018, 2019) have imposed in the Clare Valley. This will allow consistent production of 31,500 tonnes of grapes annually and increase investment to secure the valley's viable future through unlocking new employment, tourism and community wellbeing opportunities.

Businesses have demonstrated their strong support the project expressing demand for above 6 GL of additional water. However, around 3 GL of demand is more likely when pricing and potential funding scenarios and their impacts on customer affordability are considered.

Four infrastructure options have been recommended to be progressed with further investigations – the CVWSS upgrade, the Bundaleer Dam, a climate-independent recycled water solution and a lower cost

augmentation of the CVWSS. These options should be considered alongside the identified non-infrastructure solutions, such as improved water trading arrangements and increasing the support for existing and new water users, in the detailed business case.

The CVWSS upgrade and the Bundaleer Dam options have been examined further as part of this preliminary business case. This assessment demonstrates that they are economically viable and will provide significant regional employment opportunities. Both options will create around 560 to 660 full-time on-going and construction jobs.

A climate-independent recycled water solution and a lower cost augmentation of the CVWSS have been advocated by stakeholders for further investigation.

Prior to finalising the options to be considered as part of the detailed business case, a review of key considerations impacting the four options is recommended, including:

- The current status and indicative cost estimates of the Barossa New Water project and the opportunity for a climate-independent solution for the Clare Valley to be incorporated.
- A detailed review of the Round 1 demand assessment and the current design and delivery requirements of the CVWSS with SA Water and investigate where additional demand can be serviced through the current CVWSS delivery network or through minor network augmentations.
- A review of the hydrology of Bundaleer Dam to understand the available inflow into the storage for the project.

As with the vast majority of irrigation projects, the challenge is the affordability of up-front, one-off capital and on-going annual customer charges. This is particularly the case in the Clare Valley where the region is located a significant distance away from potential water sources (e.g. the River Murray and recycled water options in greater Adelaide), increasing the cost of moving the water to Clare Valley water users and placing additional pressure on their annual charges.

The affordability and willingness to pay for additional water was tested in detail in the preliminary business case. This analysis should be built upon during the detailed business case with a further demand assessment to increase certainty of demand and funding scenarios, including the quantum of government investment to meet the expected shortfall between customer capital contributions and the capital expenditure of the project.

No showstoppers or technical fatal flaws have been identified through the initial engineering design process. Further detailed engineering design effort – along with social, sustainability, environmental and cultural heritage assessments – is required as part of a detailed business case to verify findings.

Facilitating engagement with local community during the development of the detailed business case is essential for the success of the detailed business case and the project. The CVWGA will play a critical role in coordinating the regional input from local water users and other regional bodies, including Regional Development Australia (Yorke and Mid North), local council and the Northern and Yorke Landscape Board. Therefore, it is vital the CVWGA are actively involved in the delivery of the detailed business case to develop and maintain community trust in the project and ensure customer-investors are considered in the identification and development of an affordable solution.

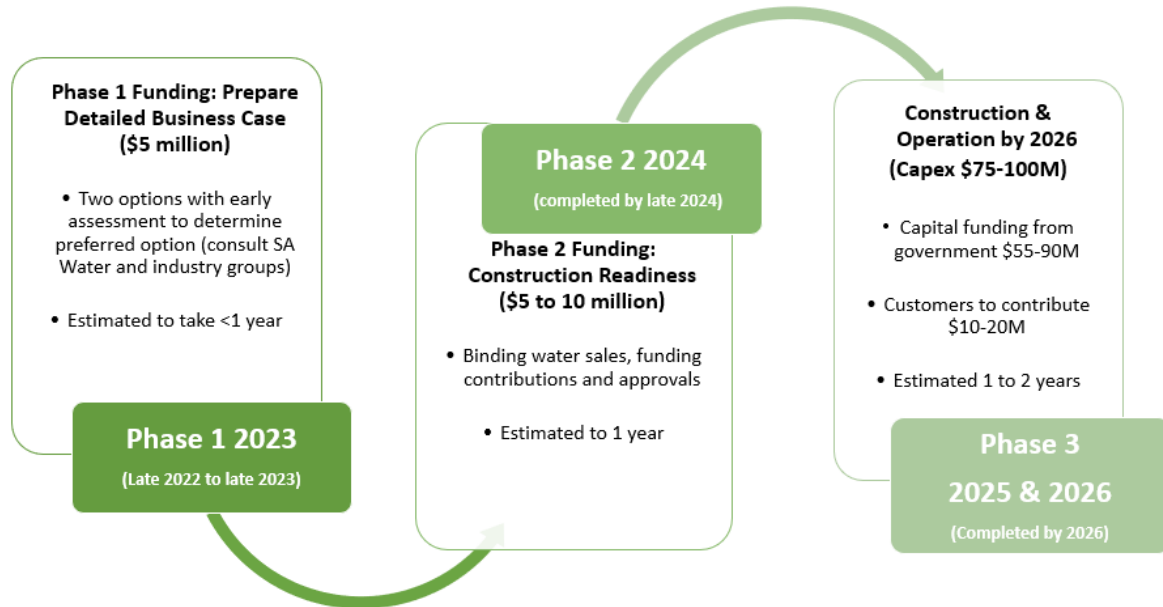
Furthermore, SA Water, as a significant infrastructure owner and operator in the region, is an important and essential stakeholder in the detailed business case. In particular, SA Water would be well placed to construct and/or operate options that involve augmenting the capacity or reach of the CVWSS.

The budget of \$5 million for the detailed business case is estimated based on experience from similar projects throughout Australia and should be funded from the National Water Grid Fund. It is acknowledged that a detailed cost estimate will be developed upon a formal funding application being submitted.

NEXT STEPS AND DETAILED BUSINESS CASE BUDGET

The next step for this project is to secure the funding for the detailed business case from the Australian Government. If the detailed business case succeeds, it will move to construction readiness (\$5 to \$10 million) and then construction, to be funded by customers and government (Figure 15).

Figure 15 Next steps for the Clare Valley Water project



As outlined above, new water could be delivered as early as 2026 to immediately commence addressing the problems and opportunities identified in this PBC for the project.

Section A – Strategic Context

1 Proposal context

1.1 NATURE OF PROPOSAL

The Clare Valley Water PBC has investigated options for affordable, reliable, long-term and sustainable water supply to meet the water demand of Clare Valley primary producers.

Broadly, the Clare Valley Water project aims to develop a scheme that will:

- increase reliability and overall productivity of the Clare Valley primary industries
- provide climate resilience
- support regional economic growth
- improve utilisation and efficiency of existing infrastructure
- allow irrigators to make informed, long-term investment decisions within the region
- encourage industry growth, providing enhanced employment opportunities.

The PBC has identified a longlist of options, selected a shortlist and undertaken a preliminary assessment on the shortlisted options.

Furthermore, the PBC has:

- confirmed the case for change and the investment need
- identified benefits, objectives, outcomes and solution requirements
- strategically considered the longlist of options and narrowed it to a shortlist
- assessed at a high level the shortlist of options against a range of criteria
- identified the option to progress to detailed business case stage for detailed analysis
- provided preliminary considerations regarding the delivery and management of solutions
- provided a clear case for further investment to consider the initiative.

1.2 STRATEGIC POSITION

The PBC aligns with the priorities and strategic plans of the South Australian Government and other organisations including the CVWGA.

1.2.1 Department of Primary Industries and Regions (PIRSA) Strategic Plan and Food, Wine and Agribusiness Growth State Plan

The vision of the South Australian Government's PIRSA and Region's Strategic Plan 2021–25 is to 'advance the prosperity and sustainability of South Australia's primary industries and the liveability of regional communities'.

This is to be achieved by stimulating 'the value growth of South Australia's primary industries while protecting and sustaining the resources that underpin them, thereby building stronger regional communities'.

The overarching strategic plan is the delivery of the Food, Wine and Agribusiness Growth State Plan which sets an ambitious target for this sector to contribute revenue of \$23 billion to the South Australian economy by 2030. This PBC aligns with the objective to grow the productive capacity of viticulture and other agriculture, including in the Clare Valley.

A related objective of the strategic plan is to reset the operating environment with a focus on addressing blockers to growth such as regulation, compliance and bureaucracy, and access to critical infrastructure. The PBC options long-list will include consideration of regulatory and compliance options that may improve the efficiency and effectiveness of existing and new water supplies. The provision of new water infrastructure will provide greater access to critical water infrastructure for the Clare Valley.

1.2.2 20-Year State Infrastructure Strategy

The 20-year State Infrastructure Strategy uses the South Australian Government's long-term goal of increasing the rate of economic growth to an average 3% per year as the cornerstone and, with Infrastructure SA (ISA), is focused on identifying investments that will best spur investment and growth and lift prosperity for all South Australians.

The proposed water supply options for the Clare Valley will focus on options that provide water supply to strengthen and potentially grow the agricultural supply of the region, generating economic prosperity.

The strategy also states that there is strong value in facilitating and encouraging private sector investment for new infrastructure including the development of infrastructure for water supply. A core element of this PBC is to determine the potential upfront and ongoing contributions from customers for new water infrastructure for the Clare Valley.

1.2.3 Clare Valley Wine and Grape Association 2018-23 Strategic Plan

CVWGA's 2018-23 strategic plan identified six domains to delivering its purpose which is to ensure the prosperity and sustainability of its member businesses and the Clare Valley community⁵. These domains are:



The key objective of the water domain is to deliver a secure, long-term sustainable and affordable water resource for Clare Valley grape growing.

1.2.4 Northern and Yorke Regional Landscape Plan 2021–26

The Northern and Yorke's Regional Landscape Plan provides direction on how the land, water, biodiversity, and marine and coastal environments are managed in the region. It was developed in consultation with the community and key stakeholders and encourages people to work together to protect and enhance our natural ecosystems while sustaining the region's primary production, local economies, and social and community wellbeing.

The changing climate presents several challenges to the region. The Northern and Yorke Landscape Board is committed to working with its community to respond by supporting strategies for adapting to the changes, mitigating the impacts and increasing regional resilience.

The plan's goal for water management focuses on collaborative land management practices that protect watercourses, permanent pools, water use, groundwater, cultural water, environmental flows, water-dependent ecosystems, river red gums, saline wetlands and lakes. Key focus areas are to:

- sustainably manage the region's prescribed water resources
- protect and rehabilitate watercourses and wetlands
- promote the sustainable use of water for environmental, cultural, social and industry outcomes.

⁵ CVWGA 2018-23 Strategic Plan, https://clarevalleywine.com.au/images/news/CVWGA_Strategic_Plan_2018_-_2023.pdf

1.2.5 Water Security Statement 2022

The South Australian Government's 2022 Water Security Statement seeks to meet the water planning requirements of the *Water Industry Act 2012*. The statement includes an overview of South Australia's water supplies and demands and its strategic priorities for ensuring long-term water security.

The statement includes 10 state-level strategic priorities that are enabling and will contribute to enhancing water security and meeting the state's growth targets (Figure 16). The priorities have been developed in consultation with stakeholders, and five of the ten specifically relate to this investigation into new infrastructure in the Clare Valley.

Figure 16 South Australian Government's 2022 Water Security Statement strategic priorities

Climate resilience

- Investing in understanding climate impacts to support adaptive decision-making and increase resilience.

Water as an enabler of sustainable growth

- In partnership with key stakeholders, developing targeted water security strategies for key water resources, communities and industries.

Ecologically sustainable water resource management

- Ensuring water resource management is ecologically sustainable and that water allocation plans are updated within timeframes that reflect statutory requirements and risks to users and water resources.

Provision of critical human water needs

- Ensuring that the critical human water needs of all South Australians are able to be met, including in remote communities.

Murray–Darling Basin Plan

- Continuing to drive full implementation of the Murray–Darling Basin Plan to achieve a healthy River Murray, to meet critical human water needs for over 90% of South Australians, maintain vibrant river communities, meet the aspirations of First Nations peoples, and sustain internationally important floodplains and wetlands.

Aboriginal water interests

- Ensuring First Nations have equitable access to water resources for cultural purposes, including economic purposes.

Integrated urban water management

- Developing and implementing an Urban Water Directions Statement that sets a framework for optimising the use of all urban water sources in a way that supports growth, greening and liveable towns and cities; efficient and cost-effective water use; and the release of recycled water for productive use outside urban areas.

Innovation and competition in the water industry

- Implementing the recommendations of the 2021 review of the Water Industry Act 2012 to drive innovation and competition in the water industry.

Data, analytics and insights for the digital water future

- Investing in data management, analytics and decision support tools to efficiently monitor and manage emerging water risks and opportunities, increase transparency and support timely decisionmaking.

Growing the South Australian water sector

- Working with the South Australian water sector, including water retailers and the research, innovation and education sectors, to build the state's capacity to respond to future water challenges across the economy and capture a greater share of an expanding global market for water technologies and services.

1.3 GOVERNMENT INVOLVEMENT

PIRSA has partnered with the CVWGA and other government agencies and organisations including the Department of Treasury and Finance (DTF), the Department for Environment and Water (DEW), Infrastructure South Australia (ISA) and SA Water, to investigate water supply and delivery options that would provide security for existing and new Clare Valley water users and address unmet demand.

1.4 PROPOSAL GOVERNANCE

Governance for the proposal includes:

- Project Reference Group (PRG)
- ISA gateway approvals process.

1.4.1 Project Reference Group

A cross-agency PRG has been established to coordinate the planning and preparatory work required. It comprises representatives from PIRSA, CVWGA, SA Water, DEW, DTF and ISA, supported by commercial, legal, technical and probity advisors, as required.

To support the CVWGA with the project, two local industry groups have been established by the CVWGA and as part of Probity and Communications Protocol document:

- Advisory Group, comprising of:
 - Chair, CVWGA
 - CEO, Clare and Gilbert Valleys Council
 - CEO, Northern Areas Council
 - Economic & Workforce Manager, Regional Development Australia Yorke & Mid North
 - Regional Manager, Northern & Yorke Landscape Board.
- Working Party, comprising of members of the CVWGA water sub-committee and other water users as required. This group was not activated during the development of the PBC.

1.4.2 ISA gateway approvals process

The key approvals process for the PBC is the ISA gateway approval process. The approvals process is shown in Table 5. This PBC will involve review of Gateway 1: Options Analysis.

Table 5 ISA gateway approvals

Gate	Description
Gate 1: Options Analysis	This review occurs once the options analysis phase is 95–100% complete. It investigates the following: How well the project/program has analysed a range of options to meet the service need and maximise benefits at optimal cost. How well the project/program is performing against the five key focus areas. Whether the proposed way forward is achievable and will successfully support the business case
Gate 2: Business Case	This review occurs once the business case phase is 95–100% complete and prior to an investment decision by Cabinet and any other funding partners. It investigates the following: How well the project/program has proven that the recommended option best meets the service need and maximises benefits at optimal cost. How well the project/program is performing against the five key focus areas. If the project/program is ready for an investment decision by Cabinet

Gate	Description
Gate 3: Procurement Review	This review occurs after the investment decision by Cabinet and prior to the main works procurement activity/phase. Undertaking the review before or after the release of an Expression of Interest/Registration of Interest will be determined on a project-by-project basis. ISA may also undertake a Health Check following evaluation and negotiation and prior to contract(s) award. It investigates the following: How well the project has developed a procurement and delivery approach to deliver the technical solution and realise the benefits outlined in the business case. How well the project/program is performing against the five key focus areas. If the project is ready to be released to market and delivered.

Source: ISA Assurance Framework.

There are two additional gateways – Gate 4: Service Readiness Review and Gate 5: Benefits Realisation Review – that occur prior to and post-project commencement.

1.5 STAKEHOLDER ENGAGEMENT AND INPUT

Engagement of project stakeholders — in particular, existing water users, potential customers, industry, and existing water providers in the region — has been at the centre of the PBC development. The findings are integrated throughout the PBC to help inform and support the service need, identifying and assessing the reference project, establishing impacts, implementation planning and managing risks.

Meeting the water requirements of potential customers has been the cornerstone of the options development and analysis. Appendix A and Appendix B outlines the extensive engagement with industry and potential customers through detailed demand assessment.

The CVWGA has assisted stakeholder engagement. It is the peak wine and grape industry body in the Clare Valley, which is a region dominated by small growers and winemakers.

The project's stakeholder engagement plan is included as Appendix B and documents the principles, approach and activities when involving those who have an interest in, or may be impacted by, during the development of the PBC.

Appendix B is the project's stakeholder engagement register and includes the engagement activities and provides a summary of the key findings.

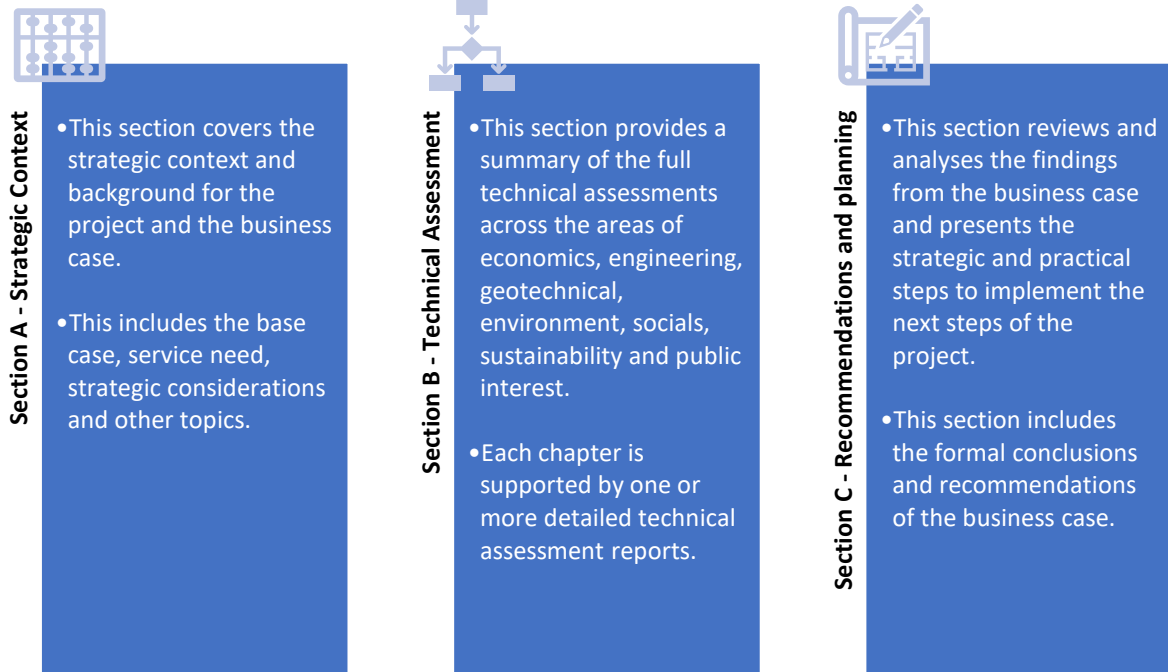
1.6 STRUCTURE OF THIS PRELIMINARY BUSINESS CASE

This PBC was prepared under the ISA Options Analysis template and in accordance with the Infrastructure Australia business case principles.

This PBC is divided into 3 core sections and is supported by a volume of appendices, which include technical assessments, strategic plans and registers.

The 3 core sections are shown in Figure 17.

Figure 17 Elements of the business case

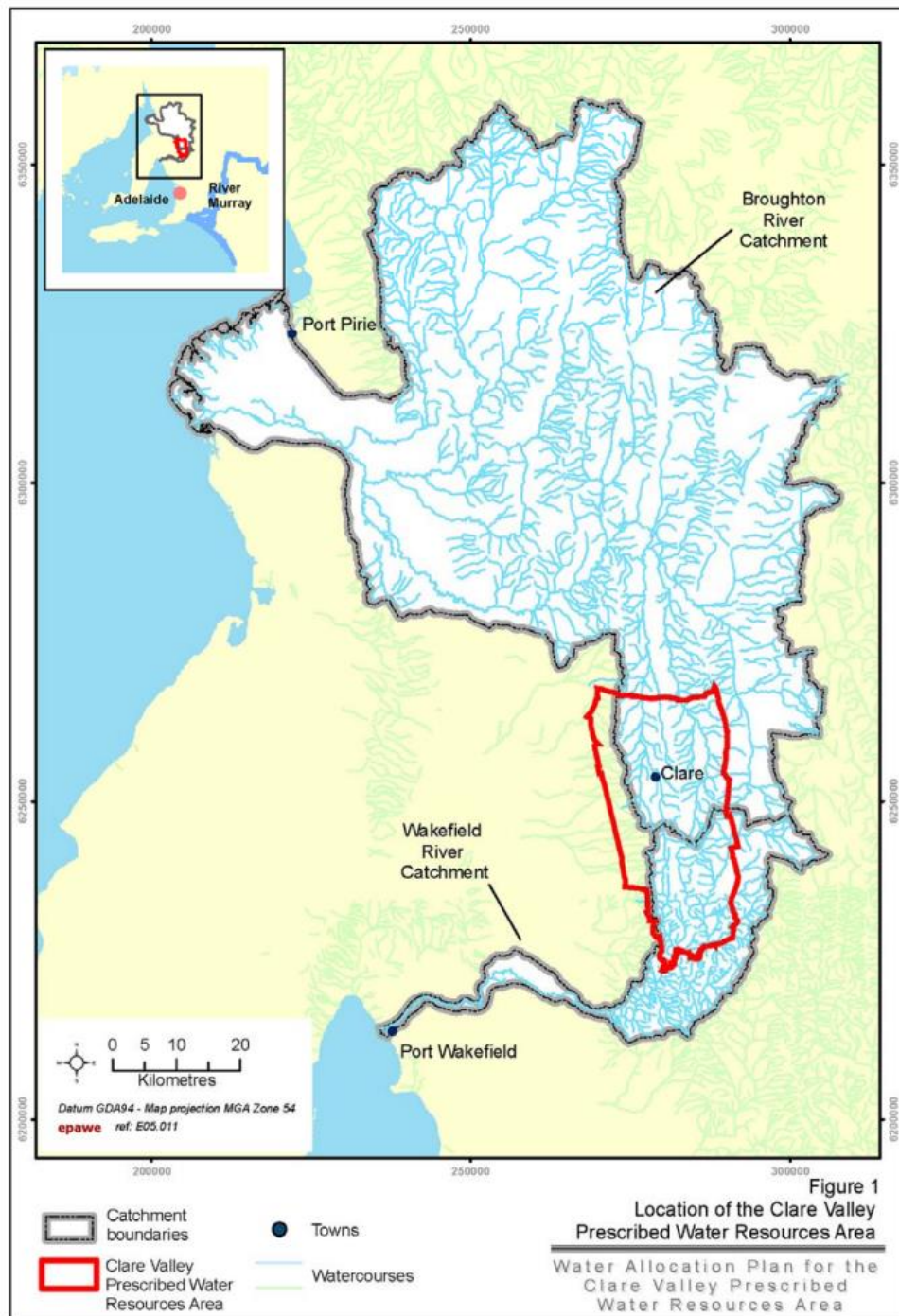


2 Case for change

2.1 CURRENT STATE

The Clare Valley is located north of Adelaide and straddles the Broughton River and Wakefield River catchment (Figure 18).

Figure 18 Clare Valley



Source: Clare Valley Prescribed Water Resources Area.

2.1.1 Agricultural production and the economy

The Clare Valley sits within the Barossa–Yorke–Mid North region of South Australia, which produced \$1.8 billion in agricultural production in 2018–19.⁶

Agricultural production and wine manufacturing are the largest employers in the Clare Valley and surrounding area (Table 6).

Table 6 Top 5 industries by employment – Clare and Gilbert Valleys

Employed people aged 15 years and over	Clare and Gilbert Valleys	%	South Australia	%	Australia	%
Wine and Other Alcoholic Beverage Manufacturing	269	6.6	5,746	0.8	14,651	0.1
Other Grain Growing	151	3.7	3,586	0.5	19,053	0.2
Primary Education	128	3.1	16,651	2.2	231,198	2.2
Grape Growing	109	2.7	2,697	0.4	6,278	0.1
Hospitals	109	2.7	30,463	4.1	411,808	3.9

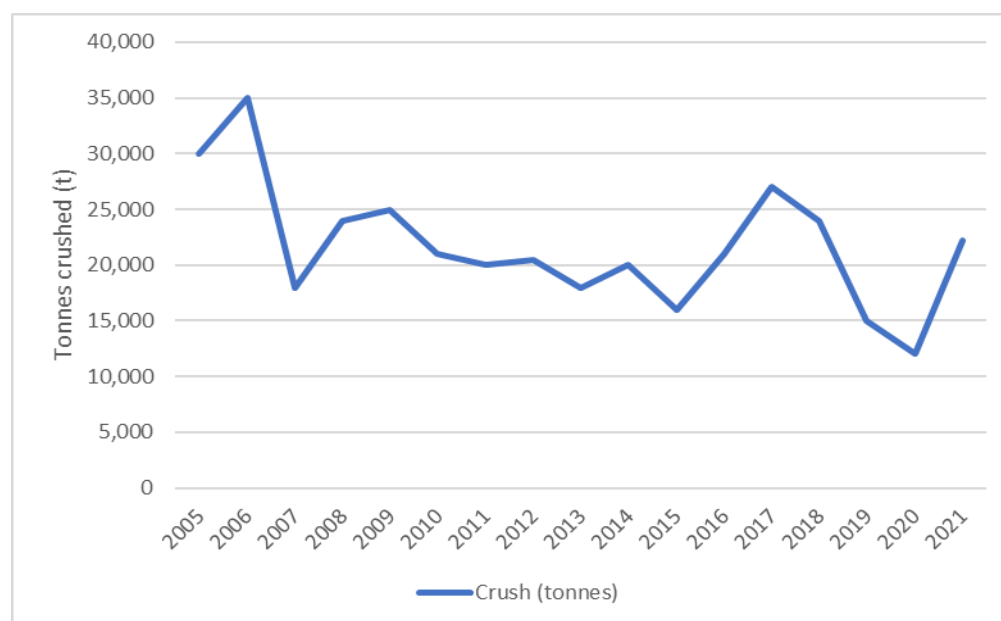
Source: ABS, 2016, Clare and Gilbert Valley.

In Clare and Gilbert Valleys Council, agriculture, forestry and fishing is the largest employer, generating 733 (15%) local jobs in 2020–21 – a decrease from 781 (16.4%) in 2019–20. In comparison, 3.8% are employed in this industry in South Australia.⁷

Grape production

The Clare Valley's grape production has averaged 21,000 tonnes over the last 15 years; however, volumes have been declining. The lowest vintage, 12,000 tonnes, was experienced in 2020 following very low rainfall in 2019 (Figure 19).

Figure 19 Clare Valley grape production



Source: Wine Australia, Regional Snapshot – Clare Valley.

⁶ ABARES, About my region – Barossa—Yorke—Mid North South Australia, <https://www.awe.gov.au/abares/research-topics/aboutmyregion/sa-barossa#agricultural-sector>

⁷ .idCommunity, RDA Yorke and Mid North Region economic profile, <https://economy.id.com.au/rda-yorke-mid-north/employment-by-industry?WebID=110&sEndYear=2020>

The key varieties of grapes produced in the Clare Valley are Shiraz, Riesling and Cabernet Sauvignon. The total value of grapes produced in 2021 was approximately \$38 million (Table 7).

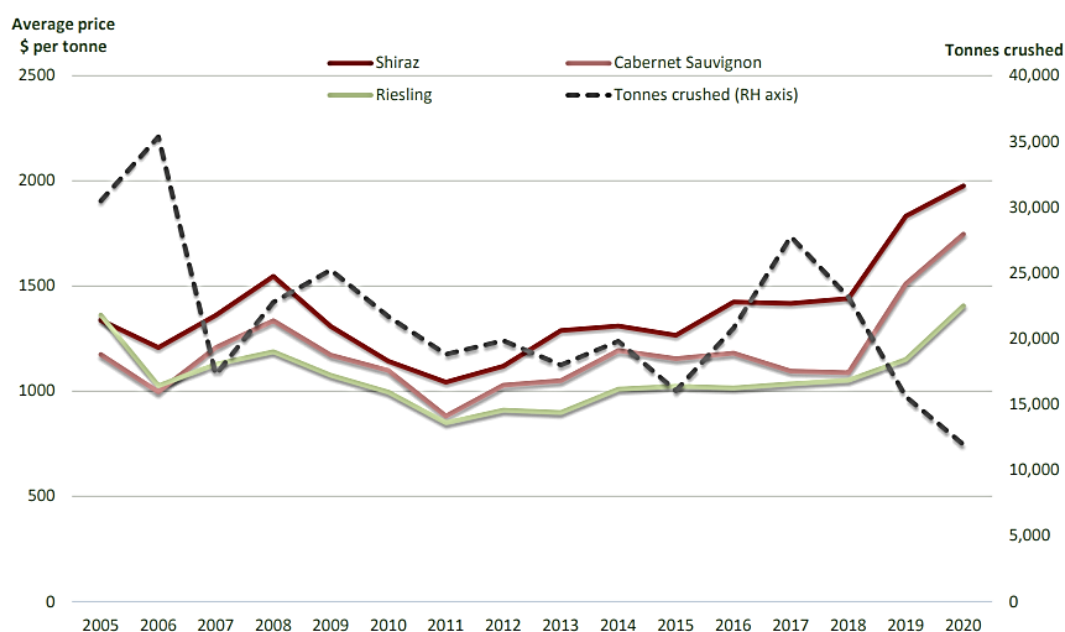
Table 7 Clare Valley grape production – 2021

Top four varieties	Share of tonnes	Av. price/tonne
Shiraz	38%	1,976
Riesling	22%	1,406
Cabernet Sauvignon	19%	1,747
Merlot	6%	1,076
Other	15%	1,551
Weighted average price	100%	1,689
Estimated value (\$ million)		38
Total vineyard area (ha)		5,093
Estimated tonnes crushed in 2021 (t)		22,266

Source: Wine Australia, Regional Snapshot – Clare Valley.

The wine grape prices have risen in recent years, with a relationship between lower production and high prices (Figure 20).

Figure 20 Volume of grapes produced and price relationship



Source: Wine Australia, Regional Snapshot – Clare Valley

This relationship is important when considering the potential price impacts of increasing supply of grapes.

Other agricultural production

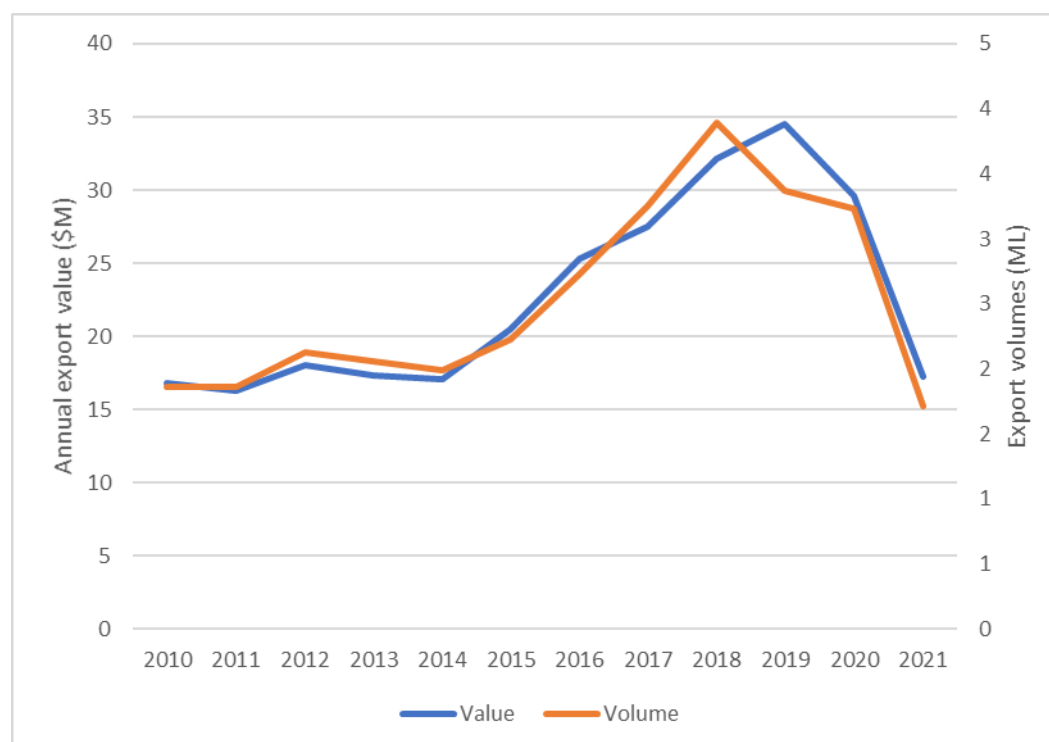
The Clare Valley also produces a range of other agricultural goods including grains and sheep (lambs and wool). The scale of the non-grape agricultural production will be determined as part of the Round 1 demand assessment.

2.1.2 Wine production

Wine prices have fluctuated over the last three years due to the introduction of a tariff on Australian wines by major international customer, China.

Wine Australia advised that price changes are likely to be ongoing due to the tariffs and residual impacts on consumer demand from Chinese consumers with a significant reduction in exports.

Figure 21 Wine exports by value and volume (Clare Valley)



Source: Wine Australia Export Dashboard

The volume of lower priced wine (less than \$20 per litre) has fallen substantially since 2019 (Table 8).

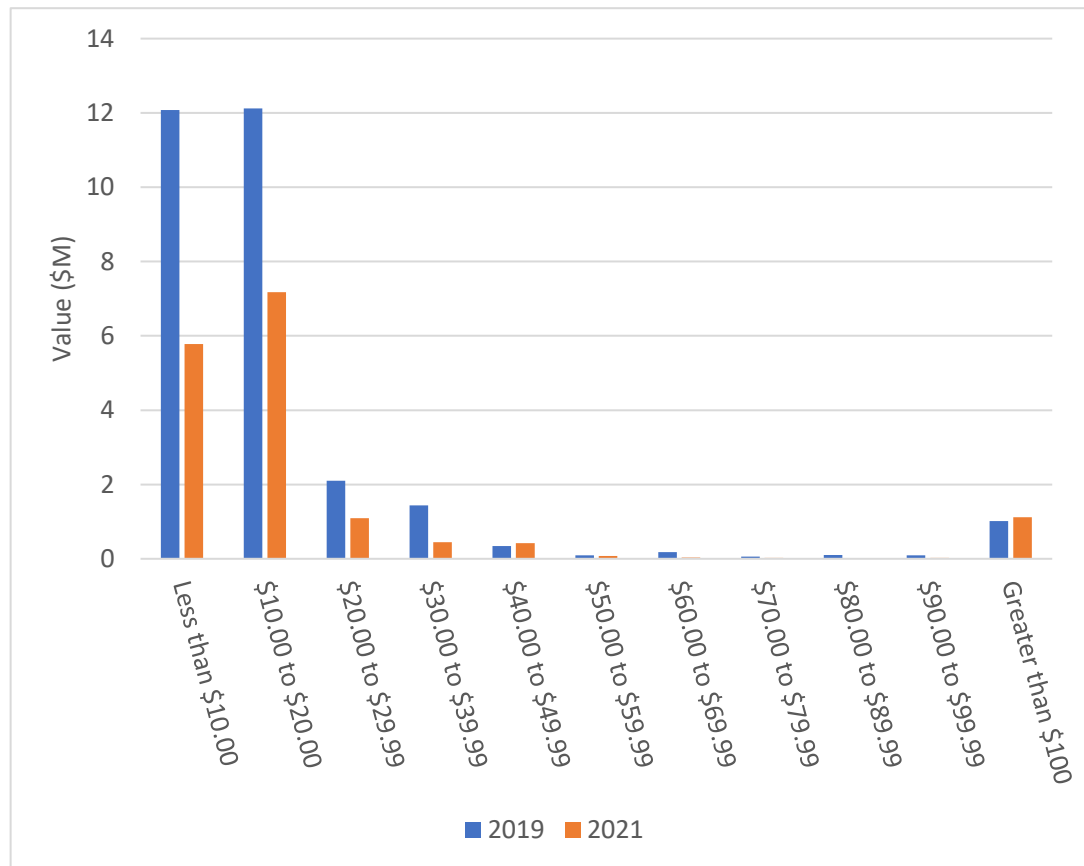
Table 8 Wine volumes by price segment

Price segment (per litre)	2019 (litres)	2021 (litres)
Less than \$10.00	2,415,475	1,156,816
\$10.00 to \$20.00	807,868	478,490
\$20.00 to \$29.99	84,080	43,763
\$30.00 to \$39.99	41,171	12,787
\$40.00 to \$49.99	7,556	9,266
\$50.00 to \$59.99	1,710	1,348
\$60.00 to \$69.99	2,777	511
\$70.00 to \$79.99	837	362
\$80.00 to \$89.99	1,175	45
\$90.00 to \$99.99	954	270
Greater than \$100	5,092	5,592
Total	3,368,693	1,709,248

Source: Wine Australia Export Dashboard.

However, the total value of wine has increased for the above \$100 per litre as shown in Figure 22.

Figure 22 Wine value by price segment



Source: Wine Australia Export Dashboard.

The volume-weighted average price for Clare Valley wine in 2021 was \$9.50 per litre.

2.1.3 Tourism

The Clare Valley has a strong ambition to grow its tourism economy. The CVWGA is seeking in its strategic plan to improve the tourism brand and build Clare Valley's image as a wine region gateway to the Flinders Ranges.

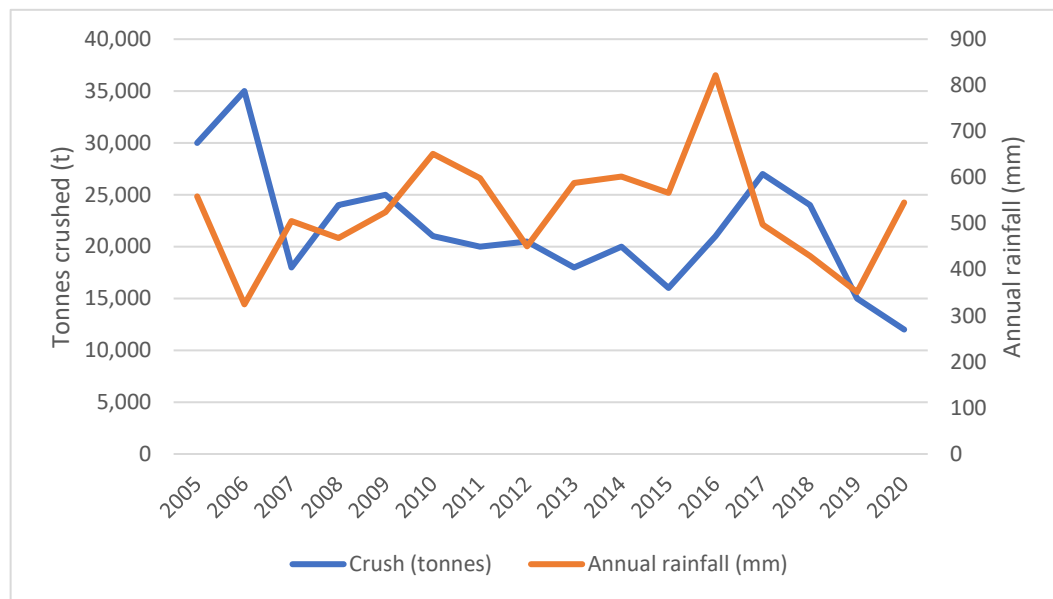
2.1.4 Riverine ecology

River ecology in the Clare Valley was noted in 2009 as being in 'very good' condition. However, persistent low streamflow and lack of groundwater as well as increasing salinity (discussed below) has impacted the river ecology. In addition, the Clare Valley contributes water to the Broughton and Wakefield rivers, so reduced streamflow in the Clare Valley results in lower flows in these rivers, with subsequent impacts on the ecology of these rivers.

2.2 DEMAND SITUATION

2.2.1 Current water demand

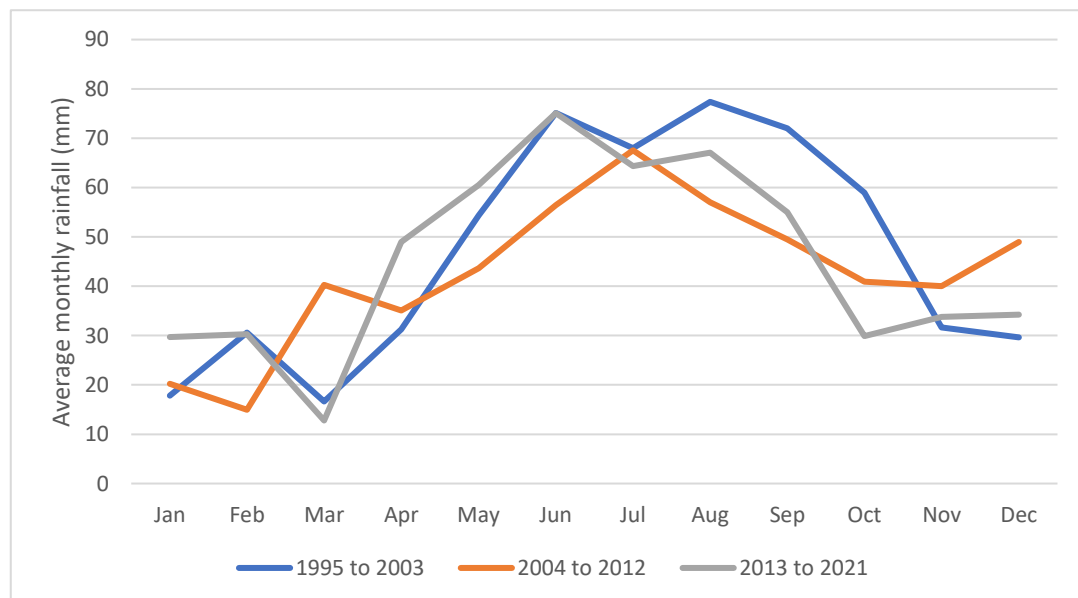
The major demand for water in the Clare Valley is for grape growing. Analysis of rainfall and grape production shows a strong relationship between annual rainfall and subsequent grape harvest (Figure 23).

Figure 23 Grape production and rainfall in Clare Valley

Source: Clare Valley, Wine Australia profile, BOM – Clare Valley School station.

Rainfall during this period was volatile with lower rainfall leading to lower crush production in the following year.

An assessment of monthly rainfall patterns suggests that the distribution of rainfall across the months of the year has shifted. In particular, the amount of rainfall during early spring (August to September) has materially reduced over the last 16 years (Figure 24).

Figure 24 Monthly rainfall average in Clare Valley

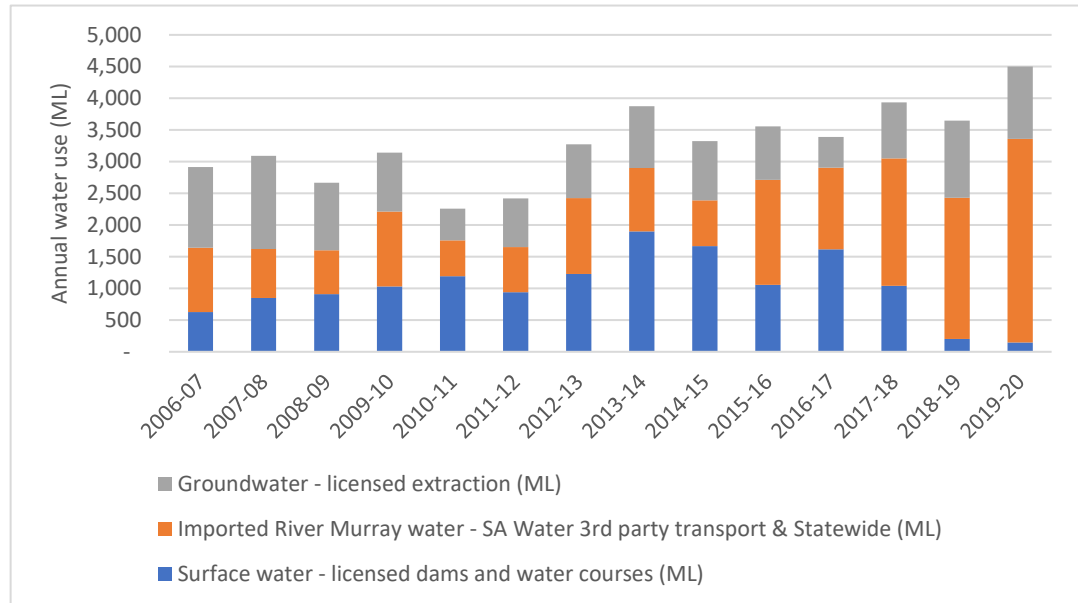
Source: BOM – Clare Valley School station <http://www.bom.gov.au/products/IDS60801/IDS60801.95667.shtml>.

Water sources available to Clare Valley growers are:

- surface water
- ground water
- imported River Murray water (3 products distributed via the CVWSS).

Water use for consumptive purposes was 5,177 ML in 2019–20, which includes 3,211 ML imported from the River Murray. Figure 25 shows the breakdown of consumptive use by sources (excluding 675 ML assumed to be consumed by stock and domestic).

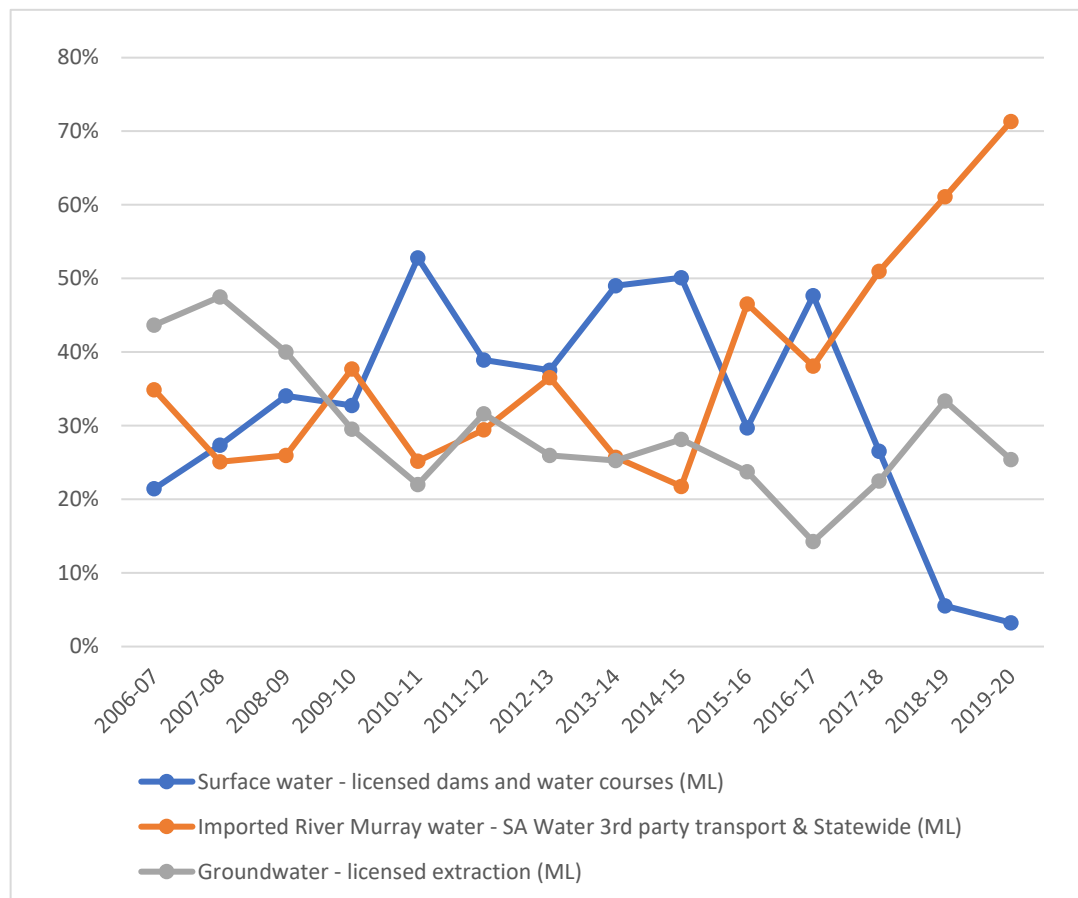
Figure 25 Water volumes by categories (Clare Valley)



Source: Clare Valley Prescribed Water Resources Area – 2019–20 Resource Assessment Clare Valley Prescribed Water Resources Area – 2019–20 Resource Assessment. Excludes estimate of stock and domestic – 675 ML.

River Murray water is supplied to customers in the Clare Valley through the CVWSS and through third-party agreements with SA Water to transport River Murray water through the Morgan Whyalla system to the Clare region. SA Water makes water available from the CVWSS under different times during the year, with different pricing arrangements, explained further below in this section.

River Murray water used in the Clare Valley is shown in Figure 26. River Murray water contributed more than 70% of water supply to the area. Surface water dropped from 50% of usage in 2016 to less than 10% in 2020.

Figure 26 Total non-rainfall water demand – Clare Valley

Source: DEW, South Australian Government Clare Valley Prescribed Water Resources Area – 2019–20 Resource Assessment.

The reason for this shift has been the reduction in rainfall, leading to low streamflow and ground water supply.

Restricted application of irrigation

The Water Allocation Plan for the Clare Valley Prescribed Water Resources Area (PWRA) (May 2009) provides criteria under which decisions about the regulation and use of water are made to ensure that water resources are managed sustainably for current and future users and water-dependent ecosystems, including downstream users and downstream water-dependent ecosystems.

The plan states that in order to sustainably manage the water resources and have sufficient water to maintain aquatic ecosystems, irrigators in the Clare Valley are only permitted to apply greater than 1 ML of water (including imported water) per year per hectare of all contiguous land parcels owned or leased where they can demonstrate that a higher application rate will not have an adverse impacts.

Adverse impacts include:

- rising underground water levels
- adverse impacts on natural flows or water quality
- adverse effects to the productive capacity of the land (e.g. increases to salinity)
- adverse impacts on water-dependent ecosystems.

Surface water

Irrigators access surface water via watercourses and by capturing overland flow in on-farm dams.

The 2019–20 Clare Valley PWRA water resources assessment noted that of the three representative streamflow gauging stations were analysed, two of which (Wakefield River and Hill River) recorded

the 'lowest on record' streamflow, with Hutt River recording 'very much below average' streamflow during 2019–20.

There is also an overall declining trend in streamflow recorded at the Wakefield River streamflow gauging station, with 13 of the past 15 years recording below-average annual streamflow. The annual streamflow recorded for the Wakefield River in 2019–20 was 334 ML, considerably lower than the long-term average of 7,515 ML.

Groundwater

Groundwater is available in Clare Valley from primarily fractured rock aquifers. The groundwater levels observed in 53% of fractured rock aquifer monitoring wells were at their lowest levels on record 2019–20. Salinity in the highly used fractured rock aquifers is increasing in most wells (93%).

The surface and ground water available to agricultural production is increasingly unreliable and, in most parts, increasingly saline.

River Murray water supply

The Clare Valley has two water pipelines that provide water from the River Murray via SA Water's potable drinking network:

- Morgan to Whyalla pipeline
- Swan Reach–Paskeville pipeline.

There are 107 grape producers who have access to CVWSS. Around a further 100 grape producers in the Clare Valley are not connected to the CVWSS and are either dryland grape producers or irrigate with alternative sources, such as groundwater and runoff.

Fees and charges

Customers who access River Murray water through SA Water infrastructure have several different fees and charges. The following section provides guidance on these.

State-wide water price

Irrigators who have a connection to the CVWSS can access potable water at any time at the standard non-residential water rate of \$2.806/kL or \$2,806/ML.

Connection fee

There is a once-off availability charge of \$3,020/ML (2022) payable to SA Water against the agreed volume of water. This is used as a capital contribution towards the 2004 Clare Valley Water Supply System infrastructure upgrade cost. This charge is payable in annual instalments over a three-year period.

Other fees

There are two standard annual fees to secure access to the transportation service:

- off-peak reservation fee of \$110/ML
- quarterly peak supply charge of \$67.85/ML.

Winter and summer nights watering

Irrigators can also access River Murray water to be delivered by SA Water in winter or during summer nights.

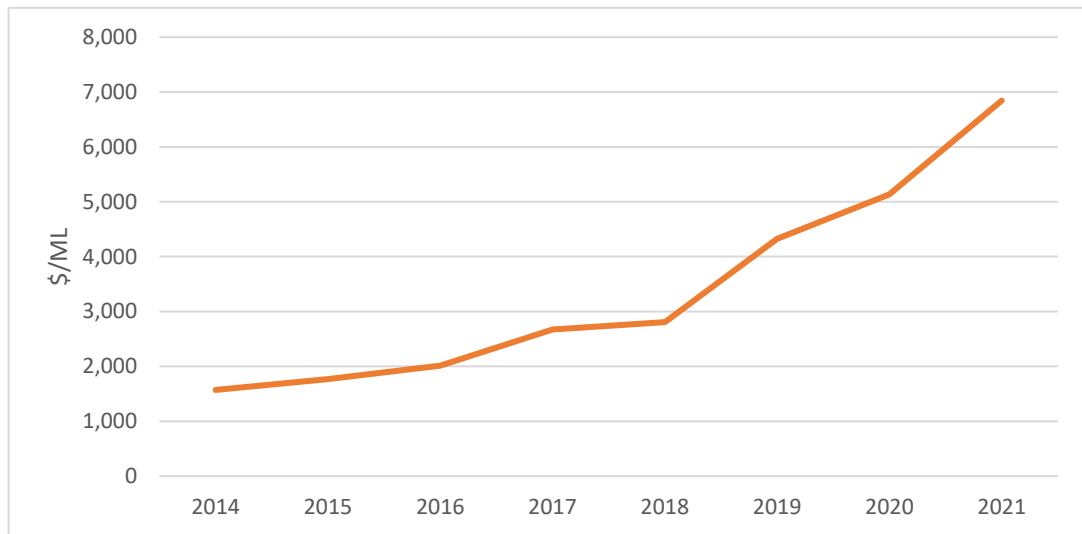
Customers require a Class 3 water access entitlement or water allocation from the River Murray. This entitlement or allocation is then transported to the customer's property through SA Water network. The cost of this licence varies year to year due to the seasonal availability and supply.

The reliability of Class 3 water entitlements has been 94% over the two decades with only four years with less than 100% reliability (Table 9).

Table 9 Class 3 water entitlement volumes and allocations

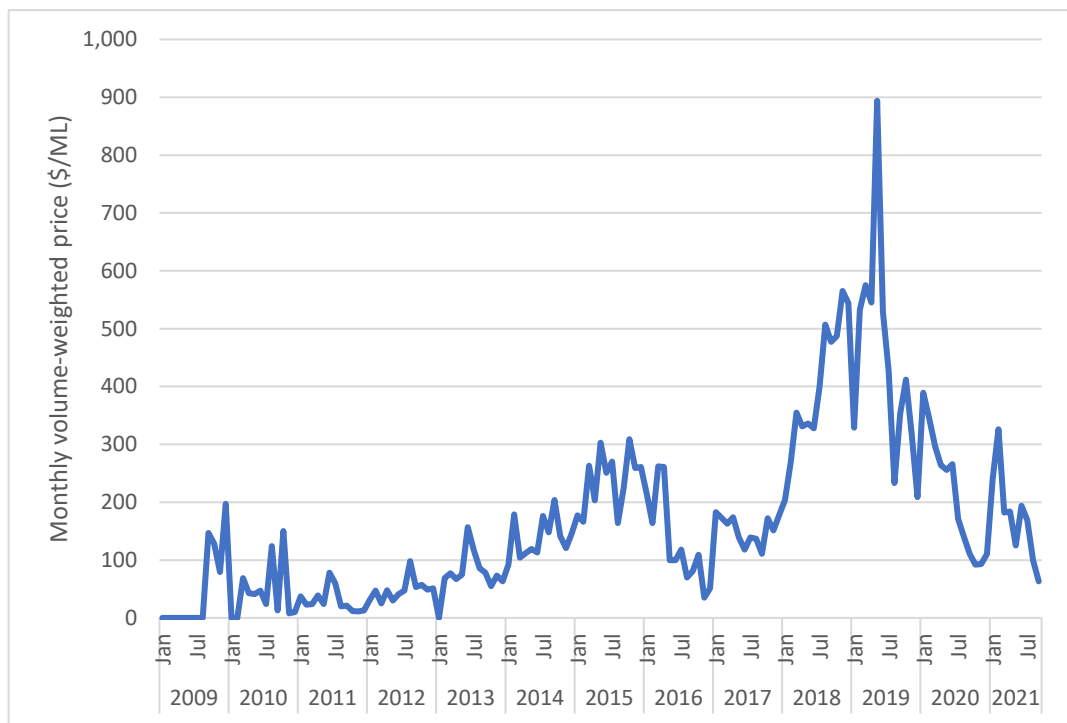
Year	SA entitlement volume (GL)	Class 3 allocation that would have been made under the current River Murray Water Allocation Plan (WAP) (%)
2000–01	1,850	100
2001–02	1,850	100
2002–03	1,850	100
2003–04	1,753	100
2004–05	1,850	100
2005–06	1,850	100
2006–07	1,480	97
2007–08	1,070	34
2008–09	1,160	49
2009–10	1,350	78
2010–11	1,850	100
2011–12	1,850	100
2012–13	1,850	100
2013–14	1,850	100
2014–15	1,850	100
2015–16	1,850	100
2016–17	1,850	100
2017–18	1,850	100
2018–19	1,850	100
2019–20	1,594	100
2020–21	1,850	100
2021–22	1,850	100

This high reliability has led to an annual price growth rate of more than 20% (Figure 27).

Figure 27 River Murray – SA Class 3 water entitlements – weighted average price (\$/ML)

Source: South Australian Government, WaterConnect dashboard, 2021.

Temporary allocation prices have also been volatile, reaching \$900/ML in May 2019 but since falling to \$63/ML in September 2021 (Figure 28).

Figure 28 Monthly volume-weighted allocation prices for River Murray water in South Australia (\$/ML)

Source: South Australian Government, WaterConnect dashboard, 2021. The period of winter watering varies:

- 1 April to 31 October.
- 1 April to 30 November.
- 1 May to 30 November.

The consumption fee to take water during these periods is \$1.308/ kL or \$1,308/ ML.

Outside the winter watering period, SA Water allows customers to access water at an off-peak rate during December until end of March at a time when there is spare capacity in the network. These times are typically either:

- 1 November to 31 March, 8.00 pm to 6.00 am.
- 1 December to 31 March, 8.00 pm to 10.00 am.

This period is commonly referred to as summer nights, and the recent price has been \$1.79/kL or \$1,790/ML. This is lower than the standard non-residential water rate of \$2.806/kL or \$2,806/ML. The amount of water that is requested by irrigators for summer nights is then used to determine the price with a 60% take-or-pay component.

Imported River Murray Water example use and cost

Table 10 outlines the complete costs incurred by a customer in the Clare Valley scheme who has a 10 ML allocation and usage split between 3 ML of state-wide water, 4 ML of off-peak and 3 ML of winter water from SA Water. .

Table 10 Indicative water charges for a customer with a 10 ML allocation within the Clare Valley scheme

Charges	\$/ML	ML	Total cost (\$)	Summary
State-wide water				
Quarterly peak supply charge	–	–	271	Standard annual fee to secure access to peak transportation service
State-wide water price	2,806	3	8,418	Water usage outside off-peak periods
Winter water				
Temporary River Murray Licence (average)	200	3	600	Seasonal temporary licence to take River Murray Water
Off Peak water transportation – winter watering	1,308	3	3,924	Water usage that has occurred during winter off peak period.
Off Peak Reservation fee	110	3	330	Standard annual fee to secure access to off peak transportation service
Summer nights (off-peak)				
Temporary River Murray Licence (average)	200	4	800	Seasonal temporary licence to take River Murray Water
Off Peak water transportation – summer nights	1,790	4	7,160	Water usage that has occurred during ‘summer nights’
Off Peak Reservation fee	110	4	440	Standard annual fee to secure access to off peak transportation service
Total			21,943	
Total ML			10	
Average (\$/ML)			2,194	

Charges exclude CVWSS connection fee of \$2,806/ML.

The example above shows an average price per ML for irrigators of \$2,194/ML, not including the initial connection fee.

Water storage

There are 1,435 farm dams within the Clare Valley PWRA, with an estimated capacity of 6,451 ML. The average farm dam density of the PWRA is 10 ML/km², with the higher rainfall headwaters having

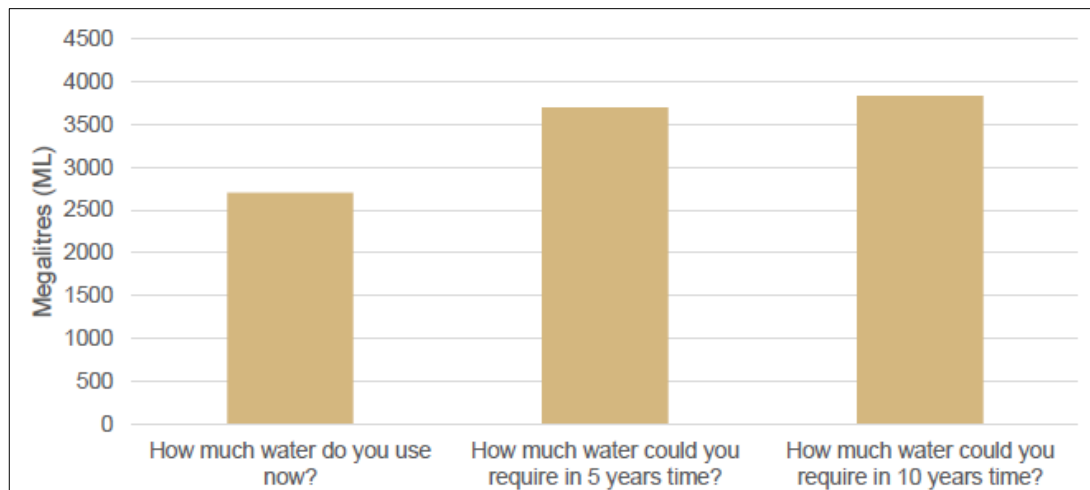
a higher density in comparison to lower rainfall areas. In comparison, the Barossa PWRA has dam storage of 17 ML/km².

2.2.2 Future water demand

Increased usage of non-rainfall sources did not reverse the falling production of grapes during the last 15 years, indicating that a new water source is required to increase the long-term average production of grapes in the Clare Valley.

The December 2020 pre-feasibility undertook a demand assessment based on 40 stakeholder interviews. The results are shown in Figure 29.

Figure 29 Pre-feasibility study demand assessment – December 2020



Source: Clare Valley Water Pre-Feasibility Study, December 2020

The pre-feasibility assessment indicated the following current and future demand:

- Current use: 2,703 ML.
- Increase to 3,698 ML in year 5: additional 995 ML above current demand.
- Increase to 3,834 ML in year 10: additional 1,131 ML above current demand.

Round 1 demand assessment

The Round 1 demand assessment included two immersion phases that focused on understanding the service need and the existing approach to price, water quality and enterprise mix. The phases were:

- Immersion 1: 7–10 February 2022 – focusing on larger water users and/or those connected to the Clare Valley WSS.
- Immersion 2: 21–24 February 2022 – focusing on smaller water users and/or those not connected to the Clare Valley WSS.

Findings from 40 immersion interviews were incorporated in the demand assessment that followed.

The Round 1 demand assessment included a two rounds of industry meetings that focused on explaining the phased demand assessment process, the demand-led PBC, and prices and types of demand sought (substitution and growth demand). The stages were:

- Round 1 Industry meeting 1: 11–14 April 2022 – two public meetings in Clare.
- Round 1 Industry Meeting 2: 3–4 May 2022 – three public meetings in Clare Valley and surrounds (Manoora, Spalding and Balaklava).

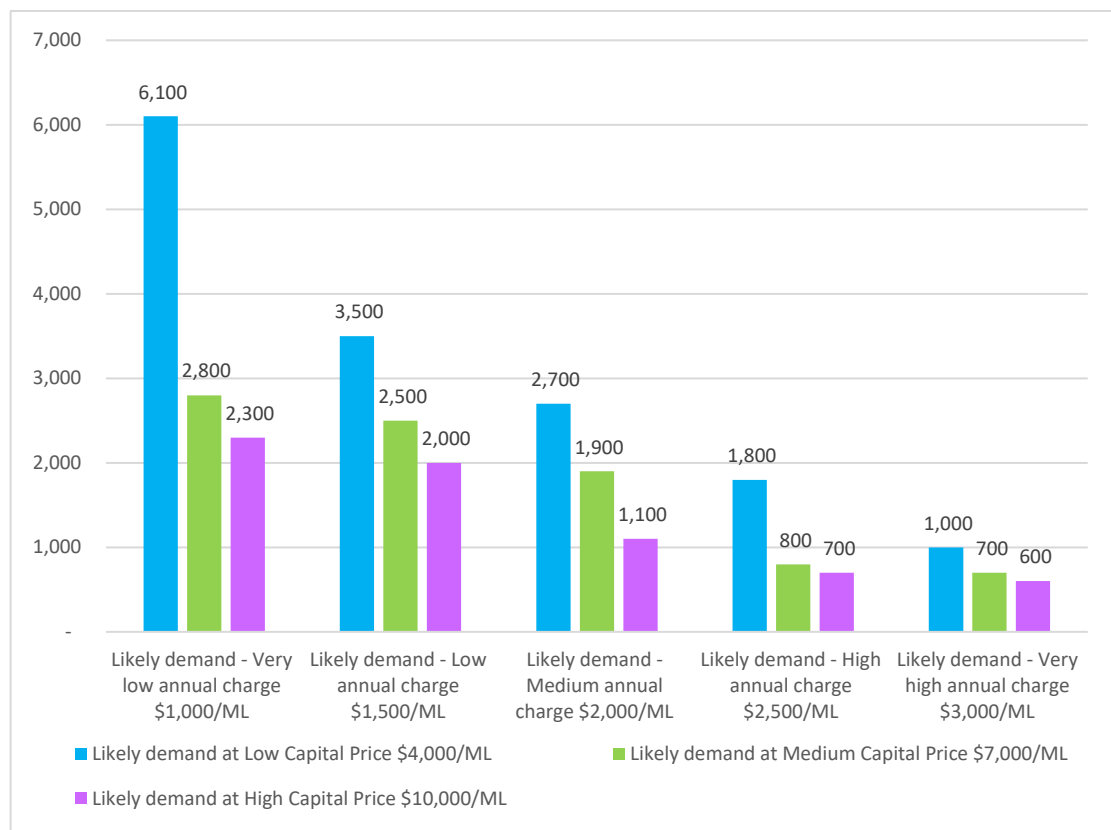
As part of promoting each meeting, the CVWGA used its mailing list and other farming networks and advertising in local newspapers.

More than 74 expressions of interest were received from potential customers for new water representing 140 properties. The following figure depicts respondent enterprises, which included grape growers, winemakers and other sectors in the Clare Valley.

Of the 5,000 ha of vineyards in Clare Valley, responses were received from 54 wine and grape businesses owning or controlling 3,350 ha or two-thirds (67%) of Clare Valley vines. There were 15 wineries among respondents.

The following figure provides a summary of total likely demand for new water at different prices. Appendix C has additional information on the Round 1 demand assessment process, findings and conclusions.

Figure 30 Likely demand for new water at different prices – annual charge (ML)



There are two water products that could be purchased to supply the chosen option:

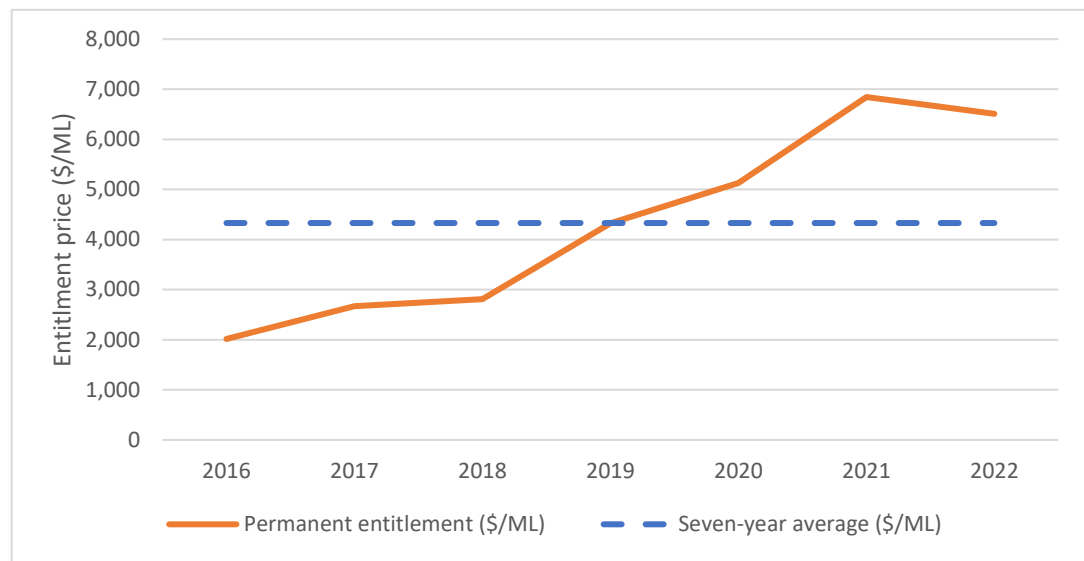
1. Permanent water entitlements.
2. Temporary water allocations.

2.2.3 Historical prices

Permanent entitlements

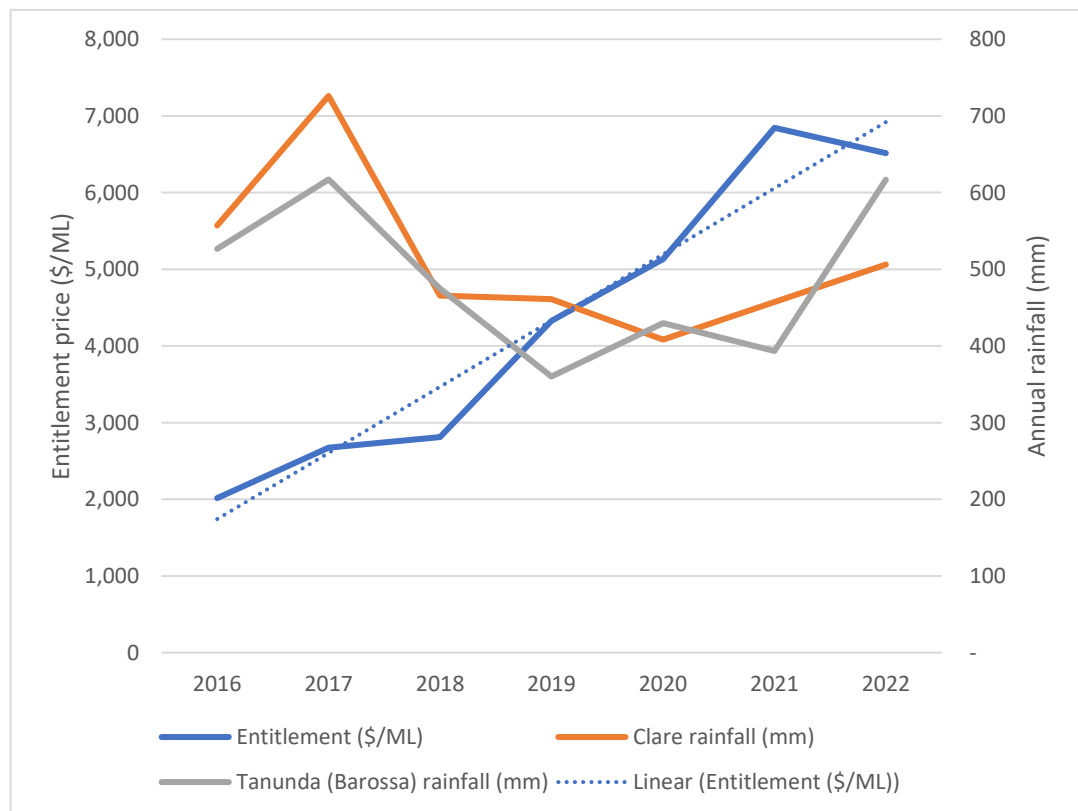
Permanent entitlements provide long term water supply security at the cost of a large upfront payment. SA WaterConnect provides seven years of data for water entitlement prices.

Class 3 water entitlements have increased in price by 18% each year, peaking at \$6,845 in 202, as shown in Figure 31.

Figure 31 Permanent entitlements – weighted average annual price (\$/ML)

Source: SA WaterConnect data

Permanent entitlement prices have risen substantially since 2016 with a clear upwards trend. The average of the period was \$4,330/ML. Permanent entitlement prices and rainfall for Zone 12 in key wine making areas including Tanunda for the Barossa and Clare for the Clare Valley, as shown in Figure 32.

Figure 32 Permanent entitlement prices and Tanunda (Barossa) and Clare annual rainfall

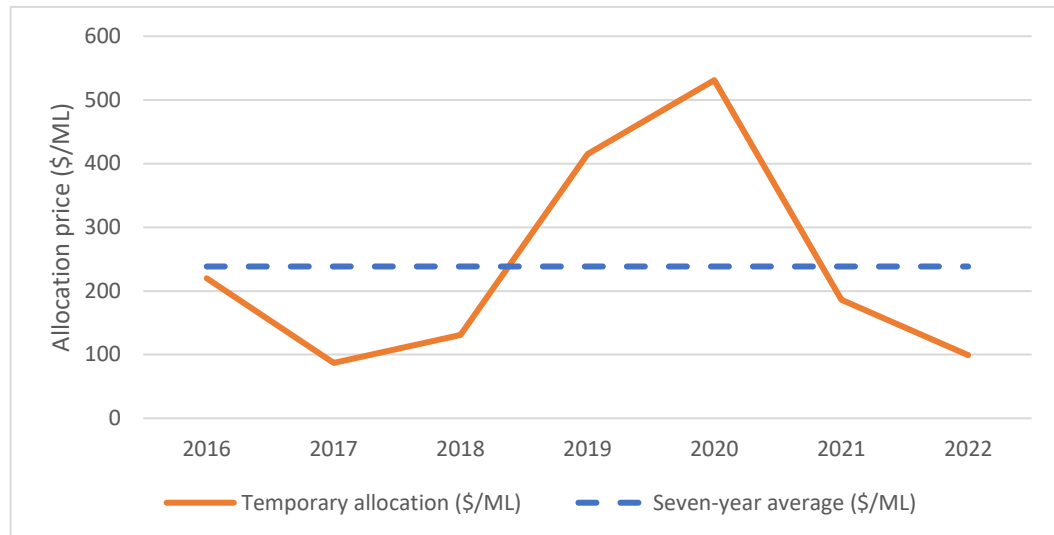
Source: SA WaterConnect data, BOM Climate data

While price increase do align with decreased annual rainfall, rising rainfall only results in a plateauing of prices. The overall trend is an increase in prices, likely driven by longer term concerns of River Murray water availability.

Temporary allocations

Temporary allocations are purchased annually from existing entitlement holders who are willing sellers. Temporary allocation prices have fluctuated substantially over the last seven years of available data as shown in Figure 33.

Figure 33 Temporary allocation prices (\$/ML)

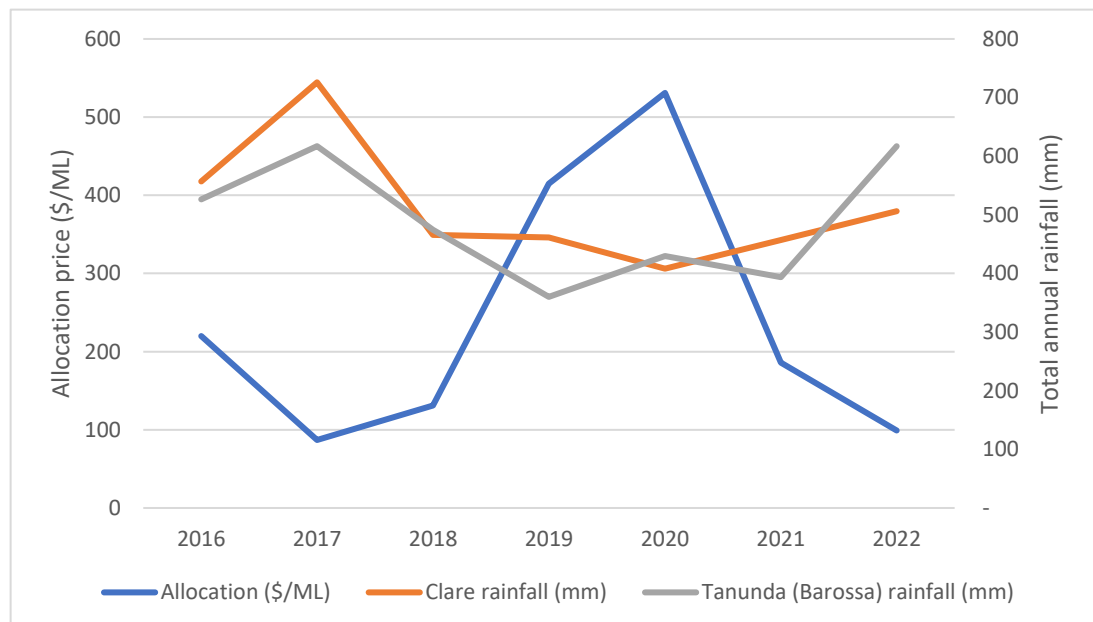


Source: SA WaterConnect data

Temporary allocations peaked at over \$500/ML in 2020 before a substantial decline to \$99/ML in 2022. The average over the period was \$240/ML.

Temporary allocation prices appear to have a stronger relationship with rainfall in key Zone 12 demand areas than permanent entitlements as shown in Figure 34.

Figure 34 Temporary allocation prices and Tanunda (Barossa) and Clare annual rainfall



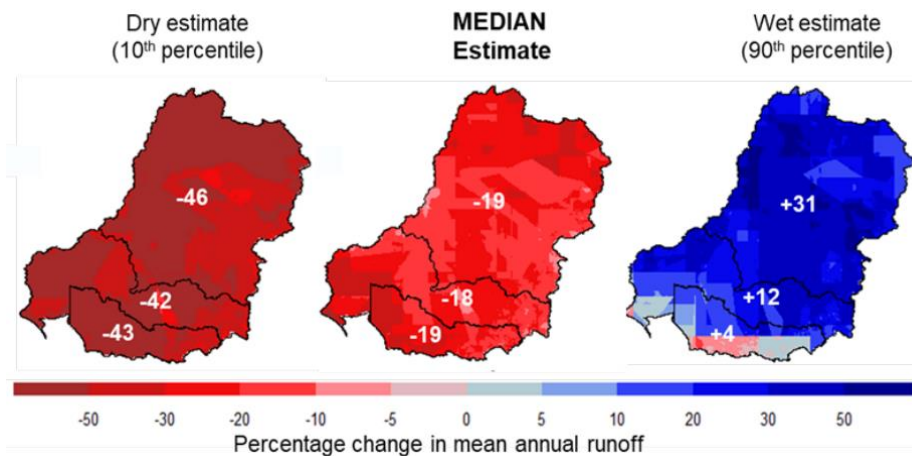
Source: SA WaterConnect data, BOM climate data

The rise in temporary allocation prices aligns with low rainfall in 2019 and 2020, followed by sharp decrease in temporary allocation prices as annual rainfall increases.

2.2.4 Climate change

Future permanent entitlements prices are likely to be driven by long term concerns about water reliability, particularly for the River Murray. The median estimate of climate change impacts on the River Murray is a reduction in runoff of 18% as shown in Figure 35.

Figure 35 Projected percentage change in mean annual runoff under 2.2°C global average warming



Source: CSIRO, (informed by climate change signal from 42 CMIP5 GCMs) relative to the IPCC AR5 1986–2005 reference period.

This information supports an upward trend in permanent entitlement prices.

Temporary allocations appear to be more responsive to changes in local annual rainfall so future rainfall forecasts should be considered. *Australia's Wine Future: A Climate Atlas*⁸ provide indicative impacts of climate change for the Clare Valley:

- average annual rainfall to match the historical average to 2030 with a small decrease by 2050
- increase rainfall during key growing months (October to April) but a decrease in rainfall during non-growing months (May to September) which is already seen in the rainfall data
- increase soil aridity (difference between rainfall and evaporation) which results in higher irrigation requirements
- increase the number of extreme hot days.

The *Wine Atlas – Climate module for Barossa* forecasts that total rainfall will not materially change over the next 30 years however the rainfall patterns, temperature and evaporation will change. Rainfall will continue to decrease in the August to October period while increasing temperatures and evaporation will mean higher irrigation requirements.

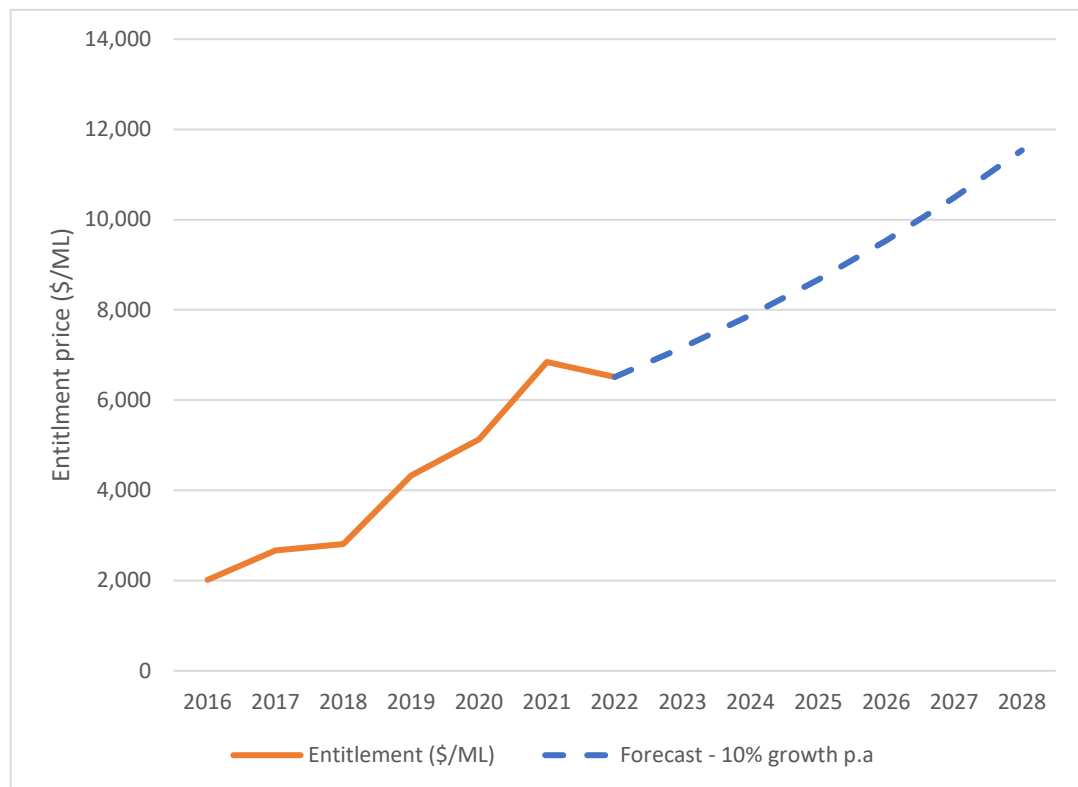
These impacts do not indicate a major shift in rainfall for key demand regions.

2.2.5 Future prices

Permanent entitlements

The forecast reduction in River Murray runoff of 18% to 2050 is likely to continue to increase prices. A 10% annual increase in water entitlement prices, smaller than the average increase of 18% over the last seven years, could see a price of \$12,000/ML in 2028, up from \$6,500/ML in 2022 (Figure 36).

⁸ https://www.wineaustralia.com/getmedia/74d2ae11-e657-4846-9b8d-3d9b35fc9f7f/atlas_region_clare_valley.pdf

Figure 36 River Murray Class 3 entitlements – forecast based on average growth rate since 2016 (\$/ML)

Source: SA Water Connect.

The potential cost for the options, if the permanent entitlements are purchased in 2025, prices will be \$8,600/ML and capital costs:

- Option 1: would be \$26 million for 3,000 ML– 35% increase in capital costs.
- Option 2: would be \$17 million for 2,000 ML– 17% increase in capital costs.

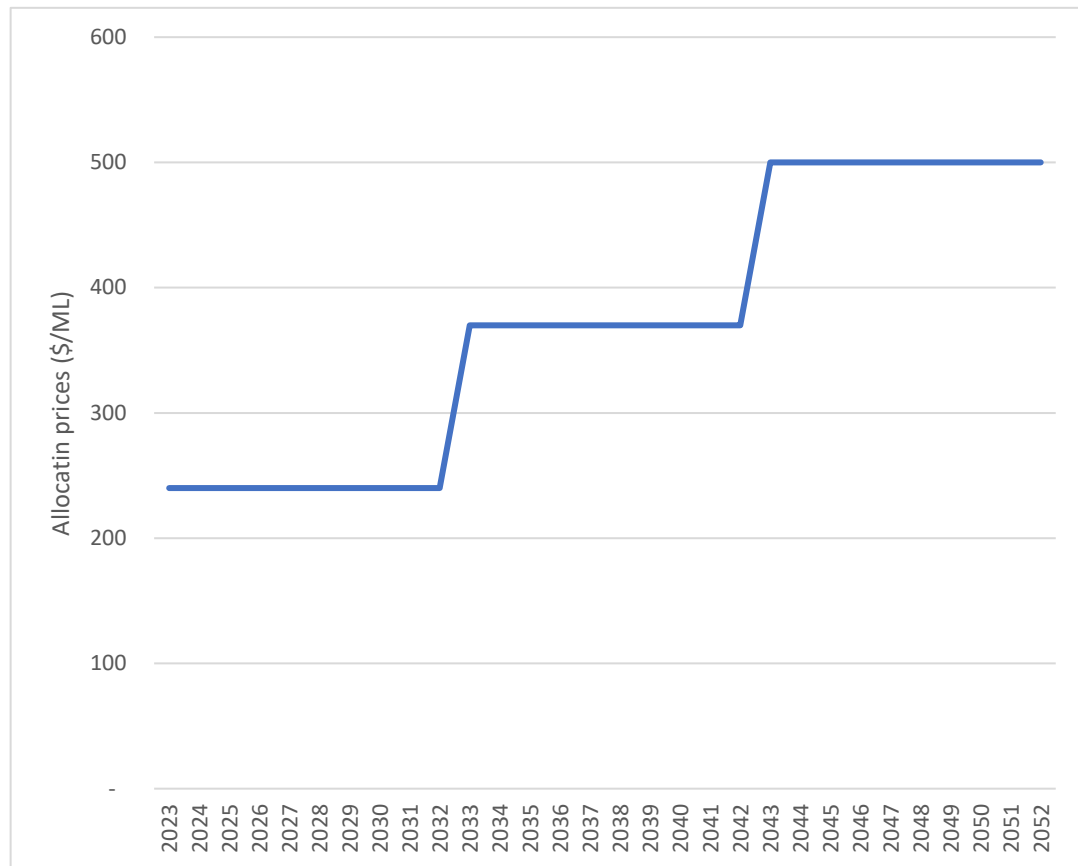
The increased capital costs is the reason that permanent entitlement purchase has not been recommended for the options.

Temporary Allocations

Temporary prices appear to be strongly related to annual rainfall so future prices will likely depend on the annual availability of rainfall.

The future forecast for allocation prices should, therefore, capture the recent volatility driven by low rainfall and the longer term forecasts of increased temperatures and irrigation requirements.

The proposed forecast for water allocations from the River Murray for the 30-year assessment period is shown in Figure 37.

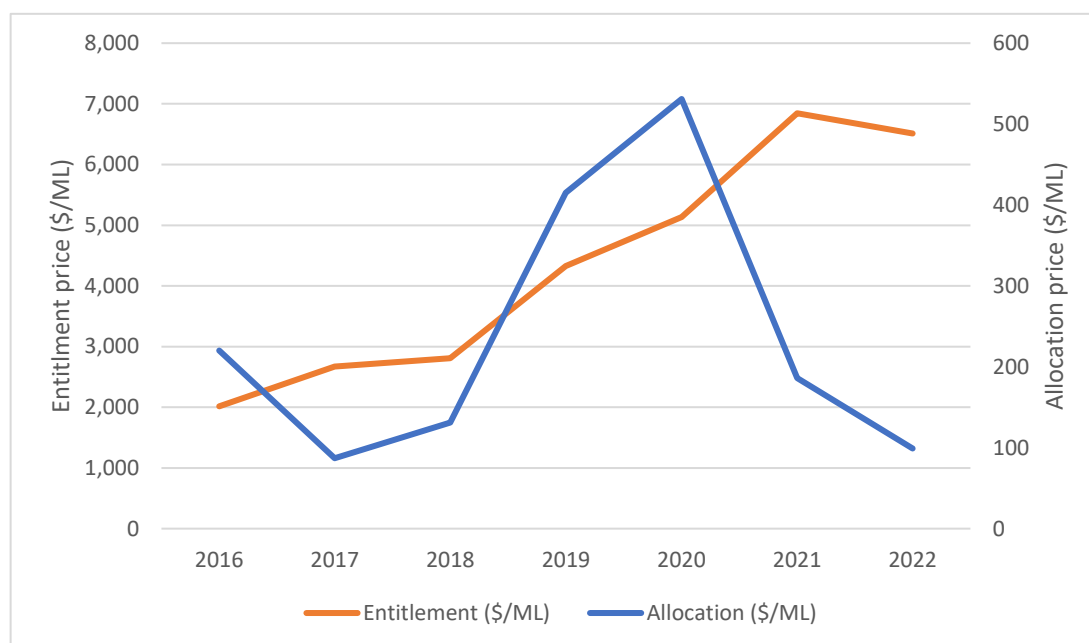
Figure 37 Water allocation forecast (\$/ML) – 30 year assessment period

The proposed water allocation price forecast adopts the following as shown in Figure 37:

- historical seven year average of \$240/ML for the next ten years
- \$370/ML for the second ten years which is the mid-point between the historical average and the peak price of \$500/ML
- last 10 year period uses the peak price from the historical water allocation information of \$500/ML.

2.2.6 Relationship between entitlement and allocation prices

Entitlement and allocation prices do not appear to be highly correlated. As shown in Figure 38, allocation prices fluctuate on a year-on-year basis and have a flat trend since 2016 while entitlement prices have a rising trend and have not substantially declined due to recent rainfall.

Figure 38 Entitlement and allocation prices (\$/ML)

Source: SA WaterConnect data

The lack of a clear relationship between entitlement and allocation prices means that it would not be prudent to adopt the historical increase, and potential future increase, in entitlement prices as the forecast increase for water allocations.

2.3

INITIAL INPUT FROM GRAPE IRRIGATORS

The key issues that irrigators raised during the initial engagement by KBR are:

- All existing water supplies are from climate dependent sources:** Farmers are receiving water from surface water, groundwater, direct rainfall, and the River Murray via the CVWSS, all of which are climate dependent. There are concerns about the declining native sources and about the long-term availability of River Murray water, and the potential negative perception of its use for irrigation, particularly for a premium wine product for which sustainable marketing is critical.
- Current native water supplies are reducing in quality and reliability:** Surface water is reducing, and storages are filling less often than they used to. For many farmers, but not all, groundwater bores are becoming increasingly saline, and levels are dropping and are slow to regenerate. The groundwater ecosystem is not well understood and there are concerns about its sustainable use as a water source, especially under an agricultural industry growth scenario.
- The cost of water is high and price for grapes is low resulting in low profitability:** Water for irrigation is a significant cost for grape growers, second only to labour. The average price per megalitre of water is higher in the Clare Valley than in competing wine regions, and the price per tonne of grapes is lower. For example, the 2021 weighted average price for grapes in the Barossa Valley is \$2,261/tonne, compared to \$1,689/tonne in the Clare Valley. The average cost for imported water in the Barossa Valley is around \$800/ML to \$1,000/ML, compared to Clare Valley's \$1,500/ML to \$2,500/ML. Many grape growers rely on other sources of income to make a living. Several corporate winemakers are reported to have left the Clare Valley in recent years – it is believed this is due to the low profits resulting from the high cost of water and low price for grapes.
- The existing reach of the CVWSS does not service several potential customers:** There are grape growers and other water-using enterprises beyond the existing reach of the CVWSS network that would connect if given the opportunity through network expansion. For some businesses,

connection to the CVWSS would be a catalyst to unlock new opportunities and see significant commercial growth.

- **The future of water availability and pricing is uncertain:** Water pricing has experienced material and sudden increases. There is concern that there is no water pricing structure in place in the medium to long term to constrain price uplifts, especially as demand increases due to growth, and water availability decreases due to climate change.
- **The existing CVWSS is at capacity and is restricted for extended periods:** Grape growers connected to the CVWSS are unable to get the peak flows they need to optimise water use, or even maintain vine health during extended periods of hot, dry weather. Large users coming on-line can cause significant drops in flow rates for other customers. Also, there are farmers adjacent to the CVWSS infrastructure that are not permitted to connect, due to the fully allocated scheme.
- **Limits on irrigation application rates are overly restrictive:** There is currently a 1 ML/ha/annum irrigation limit, which grape growers have reported is insufficient to maintain suitable yields, especially during dry years. There is a need to revisit this regulation in the upcoming review of the Clare Valley WAP, to ensure the limit is best practise for the environment while considering farmers' needs.
- **Water license management is overly complex:** The administrative effort to acquire or make amendments to water licenses is arduous. The three pricing options make it a complex optimisation problem of when to take and store the right volumes at the right times, especially when flow rates are low, to minimise the cost of water. Farmers are expressing frustration at this complexity and see it as a barrier towards new plantings and increasing their entitlements.

2.4 INVESTMENT NEED PROBLEM STATEMENT

Based on a synthesis of the findings from KBR's immersion and other research, the following problem statements are proposed:

- Unreliable, increasingly saline and climate dependent water sources result in low agricultural yields, limited profitability and forgone growth, economic activity and employment.
- Complex and restrictive regulatory arrangements restrict the value that could be delivered by available water resources.
- CVWSS infrastructure is constrained, resulting in inadequate water supply for irrigation, particularly in drought.
- High irrigation water prices and low grape prices result in low profits and low investment confidence.

2.5 INACTION CONSEQUENCES

The consequences of inaction include:

- a lack of alternative water supplies for irrigators and continued pressure on increasingly unreliable and saline native water sources with impacts on river ecology
- a lack of investment in Clare Valley agricultural production, including the grape and wine sector, with negative impacts on the achievement of the 2030 food, wine and agribusiness target
- increasing downward pressure on the profitability of irrigators
- a long-term constraint on the economic viability of the region, particularly as it seeks to improve economic development including growing tourism.

3 Outcomes sought

3.1 BENEFITS AND OUTCOMES

A successful outcome is to reduce grape production volatility, even in a drought (e.g. a valid goal may be that production never falls below 20,000 tonnes in any year). In addition, the solutions presented by this study should enable profitable expansion of grape and wine production.

Grape growers being profitable and wine makers being profitable should take precedence over expansion for expansion sake. In general, the goal of profitability may be achieved by:

- driving down input costs (e.g. irrigation water)
- increasing the price for which Clare Valley wine is sold
- increasing the volume of grape and wine production only if that increase is also profitable.

It may be necessary, in part outside this project, to take steps to improve the market perception that, for Clare Valley wines, it is worth paying more. The CVWGA is seeking to address this through the development of 3 year marketing plan.

A secondary goal is to consider increasing the economic stability, profitability and opportunities for growth of other agricultural enterprises (e.g. olives, truffles, horticulture, intensive meat production and irrigation extensive cropping).

Appendix D outlines the benefits of the project in further detail.

3.2 PREVIOUS GOALS

Clare Valley Water Strategic Supply Availability Review (the Strategic Availability Review) (December 2021) and the CVWGA also considered a goal of long-term average production of 30,000 tonnes of grapes per annum by 2030.

KBR is not yet convinced that this has emanated from the agricultural community in the Clare Valley and has some concern that it may be aspirational for some but not others. That is, driving up supply to high levels, relative to demand, may place further downward pressure on the grape prices received by approximately 105 of the valley's 150 grape industry participants.

While this goal may be valid, it is likely to be supported only by the up to 45 enterprises directly involved in winemaking. This could be the case as winemakers are net buyers of grapes and may value downward pressure on the cost of a major input such as grapes.

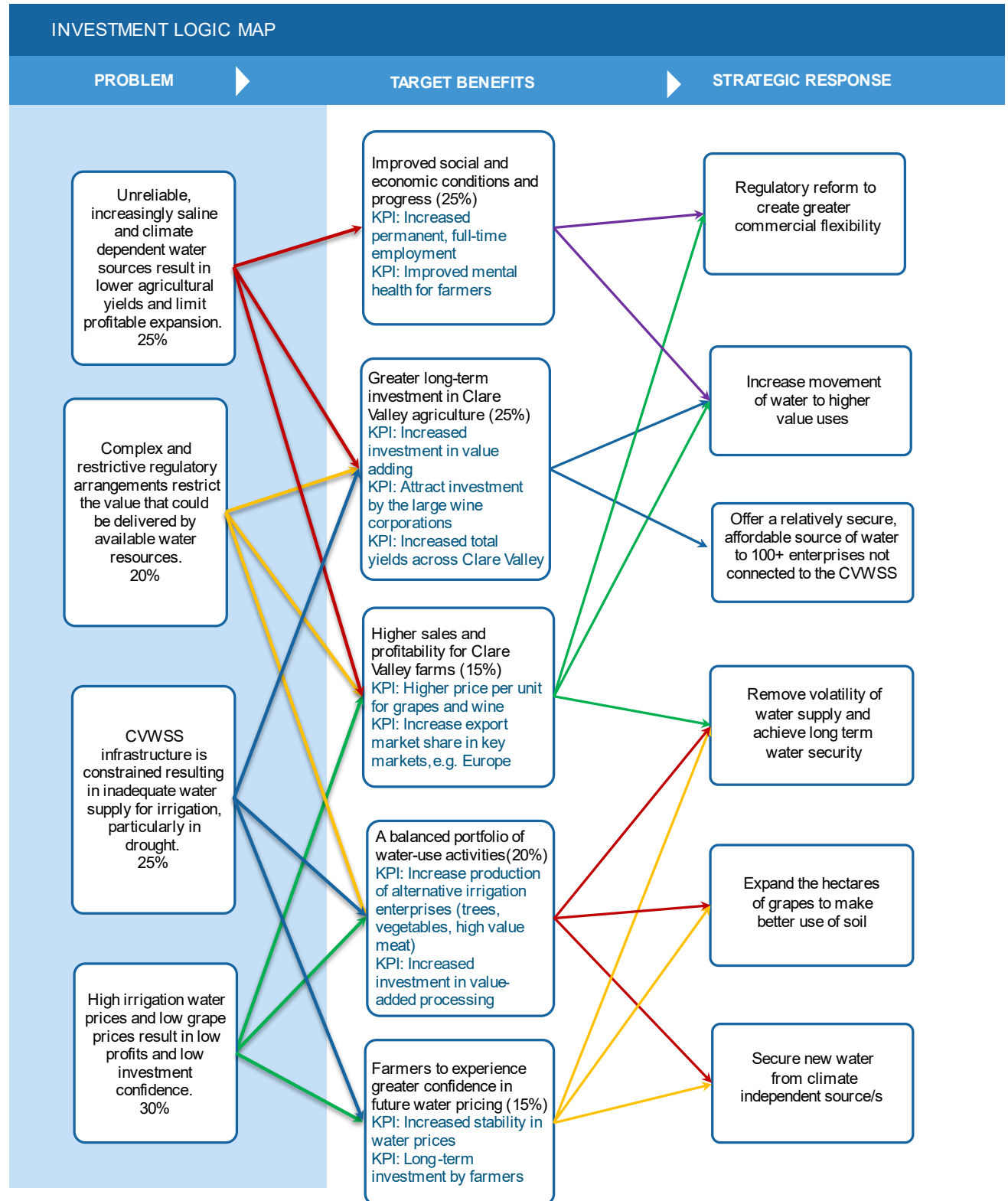
The goals perhaps should be to enhance the overall benefits to the Clare Valley and to deliver an overall benefit to the entire 150 enterprise cohort of the Clare Valley wine and grape sector, which is a highly significant contributor to the community's economic wellbeing.

3.3 INVESTMENT LOGIC MAP

An initial investment logic map (ILM) has been developed based on the identified problem statements. The ILM is shown in Figure 39.

Figure 39 Initial investment logic map

Improving agricultural water security and supply in the Clare Valley



3.4 STRATEGIC ALIGNMENT

The options analysis identified many of the government plans and strategies relevant to the project and found ‘strong alignment between the strategy and policy objectives outlined in the various levels of documentation from the Australian Government, South Australian Government and local governments’.

3.4.1 Australian Government strategies and plans

The following table outlines the Australian Government strategies and plans that were identified as being relevant to the project, and the way the project aligns with them.

Table 11 Australian Government strategies and plans

Government plan/strategy	Overview	Project alignment
National Water Initiative (NWI) (2004)	The NWI is an intergovernmental agreement that provides the blueprint for national water reform. Federal government guidance notes for the NWI provide that water infrastructure projects should: • be in areas where NWI-compliant water planning and entitlement frameworks are in place or will be • demonstrate that costs will be recovered through user fees • be economically viable and ecologically sustainable • demonstrate that unallocated water will be released for consumptive use through market-based mechanisms.	The project is aligned with the National Water Initiative. This PBC investigates the extent to which costs will be recovered through user costs and the economic viability of the project. The ecological sustainability of the project will be considered further detail in a detailed business case.
National Water Grid Authority	The aim of the authority is to identify and plan the next generation of water infrastructure that will support regions by growing primary industries; increasing water security; and building resilience to a changing climate.	The shortlisted options are aligned with the objectives outlined by the NWGA. The PBC identifies a project that will support primary industries, increase water security and build resilience to climate change.
National Water Grid Fund	The Australian Government has established the National Water Grid Fund as a rolling 10-year water infrastructure program to fund water infrastructure investments. An additional \$2 billion in capital funding was announced as part of the 2020–21 federal Budget, bringing the Australian Government’s total funding commitment under the National Water Grid Fund to \$3.5 billion.	This project is aligned with the objectives of the National Water Grid Fund. The PBC identifies a project that will deliver the construction of an economically viable water infrastructure scheme for irrigation, to bring reliable and affordable water of suitable quality for the wine industry, supporting one of the highest value uses for precious water resources. The project will drive commercial and community growth in the Clare Valley, South Australia and Australia.
Australian Infrastructure Plan (2021)	The Australian Infrastructure Plan 2021 is a roadmap for infrastructure reform intended to support community growth; strengthen against and recover from natural disasters; and support local, state and national economies. It provides a package of reforms focused on improving investment in, delivery of and use of Australia’s infrastructure.	The reference project is aligned with the Australia Infrastructure Plan in that it seeks to improve the use of existing infrastructure by resolving bandwidth and service reach constraints and increase the reliability of water for primary production. The provision of water into the Clare Valley will deliver secure and

Government plan/strategy	Overview	Project alignment
	The plan notes that successful irrigated agriculture is dependent on producers having access to reliable and secure water resources. It also notes that regional water infrastructure that supports irrigated agriculture faces challenges because of the increasingly variable climate, growing demand and difference in the ability or willingness to pay.	economically stimulating water supply to meet projected future demands The project will achieve these goals under a funding and ownership model that is affordable to the government and to customers into the future.
Australian Infrastructure Audit (2019)	Infrastructure Australia regularly performs an audit of nationally significant transport, energy, water, telecommunications, and social infrastructure. In terms of infrastructure impacts on communities, the 2019 audit found that: • infrastructure in the largest cities is failing to keep pace with population growth • smaller cities and regional centres are growing as service hubs for neighbouring regions and fast-growing cities • infrastructure quality is below standard for people in remote communities • infrastructure is key to developing regions to improve productivity, connectivity, and quality of life.	This project will resolve water infrastructure bandwidth and service reach constraints to capitalise on unrealised economic potential in the Clare Valley. The provision of an additional, highly reliable water supply into the region will support and stimulate growth areas, drive further investment and strengthen resilience against climate change impacts, in particular to native water sources. In doing so it will secure the future of the Clare Valley brand as a sustainable world-class premium wine-producing region.
Agricultural Competitiveness White Paper (2015)	The Agricultural Competitiveness White Paper sets out a roadmap of government-led initiatives to grow Australian agriculture for a stronger economy. The paper details five key initiative areas: • A fairer go for farm businesses • Building infrastructure of the 21st century • Strengthening [the government's] approach to drought and risk management • Farming smarter • Accessing premium markets.	This project aligns with all of the key initiatives of the Agricultural Competitiveness White Paper. It will deliver new water infrastructure to bring new and improved access to a reliable water supply to one of Australia's most premium wine-growing regions. It will strengthen resilience to climate change and resolve the current volatility in agricultural production resulting from periods of low rainfall. It will promote the Clare Valley as a modern and sustainable agricultural hub and attract further investment in its future.

3.4.2 South Australian Government strategies and plans

The following table outlines the South Australian Government strategies and plans that were identified as being relevant to the project, and the way the project aligns with them.

Table 12 South Australian Government strategies and plans

Government plan/strategy	Overview	Project alignment
Water Security Statement	The Water Security Statement provides an overview of water security across South Australia and includes 10 strategic priorities out to July 2024. These priorities seek to further enhance water security and meet the state's growth targets, while adapting to a changing climate. The statement provides an overview of water security status for key population centres and water resources across South Australia and was prepared to meet the water planning requirements of the Water Industry Act 2012. The 10 strategic priorities set out in the statement required working with industry, key stakeholders and partners.	Five of ten strategic priorities set out in the statement were aligned with the project: • Invest in understanding climate impacts to support adaptive decision-making and increase resilience. • In partnership with key stakeholders, develop targeted water security strategies for key water resources, communities and industries. • Ensure water resource management is ecologically sustainable and water allocation plans are updated within timeframes that reflect statutory requirements and risks to users and water resources. • Invest in data management, analytics and decision support tools to efficiently monitor and manage emerging water risks and opportunities, increase transparency and support timely decision-making. • Work with the South Australian water sector, including water retailers and the research, innovation and education sectors, to build the state's capacity to respond to future water challenges across the economy and capture a greater share of an expanding global market for water technologies and services.
Growth State (2018–2022)	The previous Liberal South Australian Government was actively engaging with nine identified economic priority sectors. These include tourism, and food, wine and agribusiness. The aim is to grow South Australia as the nation's leading agricultural region for global exports, through investment in its premium food and wine agribusiness across the state.	This project aligns with the South Australian Growth State by constructing new infrastructure to meet the demand for additional and more reliable water in the Clare Valley, which is one of the premium agricultural sectors in the state and in Australia. The project will support and stimulate growth in the region, drive future investment and increase the quantity and quality of agricultural production. This project will further secure South Australia as the leading agricultural region producing wine for global export.

Government plan/strategy	Overview	Project alignment
20-Year State Infrastructure Strategy	This strategy sets the long-term, state-wide strategic direction and initial priorities for infrastructure development in South Australia. It identifies needs, challenges and future priorities for infrastructure in areas of digital; health; housing; justice; tourism, sport and culture; transport; and utilities, with the aim to achieve the following objectives: • Sustained economic and jobs growth • Planned population growth • Connected and productive regions • A vibrant, global Adelaide • Envable liveability.	This project aligns with the strategy's statement about water utility needs and challenges: 'Secure and affordable water supplies are required to capitalise on key growth opportunities presented by wine and agriculture industries to the north and south of Adelaide.' This project aligns with the strategy's key principles, including: • Optimise current assets before building new. • Adopt a lifecycle approach to new infrastructure. • Prioritise infrastructure that contributes to economic and jobs growth. • Make evidence-based planning decisions. • Expand funding and procurement models and leverage private sector capital.
Landscape South Australia Act 2019 – State Landscape Strategy (incl. Northern and Yorke Landscape Board Landscape Plan 2021–2026)	The 10-year State Landscape Strategy sets the collective vision and guides the individual and collective efforts of all landscape partners to tackle shared priorities. The strategy provides a framework to bring together the combined capacity of regional communities, private landholders, landscape boards, state and local governments, industry, the conservation sector and First Nations, to jointly tackle the big issues. The strategy sets the Board's joint vision, identifies major shared challenges, and marks out key directions need to take to address these challenges over the next ten years. It outlines seven state-wide priorities requiring shared effort and three foundational commitments for how it will be collectively delivered on. It outlines mechanisms for implementation, including principles for the Landscape Priorities Fund and a monitoring and evaluation framework.	The Northern and Yorke Landscape Board Landscape Plan 2021–2026 outlines two priority areas (water management and sustainable agriculture) which will be supported by the project. • Water management – collaborative land management practices that protect watercourses, permanent pools, water use, groundwater, cultural water, environmental flows, water-dependent ecosystems, river red gums, and saline wetlands and lakes • Sustainable agriculture – collaborative land management practices within grazing, cropping, viticultural, horticultural, and aquaculture enterprises that enhance soil, water and biodiversity value to build resilience in agricultural systems.

Government plan/strategy	Overview	Project alignment
South Australia Government Climate Change Action Plan 2021-2025	The Action Plan describes 68 government-led actions addressing key objectives in the following seven focus areas: • Clean energy transformation • Climate smart economy • Climate smart agriculture, landscapes and habitats • Low emissions transport • Climate smart built and urban environments • Resilient communities • Government leading by examples. The Action Plan states that the state government is focused on ‘practical measures to address climate change that create jobs and growth, protect the environment and support community wellbeing’.	The project aligns with the Action Plan by building climate resilience into the Clare Valley and its community and doing so in a way that reduces the demand on native water sources and creates jobs and prosperity in one of Australia’s premier wine regions to boost the local, state and national economies.

3.4.3 Local government and industry strategies and plan

The following table outlines the local government strategies and plans that were identified as being relevant to the project, and the way the project aligns with them.

Table 13 Local government strategies and plans

Government plan/strategy	Overview	Project alignment
Clare & Gilbert Valleys Council's Strategic Plan (2019–2029)	The Clare & Gilbert Valleys Council's Strategic Plan will provide high-level direction for the future investment and delivery of services by the council. The Strategic Plan lists the following four themes: • Connected and empowered community. • Vibrant local economy. • Protected and enhanced natural and built environment. • Quality services, assets and infrastructure.	The project supports several outcomes under each theme which the council seeks to have realised by 2030. These outcomes include: • a burgeoning local economy built around successful businesses and industry providing local employment opportunities and attracting investment which contribute to the sustainability and enhancement of the district • successful agriculture, wine and tourism industries, as the foundation of the council area's local economy, that continue to develop through on-going investment, innovation and recognition • the emergence of new industries which leverage our local assets, such as quality produce and value-add to our existing industries such as agriculture • ensuring the council district's reputation for quality produce is sustainable and not compromised by climate and environmental impact.
CVWGA Strategic Plan (2018–2023)	As part of the strategic plan, the high price of water was considered a weakness of the region. Furthermore, access, price and security of water and climate change impacts were considered to be threats to the grape growing. A key stated goal of the strategic plan is to secure, long-term sustainable and affordable water resource for Clare Valley grape growing.	The project seeks to identify the best option for secure, sustainable and affordable water resources for the Clare Valley growers.

3.5 OTHER INITIATIVES

Other initiatives that the PBC may impact, or be impacted by, include:

- the Barossa New Water detailed business case
- a review of the Water Allocation Plan for the Clare Valley PWRA
- the business case for the Northern Water Project.

3.6 CRITICAL SUCCESS FACTORS

The critical success factors for the successful PBC are:

- detailed and ongoing community engagement including rigorous demand assessments

- cost-effective water supply options design
- 'right-sized' proposal to meet the demand needs of water users in the area to ensure commercial and financial factors for the South Australian Government and the community are managed.

Section B – Technical Assessment

4 Options development

4.1 BASE CASE DEFINITION

ISA states that the base case is:

- a realistic representation of ‘business as usual’ and consider how to maintain existing service levels and possibly respond to forecast demand levels with established assets, systems and processes
- aligned with current wider developments such as recent trends in customer behaviour, new relevant legislation or service price changes.

Infrastructure Australia states that the project appraisals compare the costs and benefits of doing something – the project case – with ‘do minimum’ base case such that:

- do minimum does not mean ‘do nothing’
- do minimum means opex only – no new (currently unapproved) capex.

The base case is, therefore, is a ‘real world’ assessment of the future infrastructure and operations, making reasonable assumptions of future developments.

The current state and demand situation in the case for change (Section 2) provides the basis for the base case. The base case, therefore, is summarised as:

- the region will continue to be dependent on grape and wine production along with existing other agricultural production
- grape and wine production will continue to be volatile, driven by changes in rainfall availability and the use of non-rainfall sources that do not compensate for this changing rainfall
- the use of a range of non-rainfall sources, including streamflow and groundwater, may eventually have significant ecological impacts. It is understood that there may be negative environmental impacts currently in certain areas (e.g. rising salt levels in groundwater)
- climate change is forecast to increase temperatures and evaporation in the region, and the rainfall impact will be a change in rainfall patterns (e.g. less rainfall during winter)
- farm profitability and future investment will continue to be hindered by the uncertainty associated with water supply.

4.2 PREVIOUS OPTIONS

The most recent report which investigated water supply and delivery options for Clare Valley water users was the Strategic Availability Review (December 2021). The purpose of the Strategic Availability Review was to assess seasonal water availability and supply options for the Clare Valley. It considered several prior investigations, including:

- the Goyder Institute for Water Research’s Inventory of Water Resources and Management Supply Options in the Clare Valley (August 2014)
- PIRSA’s PBC for the Northern Adelaide Irrigation Scheme (NAIS) Expansion and the relevant consideration of the Clare Valley (August 2019)
- CVWGA Water Pre-Feasibility Study (December 2020).

The Strategic Availability Review included an assessment of possible water availability and supply options to the region, and a summary of appropriate governance and commercial models for an irrigation distribution network.

The Strategic Availability Review included an initial longlist that considered a wide variety of different water types (recycled, surface, ground, aquifer, sea water, etc.) and geographic locations respective to the Clare Geographical Indication (GI) zone.

The target of the review was to provide at least 5 GL additional water supply requirement to the region to produce an additional 10,000 tonnes per year of grapes. This would achieve the CVWGA's target of a sustainable yield of 30,000 tonnes per year by 2030. Infrastructure options were predominately identified to deliver at least 5 GL additional water.

In total, 38 options were considered and screened based on the availability and reliability of the supply to achieve the region's 2030 ambitions. The options were also screened for affordability in treatment and transport of each source to the Clare GI to enable a fair comparison between sources and an assessment of the timing to enable each supply to be delivered to the Clare GI to support a 2030 timeframe.

The 38 options were shortlisted to 10 options that predominantly centred on two water source options for the region:

- the River Murray, through direct connection or via existing SA Water Infrastructure
- recycled water from SA Water treatment facilities in metropolitan Adelaide.

The 10 shortlisted options were developed and assessed via a multi-criteria analysis (MCA) process to determine their suitability to meet the ambitions of the region. The MCA assessment built on the long-list screening process, with the inclusion of an assessment of regional equity, comparative capital requirements and political/legislative considerations.

The top ranked options were:

- water supplied to the region from a new raw water pipeline from the River Murray
- water supplied via the Morgan Whyalla system off-peak to the Bundaleer Dam to supply the region via a raw water pipeline to the north of the Clare GI
- water supplied via a direct offtake off the Morgan Whyalla system, potentially utilising the existing CVWSS.

All three options were assessed from a commercial perspective and, with a 50% Commonwealth funding assumption to support capital costs, offer merit for further consideration in the PBC for comparison with existing water supply options for irrigators.

The Strategic Availability Review noted that if the affordability factor was not included (or reduced) in the MCA assessment, the other water supply option worthy of consideration in a PBC is the treatment and transfer of treated water from the output of the Bolivar WWTP, including high-salinity supplies.

4.3 POTENTIAL INITIATIVES

Following the identification of service needs and the base case through planning processes, the first stage of prioritisation involved the consideration of a range of ideas that can address an identified service need and generate a project. There may be several options available to address a need, with benefits as well as disadvantages to each.

These options may be infrastructure or non-infrastructure solutions.

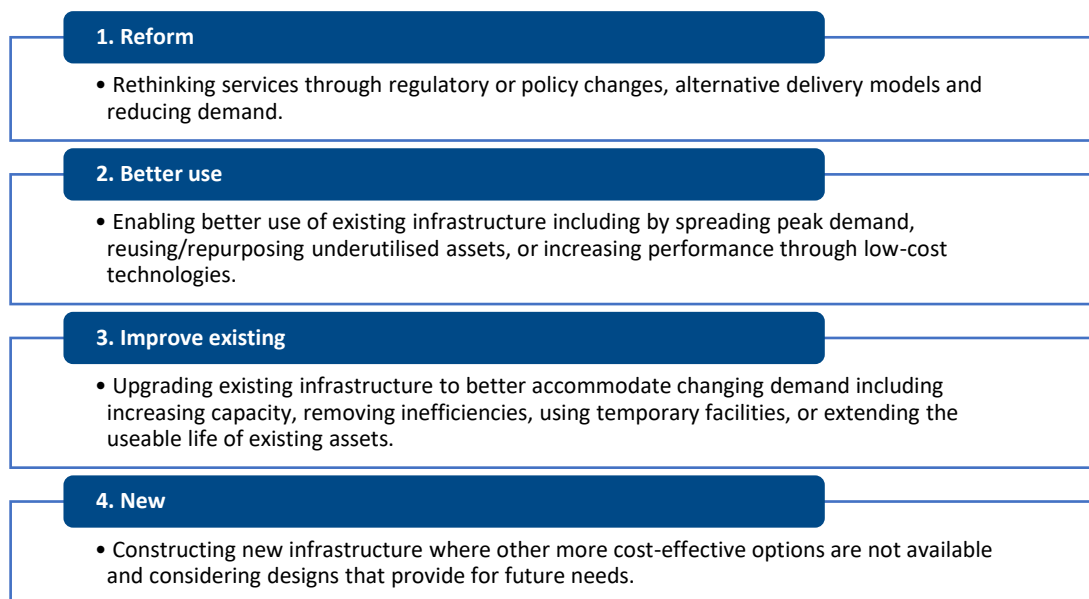
Targeted stakeholder consultation through workshops and interviews has provided key insights and has informed the long-list development.

ISA's 20-year infrastructure strategy (May 2020) outlined seven key principles (Figure 40) to improve the planning and delivery of infrastructure in South Australia.

Figure 40 ISA's key principles for infrastructure planning and delivery

Typically, there is a preference for non-build options, as building new infrastructure is expensive. In many situations multiple options will be required to achieve the desired outcome. A combination of 'better use' and 'improve existing' may delay the need for 'new' infrastructure, while 'reform' in combination with 'new' could reduce the cost of new infrastructure.

Figure 41 provides an overview of the order of priority of effective solutions adopted by many state governments and Infrastructure Australia when considering a range of solutions that have the potential to achieve the desired outcome.

Figure 41 Order of priority of effective solutions

Source: Adapted from Queensland's Draft State Infrastructure Strategy (November 2021) and Infrastructure Australia's Assessment Framework (March 2018).

4.4 OPTIONS DEVELOPMENT PROCESS

The initial step in developing the options longlist was consideration of the project's ILM and the three problem statements.

Solutions to these problems were developed as options under the each of the effective solution categories outlined in Figure 41.

An initial assessment of the additional water provided by each option was defined under 3 categories:

- less than 1 GL
- between 1 GL and 3 GL
- greater than 3 GL.

This is based on KBR's desktop assessment/forecast of demand for additional water in the area.

The full list of the 38 options identified in the strategic analysis long-list were considered. The strategic analysis focused on delivering at least an additional 5 GL per annum and predominately concentrated on infrastructure solutions.

The options longlist has focused on:

- identifying non-infrastructure solutions
- the shortlisted options of the strategic analysis
- reconsidering options excluded during strategic assessment shortlisting due to not meeting 5 GL target, based on KBR's assessment that demand is more likely to be 0.5 GL to 3 GL for new water.

4.5 OPTIONS LONGLIST

Figure 42 and Table 14 provide a summary and details on the options that have been identified as part of the options longlist process.

Figure 42 Initial long-list overview

1. Reform	2. Better use	3. Improve existing	4. New
A1. Increasing the maximum irrigation application rate from 1ML per hectare under the Water Allocation Plan A2. Increasing the support to current (and new) water users in the Clare Valley A3. Additional marketing and branding to increase the sale price for wine (and grapes) from the Clare Valley A4. Increasing the simplicity, flexibility and understanding of water trading A5. Increasing the certainty and transparency of pricing frameworks of existing water products A6. Improving the access to and flexibility of groundwater entitlements	B1. Purchasing capacity in SA Water's potable water storages (e.g., Upper Wakefield Reservoir) B2. Using underutilised dams for storage between growers B3. An on-farm infrastructure program to support and winter water and summer nights water	C1. Expanding the Clare Community Wastewater Management System (CWMS) C2. Developing community storage/s to support delivery during peak periods C3. Extending the reach of the Clare Valley Water Supply Scheme (CVWSS) distribution network C4. Increasing the delivery capacity of existing CVWSS distribution network C5. Utilising the current operating capacity of Bundaleer Dam	D1. Local stormwater system D2. Treated water from Bolivar wastewater treatment plant (WWTP) D3. Treated water from Glenelg WWTP D4. New pipeline from River Murray D5. Returning the capacity of Bundaleer Dam and supplement storage from River Murray D6. A new direct offtake from the Morgan-Whyalla pipeline
Key: Less than 1 GL of additional water Between 1 GL to 3 GL of additional water Greater than 3 GL of additional water			

Table 14 provides a description of each option in the longlist.

Table 14 Initial longlist of options

Option ID	Option	Est. volume of additional water	Description
Reform			
A1	Increasing the maximum irrigation application rate from 1 ML per hectare under the Water Allocation Plan	Less than 1 GL	The 2009 Water Allocation Plan for the Clare Valley PWRA outlines the maximum taking and use of water in relation to area of land owned or occupied. The plan states: <i>The total volume of water from all sources that may be allocated for irrigation purposes (including imported water) should not exceed 1 megalitre per hectare of the relevant land per annum (where the relevant land is the aggregate of all contiguous land parcels owned or leased by the applicant) unless the Minister is satisfied that the application of more than 1 megalitre of water per hectare in any specified area of the land will not:</i> <i>(a) cause, or be likely to cause, a rise in the underground water level resulting in detrimental effects to structures or ecosystems; or</i> <i>(b) result, or be likely to result, in adverse effects on the natural flow or quality of another water resource; or</i> <i>(c) result, or be likely to result, in adverse effects to the productive capacity of the land including but not limited to, increases in land salinisation, waterlogging, or perched water tables; or</i> <i>(d) adversely affect water dependant ecosystems.</i> Water users have stated that this restriction is outdated and is not reflective of the current (and future) irrigation requirements in the Clare Valley. For those water users without non-irrigated, relevant land parcels, an irrigation rate of 1 ML per hectare is below the optimal application rate. A review of the 2009 plan should consider increasing the application rate to a sustainable level. This could be between 2 ML to 3 ML per hectare and lead to increased yields. This would still require the assessment of impacts or adverse effects. Considering the declining availability of native water sources, a greater focus on minimum quality standards for imported water may reduce this requirement and provide opportunities for increased flexibility.

Option ID	Option	Est. volume of additional water	Description
A2	Increasing the support to current (and new) water users in the Clare Valley to maximise production/output	Less than 1 GL	Increasing the support to current (and new) water users in the Clare Valley would lead to increased production/output from the use of irrigation water. A suite of initiatives to support current (and new) water users could include: • Increase the awareness of the definition of the '1ML per hectare' rule and the additional allowance provided with non-irrigated, relevant land parcels. • Increase the understanding of optimal irrigation rates and the impacts of drought on the future yields. • Support water users reconfiguring irrigation systems to better meet their application needs. • Provide current and reliable information on the most up to date scientific information, including expected changes to climate and expected reliability of existing water sources (including River Murray entitlements).
A3	Additional marketing and branding to increase the sale price for wine (and grapes) from the Clare Valley	Less than 1 GL	Increasing the sale price of wine (and grapes) will have a material impact to the profitability of the Clare Valley wine and grape sector. This could be a role for the CVWGA and include initiatives of valley-wide sustainability commitments, a carbon-neutral irrigation scheme and other measures to provide a 'point-of-difference' for a consumer for which they are prepared to pay an additional premium for.
A4	Increasing the simplicity, flexibility and understanding of water trading	Less than 1 GL	Increasing the simplicity, flexibility and understanding of water trading will lead to increased water use, water moving to the highest value uses and may avoid new and/or make better use of existing on-farm infrastructure. Improvements to existing processes and systems to obtain volumes of River Murray entitlements, or winter water and summer night allocations may be achieved through: • improving the awareness and making it easier to trade water (and pipeline capacity) between water users • simplifying the process to acquire small volumes of water allocations (less than 10 ML) from the River Murray for delivery under the third-party transfer agreements with SA Water • a local water trading notice board where local buyers and sellers of water allocations and pipeline capacity can be matched • simplifying trading forms and publication of traded prices to assist market participants.

Option ID	Option	Est. volume of additional water	Description
A5	Increasing the certainty and transparency of pricing frameworks of existing water products	Less than 1 GL	SA Water has been very supportive of Clare Valley water users, and no new initiatives or arrangements should compromise the current and ongoing goodwill. The CVWSS's water transportation charge schedule was established in 2015–16 before SA Water was governed under economic regulation and before the third-party access regulations were implemented. There may be some benefit in removing minimum aggregate demand requirements from SA Water when setting pricing due to the demonstrated water usage over several years. There could also be opportunities to reduce the concerns about future price rises and to provide short-term price certainty. This could be achieved through pegging future SA Water prices to a low-price index (e.g. regional South Australian CPI or Adelaide CPI – or whichever is lower). A case could be developed for a form of light-handed economic regulation that relies on cost and volume transparency. This may include consultation with irrigators via a funded pricing committee. Formalising this price stability/cost transparency approach may cost-effectively negate irrigator concerns about long-term price rises and encourage additional water uptake and on-farm investment, including expansion.
A6	Improving the access to and flexibility of groundwater entitlements	Less than 1 GL	There is an opportunity to improve the understanding of groundwater ecosystem to determine sustainable extraction limits. Water users believe there is an opportunity to increase allocations in several groundwater zones. The Landscape Board is currently carrying out monitoring of water-dependent ecosystems that will provide information to underpin any consideration for changes in this area. More flexible trading arrangements around groundwater entitlement, such as the separation of land and entitlements, will assist in water moving to higher value uses. Increased trading opportunities may allow those with groundwater entitlements with access to the CVWSS distribution network to trade those entitlements to those without access to the CVWSS distribution network. The shortfall from the trading of the groundwater entitlement could be replaced with additional or new water entitlements from an expanded CVWSS (or another new) distribution network. This example would avoid the need for the CVWSS to be extended to an unconnected water user through increasing their access to groundwater. There may be a role for an intermediary to support this 'swap' of groundwater and imported water entitlements.
Better use			
B1	Purchasing capacity in SA Water's potable water storages (e.g. Upper Wakefield Reservoir)	Less than 1 GL	There may be opportunity to purchase capacity in SA Water's potable water storages. One of these opportunities may be the Upper Wakefield Reservoir. Stored water may be able to be delivered at more suitable times for direct application, rather than delivered during winter or summer night periods. This is an unlikely option as it is not a very large storage, and it is also at the tail-end of the system for the Clare region.
B2	Using underutilised dams for storage between growers	Less than 1 GL	With the reduction in surface flow/runoff, some existing dams do not regularly fill and are underutilised. There may be opportunity for neighbouring landholders to make use of this spare capacity in the existing dams to store winter water.

Option ID	Option	Est. volume of additional water	Description
B3	An on-farm infrastructure program to support off-peak and winter water	Between 1 GL and 3 GL	Several large water users have installed multiple, large tanks on-farm to assist in taking advantage of lower cost water and being able to manage farm water demands throughout the day. This has led to increased flexibility and avoidance of state-wide priced water from SA Water during the middle of the day in summer. There is an opportunity for a coordinated program to assist those small and large water users who do not have sufficient on-farm storage and currently irrigate direct from the CVWSS (and may not get all the water required during peak times). The program may include: • government funding support for the purchase of on-farm storage (e.g. dollar-for-dollar matching) • coordinated procurement of on-farm storage to achieve pricing discounts and supply chain efficiencies • provision of expert advice for on-farm irrigation networks.
Improve existing			
C1	Expanding the Clare Community Wastewater Management System (CWMS)	Less than 1 GL	Utilisation of available water resources from the existing Clare CWMS scheme could be a useful water resource to supplement the development of a Clare Valley scheme. Currently, this water resource will only support the development of a scheme that can deliver <0.5 GL per year. Forecasts of regional growth will increase future water availability. This water resource may require further treatment (or mixing with higher quality water) to ensure that the source is acceptable quality to meet irrigation requirements.
C2	Developing community storage/s to support delivery during peak periods	Between 1 GL and 3 GL	Strategically located community storage/s could receive water during off-peak periods and deliver to water users during peak demand periods. The construction of new potable water storage/s would permit the existing potable CVWSS to still be utilised. Alternatively, a new raw water distribution network could be established from the community storage/s (if not constructed to potable water standards).
C3	Extending the reach of the CVWSS distribution network	Between 1 GL and 3 GL	Extending CVWSS network reach will provide opportunities for landholders to access water who previously had not had that opportunity. The availability of water will likely be outside the peak delivery period and will likely require additional on-farm storage (without any an additional infrastructure improvements). This option is likely to be considered with other options and with the results from the demand assessment.
C4	Increasing the delivery capacity of existing CVWSS distribution network	Between 1 GL and 3 GL	Increasing the capacity of existing CVWSS distribution network would involve the augmentation of the existing network to remove capacity constraints. This may allow additional water for existing customers and new customers to be connected to the existing network.

Option ID	Option	Est. volume of additional water	Description
C5	Utilising the current operating capacity of Bundaleer Dam	Between 1 GL and 3 GL	The current operating capacity of the Bundaleer Dam is reduced due to dam safety issues. This option does not consider any increase to the current operating capacity. The Bundaleer Dam has a very small (8 km²) local catchment with its historic yield viability achieved through access to a wider 1,559 km² supplementary catchment including the Bundaleer Creek (420 km²) and (prior to 1986) the Broughton River and Freshwater Creek catchments. The Bundaleer Dam is located 35 km from the northern extent of the Clare GI zone. Rainfall runoff captured by the Bundaleer catchment could conservatively support a 1–3 GL per year scheme to the Clare Valley. The water will have to be transferred to the region and treated to ensure salinity and other water quality parameters are appropriate. Addition of water from the Morgan Whyalla pipeline will reduce the salinity of the dam water to provide a suitable water quality that meets growers' requirements. A new raw water distribution network is likely to be required for this option.
New infrastructure			
D1	Local stormwater system	Between 1 GL and 3 GL	Capture and reuse of stormwater runoff within the region could support the development of a 0.5–2 GL per year scheme. Captured water would have to be treated to ensure water quality parameters are fit for purpose. The reliability of this resources is comparatively uncertain. A new raw water distribution network will also be required and would need consideration as part of the WAP review.
D2	Treated water from Bolivar WWTP	Greater than 3 GL	Provision of treated water from Bolivar WWTP. Water resources will then be transferred north to the Clare Valley. This option is linked to the investigation of taking water from the Bolivar WWTP to the Barossa and Eden valleys (referred to as the Barossa New Water project). Capacity of this option is dependent upon uptake by future NAIS customers and the potential expansion the Barossa and Eden valleys. This option will require treatment to ensure that the source is acceptable to meet all irrigation requirements—likely between 300 and 400 ppm. A new recycled water distribution network will also be required. This is a climate independent source of water.

Option ID	Option	Est. volume of additional water	Description
D3	Treated water from Glenelg WWTP	Greater than 3 GL	Provision of treated water (between 300 and 400 ppm) from Glenelg WWTP. Wastewater from Glenelg WWTP is a readily available water resource that could support the development of a >10 GL per year scheme to the Clare Valley. This option will require treatment to ensure that the source is acceptable to meet all irrigation requirements—likely between 300 and 400 ppm. A new recycled water distribution network will also be required. This is a climate independent source of water.
D4	New pipeline from River Murray	Greater than 3 GL	The development of a new pipeline from the River Murray could deliver raw water to the Clare Valley that can support a >10 GL per year scheme. This water source can be pumped on an as-needs basis. A new raw water distribution network will also be required. There could be opportunities to increase the scale of this option with demand along the pipeline route, including new and existing users in the Barossa and Eden valleys.
D5	Returning the capacity of Bundaleer Dam and supplement storage from River Murray	Greater than 3 GL	The Bundaleer Dam capacity could be increased with dam safety issues being addressed. This option assumes that the dam is still connected to the surrounding catchment and therefore can capture seasonal runoff. Addition of water from the Morgan Whyalla pipeline will reduce the salinity of the dam water to provide a suitable water quality that meets growers' requirements. A dam safety investigation/upgrade will need to be completed and water will need to be transferred south into a distribution network. This option increases the confidence of being able to access 5–10 GL per year. Additional demand could be located between the Bundaleer Dam and north of the Clare Valley. A new raw water distribution network is likely to be required for this option.
D6	A new direct offtake from the Morgan–Whyalla pipeline	Greater than 3 GL	A direct offtake from Morgan Whyalla pipeline or one of the major trunk mains that feed Mintaro can distribute water into a new storage dam in the region. Water within this dam can be accessed under 3rd party arrangements to support a 5–10 GL per year scheme within the Clare Valley. A new distribution scheme may be required to take full advantage of the additional capacity.

4.5.1 Long-list to shortlist

The long-list process identified 20 options for further consideration.

To commence the process to produce an options shortlist, each option went through an initial screening process.

Initial long-list screening

This process considered each of the 20 identified options against the following three criteria:

- Is it clear that another option would outperform this option?
- Is the option likely to deliver greater than 1 GL of new water (>90% reliability) to materially address the problem statement/s?
- Is the option able to meet the demand expressed in the Round 1 demand assessment?

In summary:

- Options that provided limited additional water (less than 1 GL) were excluded from further investigation as part of the PBC (typically 'reform' or 'better use' options). However, these options are considered to be best investigated further by relevant stakeholders (such as the Department of Environment and Water and local representative group/s (e.g. the CVWGA)).

The non-infrastructure 'reform' solutions are extremely important and would be complementary to any improvements to existing infrastructure or the development of new infrastructure, in particular improvements to the flexibility and understanding of water pricing and the transparency and certainty of existing pricing frameworks.

- A local stormwater system and expanding the CWMS did not meet the supply requirements as expressed in the Round 1 demand assessment (less than 1 GL).
- Treated water from Glenelg WWTP was considered inferior to the Bolivar WWTP option due to the complexity and additional infrastructure required to supply the Clare Valley as Bolivar WWTP is closer to the Clare Valley.
- The volumes of the Round 1 demand assessment did not warrant the capex associated with returning the Bundaleer Dam to its original capacity.
- A new direct offtake from the Morgan–Whyalla pipeline was considered inferior to an upgrade of the CVWSS as the capacity restrictions are in the CVWSS rather than the infrastructure between the distribution network and the Morgan–Whyalla pipeline.

Further investigations

Table 15 outlines the four remaining options from the longlist that were considered for further investigation.

Table 15 Options considered for further investigations

Option ID	Option	Estimated volume of additional water
C2, C3 and C4	A combination of three options to upgrade and expand the CVWSS: • Developing community storage/s to support delivery during peak periods • Extending the reach of CVWSS distribution network	Between 1 GL and 3 GL

Option ID	Option	Estimated volume of additional water
	Increasing delivery capacity of existing CVWSS network	
C5	Utilising the current operating capacity of Bundaleer Dam	Between 1 GL and 3 GL
D2	Treated water from the Bolivar WWTP	Greater than 3 GL
D4	New pipeline from River Murray	Greater than 3 GL

As part of the PBC's technical investigations, Inside Infrastructure undertook initial engineering on the four options to meet the demand volumes expressed at 10 up-front and annual charge scenarios during the Round 1 demand assessment process (Table 16).

Table 16 Ten water demand scenarios considered

Demand scenario	Annual charge (\$/ML)	Capital price (\$/ML)	Demand (ML/year)
Low 1	1,000	4,000	6,100
Low 2	1,000	7,000	2,800
Low 3	1,000	10,000	2,300
Medium 1	1,500	4,000	3,500
Medium 2	1,500	7,000	2,500
Medium 3	1,500	10,000	1,900
High 1	2,000	4,000	2,700
Hing 2	2,000	7,000	1,900
High 3	2,000	10,000	1,100
Very high 1	2,500	4,000	1,800

A high-level cost estimate of each option under the 10 demand scenarios were considered to enable an assessment as to the probable (green), possible (amber) or unlikely (red) of an affordable option under the following customer up-front capital and annual charge assumptions:

- Up-front capital charge – based on 25% of capital cost of the option funded from up-front contributions and the 75% balance from government grant funding (refer to Budget Raised column of Table 17).
- Annual charges – all operating expenses are funded from customer annual charges.

The cost basis for both components was indicative to support the suitability screening process and applied consistently across the field of 40 option scenarios (4 water option schemes x 10 budget options).

Table 17 outlines the results of the high-level assessment.

Table 17 High-level cost estimates of four option under the ten demand scenarios

Demand scenario	Annual charge (\$/ML)	Capital price (\$/ML)	Demand (ML/year)	Budget raised (\$ million)	CVWSS capex (\$ million)	CVWSS opex (\$/ML)	Bundaleer capex (\$ million)	Bundaleer opex (\$/ML)	Recycled capex (\$ million)	Recycled opex (\$/ML)	Murray capex (\$ million)	Murray OPEX (\$/ML)
Low 1	1,000	4,000	6,100	97.6	NA	NA	103	1,989	301	2,547	145	1,425
Low 2	1,000	7,000	2,800	78.4	56	1,928	45	1,647	162	2,786	106	1,786
Low 3	1,000	10,000	2,300	92.0	51	1,956	42	1,727	143	2,898	100	1,935
Medium 1	1,500	4,000	3,500	56.0	61	1,900	61	1,660	207	2,795	112	1,643
Medium 2	1,500	7,000	2,500	70.0	53	1,943	44	1,695	147	2,817	100	1,850
Medium 3	1,500	10,000	1,900	76.0	47	1,988	41	1,826	126	3,014	90	2,044
High 1	2,000	4,000	2,700	43.2	54	1,931	44	1,662	150	2,742	101	1,786
High 2	2,000	7,000	1,900	53.2	47	1,988	41	1,826	126	3,014	90	2,044
High 3	2,000	10,000	1,100	44.0	10	1,988	36	2,198	94	3,537	72	2,557
Very high 1	2,500	4,000	1,800	28.8	47	2,000	41	1,858	123	3,074	89	2,102

Table 17 identifies that the high-level cost estimate of the treated water from the Bolivar WWTP and a new pipeline from River Murray recycled under the majority of the 10 demand scenarios were considered very unlikely to be affordable based on customer up-front capital (and budget raised) and annual charge assumptions: The Bolivar WWTP option assumes the Barossa New Water project is supported (e.g. least cost scenario through efficient use of infrastructure). More details on this analysis is located in Appendix E.

From this assessment process, two options were taken forward for further development to inform the PBC:

- 3,000 ML per year supply from the CVWSS to community/private storage and irrigation system supply (drawing on scenarios High 1 and High 3).
- 3,000 ML per year supply from the Bundaleer Dam through a new whole-region irrigation system (drawing on scenarios Medium 1, Medium 2, and High 2).

Further details on this assessment are included in Appendix E.

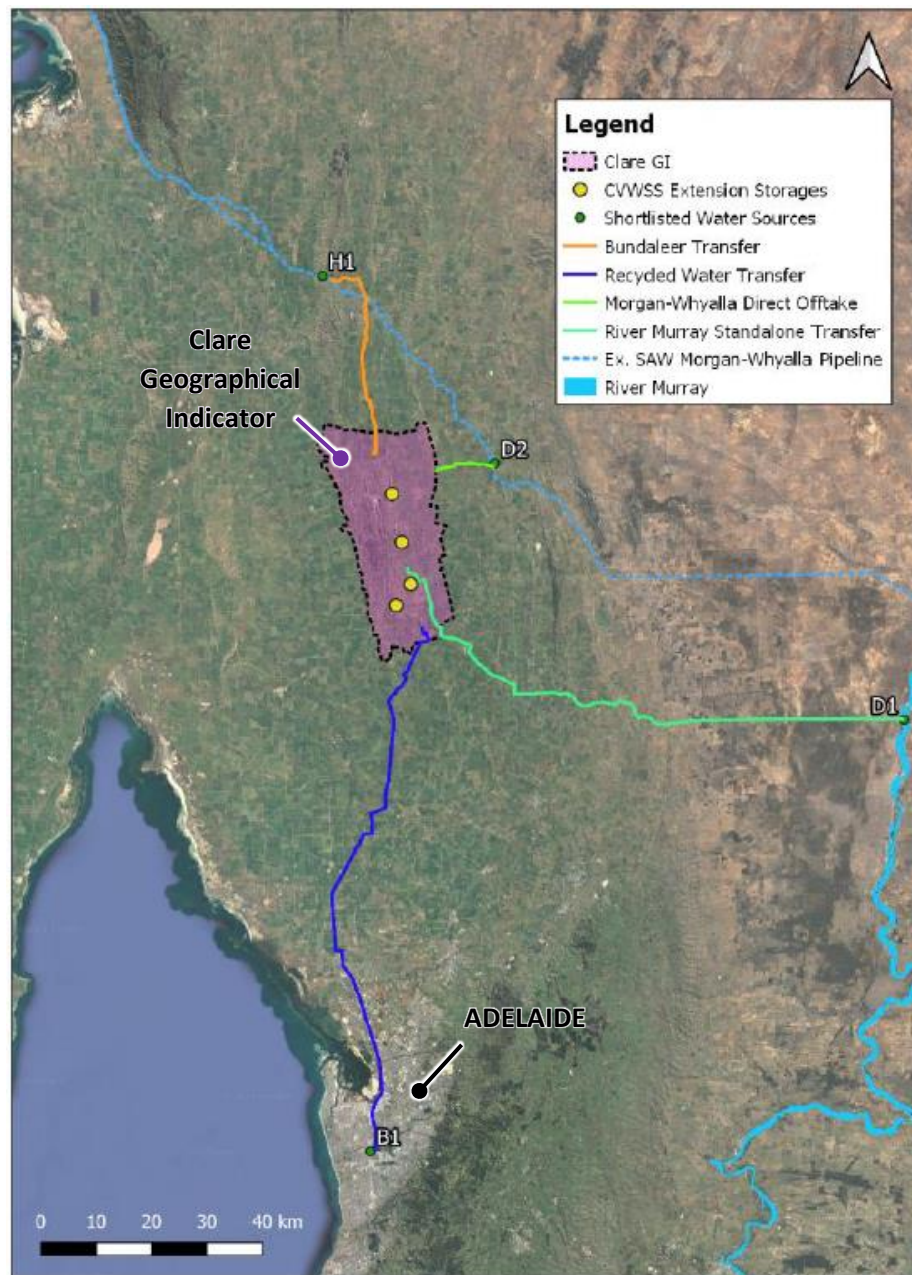
4.6 SCOPE OF OPTIONS SHORTLIST

This section presents a summary of the engineering considerations and proposed infrastructure for each of the shortlisted options. Further details are presented in Appendix E.

4.6.1 Project location

This project is located in the Clare Geographical Indicator (GI), which encompasses the Clare Valley and surrounding area. It is located approximately 150 km north of Adelaide in South Australia. A map of this Clare GI and potential pipeline connection routes to nearby water supplies is presented in Figure 43.

Figure 43 Project location and potential sources of water



4.6.2 Options shortlist overview

The pertinent operational and infrastructure details of the options shortlist are presented in Table 18.

Table 18 Scheme and infrastructure summary of Clare Valley shortlisted options

	Option 1	Option 2
Water source	CVWSS	Bundaleer Dam
Customer demand (ML/year)	3,000	3,000
Number of property outlets	102	102
Length of pipeline (km)	107	155
Number of pump stations	4	1
Total pump station size (kW)	78	1,762
Number of storages	4	1
Storage volume (ML)	2,200	100
Guaranteed pressure at customer connection (m)	10	10

The following sections provide further details on the infrastructure proposed under each of the shortlisted options.

The options have been developed based on the volumes and locations of demand expressed through the Round 1 demand assessment. A network has been developed that supplies water to as much of that expressed demand efficiently and through infrastructure that could reasonably be funded by an affordable customer pricing and government funding arrangement. Four properties that expressed an interest have not been included in the initial design. The low volumes expressed by these four properties was not viable for the pipeline network to be extended. These potential customers are encouraged to participate in future demand assessment and to support other properties near them to improve the viability of a pipeline extending to their area.

The proposed networks were modelled using WaterGEMS to assess hydraulic and operational performance.

4.6.3 Option 1 CVWSS upgrade infrastructure

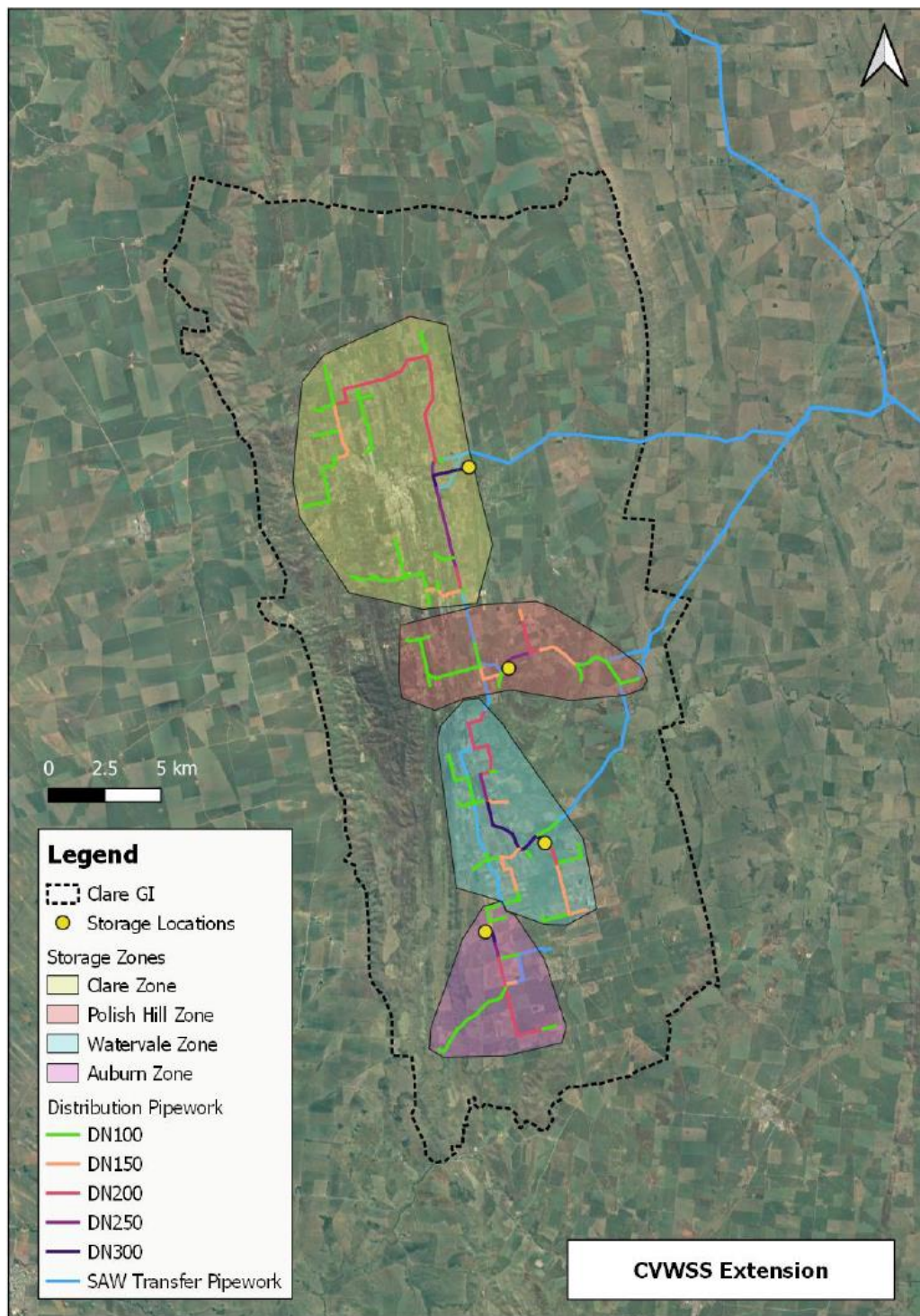
The following subsections provide an overview of the infrastructure proposed under Option 1 CVWSS upgrade.

When developing Option 1, the analysis considered the additional cost developing storages suitable for potable water against non-potable water. The analysis concluded that it was more cost-effective to build less expensive non-potable water storages and build a new non-potable delivery network. This was based on the available information regarding the design and location of demands for the CVWSS.

Refer to Appendix E for further details on the investigations undertaken and design assumptions made in developing the Option 1 infrastructure.

An overview of the Option 1 network layout is presented in Figure 44.

Figure 44 Overview map of Option 1 CVWSS upgrade



CVWSS connection, water storage and customer supply zones

Water will be supplied from the existing CVWSS, which sources River Murray water from the Morgan to Whyalla Pipeline.

It is understood at the time of this PBC that the CVWSS has 38 ML/day capacity above the residential and commercial customer requirements, and of this, 20 ML/day is committed to bulk water transfer to Swan Reach Paskerville systems. This indicates 18 ML/day is available to the proposed CVWSS upgrade under Option 1.

Water use data indicates that the highest period of demand from the CVWSS is over January, during which 19% of the annual supply is consumed over a single month. For the proposed new 3,000 ML scheme, this equates to an average day of demand in January of just over 18 ML, which is the maximum the current CVWSS has capacity to provide. Peak days will therefore exceed the capacity of the CVWSS.

The proposed solution is to construct four new storages to buffer peak periods of demand between the CVWSS and the new scheme. Storage locations have been selected to supply clusters of demand that were expressed through the Round 1 demand assessment, forming four zones within the proposed scheme upgrade.

A map of demand parcels and the proposed zoning is provided overleaf in Figure 46.

The storages have been sized to hold the typical peak period demand from December to April, equal to 72% of annual use, or 2,200 ML across the full proposed scheme. Storage sizing is detailed in Table 19.

Table 19 Proposed new storages and volumes under Option 1 CVWSS upgrade

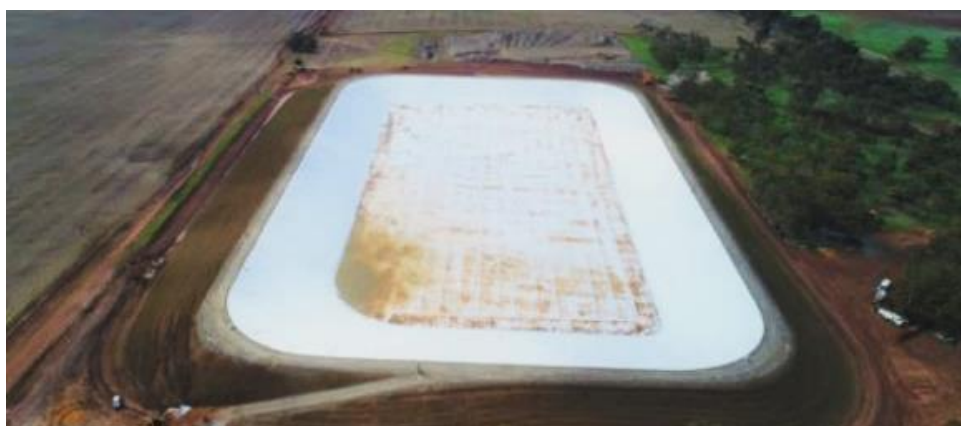
Storage / Zone name	Storage volume (ML)
Clare	600
Polish Hill	350
Watervale	800
Auburn	450
TOTAL	2,200

The storages will be filled over the off-peak months to optimise water prices for customers and can distribute during the peak months when demand and prices are highest, or whenever the water is needed.

The remaining 800 ML may be taken by customers on demand, and for costing purposes it has been assumed to be taken at the night-time tariff during the peak season.

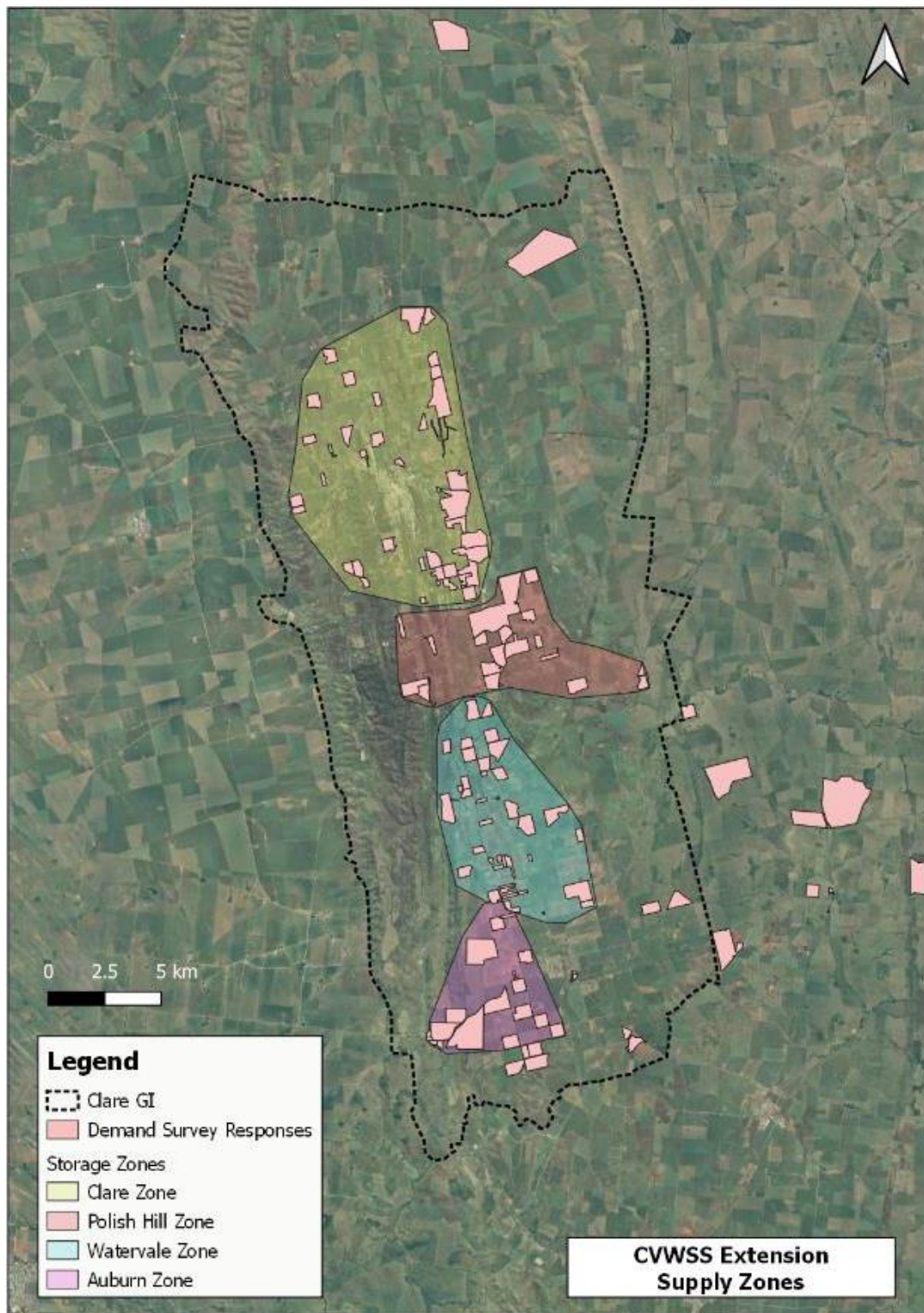
A conventional ‘turkey nest’ irrigation storage reference design has been adopted as the design basis. This is an earthen bank storage with a high-density polyethylene (HDPE) lining on geotextile over a compacted clay base. Fencing around the perimeter will provide security from unauthorised access and intrusion from animals. An example of the proposed storage type is the Auburn Terra Rossa Storage, displayed in Figure 45.

Figure 45 Example of an HDPE lined turkey nest irrigation storage – Auburn Terra Rossa storage



The storages will be uncovered and the end-use is for irrigation. Once the water from the CVWSS scheme has entered the storages, it will no longer be for potable supply.

Figure 46 Customer demand parcels and proposed supply zoning under Option 1



Pipelines and pumping

A distribution network will be constructed using polyvinyl chloride (PVC) pipe with a pressure rating of PN16 and sized to provide a peak day of one per cent of annual demand. This is equal to 30 ML/day over the whole of the network and varies across individual zones to meet localised demand.

The length of pipeline infrastructure by diameter is detailed in Table 20. The total length of pipelines is 107 km.

Table 20 Pipeline quantities by diameter under Option 1

Pipe diameter (mm)	Pipe material and class	Pipe length (km)
100	PVC-O PN16	51.7
150	PVC-O PN16	16.3
200	PVC-O PN16	23.3
250	PVC-O PN16	7.8
300	PVC-O PN16	7.6
TOTAL		107

Three pump stations will be installed to boost pressure where needed to overcome elevation increases and maintain the guaranteed minimum pressure of 10 m to customers during peak periods of demand. The pump stations and their sizing are listed below in Table 21.

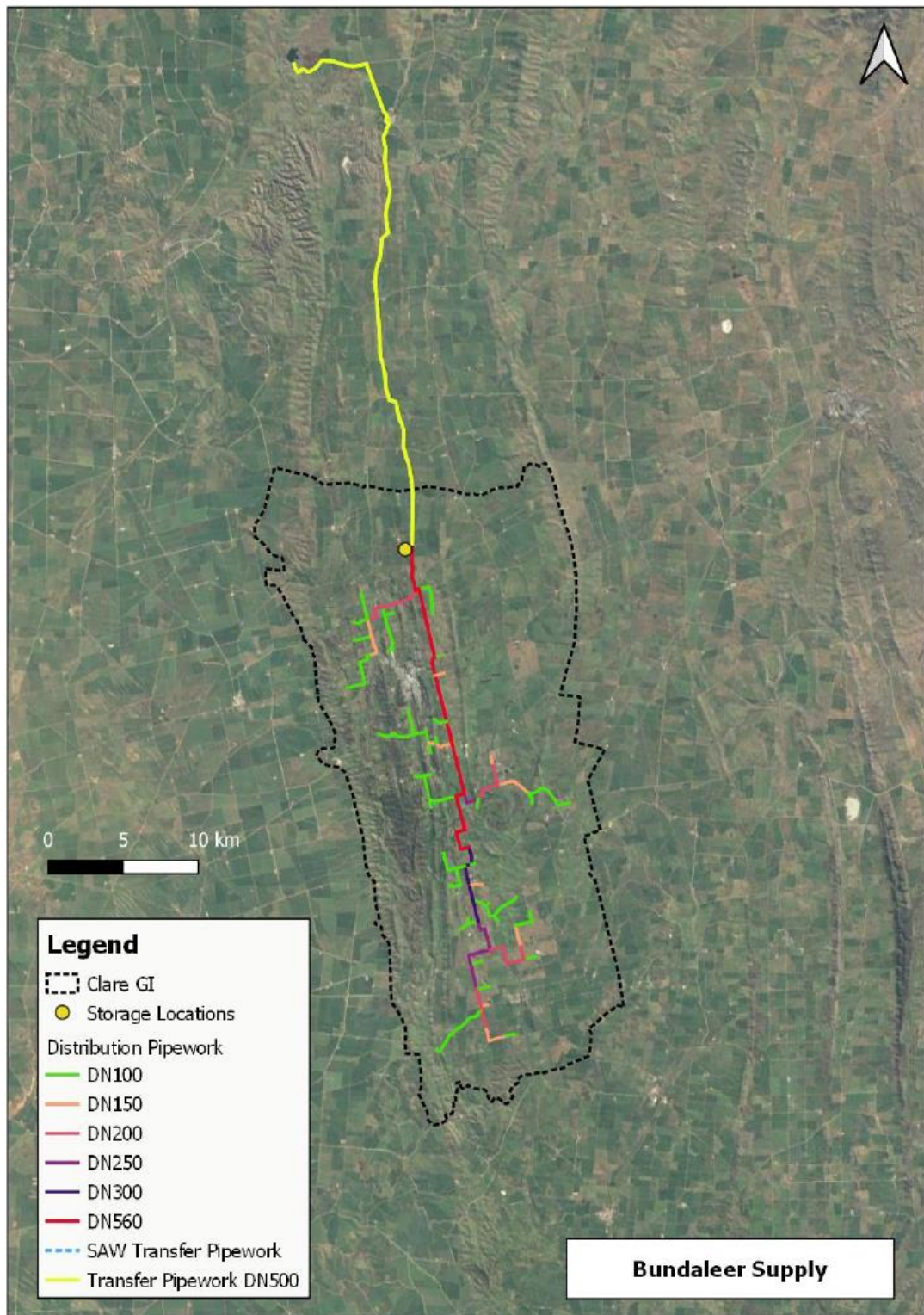
Table 21 Pump stations under Option 1

Pump station	Size (kW)
Watervale	65.4
Polish Hill 1	7.0
Polish Hill 2	5.3
TOTAL	78

4.6.4 Option 2 Bundaleer supply infrastructure

The following subsections provide an overview of the infrastructure proposed under Option 2 Bundaleer Dam supply. Further details on the investigations undertaken and design assumptions made are provided in Appendix E.

Figure 47 Overview map of Option 2 Bundaleer supply



Bundaleer Dam supply

The Bundaleer Dam is a 6.3 GL contingency supply dam located roughly 40 km north of the Clare GI. It stores water from the local catchment and has previously been connected to the Morgan–Whyalla Pipeline for supplementary supply with filtered River Murray water. The River Murray water is typically of a quality between 200 and 300 mg/L, but blends with the local catchment water in the dam to result in a non-potable product of roughly 500 mg/L or less.

The Bundaleer Dam is shown in Figure 48.

Figure 48 Bundaleer Dam – water source for Option 2



Source: Government of South Australia, [Reservoir reserves: Bundaleer](#), Government of South Australia website.

Bulk transfer pumping and pipelines

A 40 km trunk main will transfer water from Bundaleer Dam to the Clare GI. The pipeline will be a 500 mm diameter mild steel cement lined (MSCL) pipe with a pressure rating of PN35. The proposed alignment is detailed in Table 22.

Table 22 Option 2 transfer main alignment

Street name	Section length (km)	Running total length (km)
Goyder Highway	9.5	9.5
Trelyn Road	0.5	10
R M Williams Way	10.3	22.3
Hutt River Road	6.6	28.9
The Bluff Road	0.7	29.6
Lehman Creek Road	3.1	32.7
Calcannia Road	7.1	39.8

A 930 kW transfer pump station will be required to lift water from an elevation of about 290 m Australian Height Datum (mAHD) at Bundaleer Dam to 420 mAHD at a storage at the top of the Clare GI, a rise of 130 m.

Water storage

The transfer main will discharge into a 100 ML storage at the northern end of the Clare GI. This is assumed to be a conventional ‘turkey nest’ earthen storage with HDPE lining, similar to the example displayed in Figure 45.

This storage will perform as a balancing tank between the Bundaleer transfer pump station and the distribution network, to provide a constant inlet pressure to the distribution network. An elevated site has been selected to reduce the pumping effort into the network, which is significant. Details are provided in the following section.

Distribution pumping and pipeline network

The network under Option 2 is similar to that under Option 1 in that it connects to the same parcels of demand (displayed in Figure 46) and therefore follows almost identical alignments. The difference is that all water is supplied from the north and is distributed through a single network encompassing the whole area, rather than via four discrete zones as is the case in Option 1.

The length of pipeline infrastructure by diameter is detailed in Table 23. The total length of distribution pipelines (i.e., not including the 40 km transfer main) is 115 km.

Table 23 Distribution pipeline quantities by diameter under Option 2

Pipe diameter (mm)	Pipe material and class	Pipe length (km)
100	PVC-O PN16	51.4
150	PVC-O PN16	12.8
200	PVC-O PN16	15.0
250	PVC-O PN16	7.6
300	PVC-O PN16	5.4
560	MSCL PN24	22.9
TOTAL		115

The supply coming from the north with a single encompassing network means significant pumping effort is required for distribution. This is because the water must be pumped 33 km from the northern tip of the network to the southern tip.

Four distribution pump stations will be installed to distribute and boost pressure to overcome elevation increases and maintain the guaranteed minimum pressure of 10 m to customers during peak periods of demand.

Two of these pump stations (Bundaleer 1 and 2) serve as in-system transfer pump stations to transfer water through the 23 km MSCL main down the centre of the network. The pump stations and their sizing are listed in Table 24.

Table 24 Distribution pump stations under Option 2

Pump station	Size (kW)
Bundaleer 1	396
Bundaleer 2	402
Bundaleer 3	29
Polish Hill	5
TOTAL	832

5 Option assessment

5.1 ECONOMIC ASSESSMENT

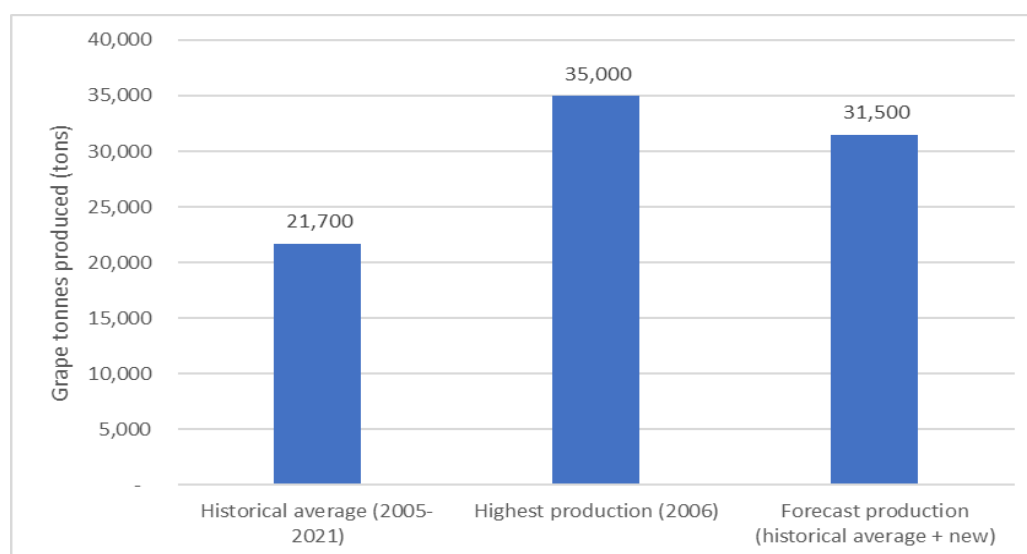
5.1.1 Key points

- The economic analysis provides the BCR's and net present values (NPVs) of the project in line with South Australian and Infrastructure Australia business case guidelines.
- The two options included this analysis are:
 - Option 1 - CVWSS upgrade
 - Option 2 - Bundaleer Dam.
- Both options are proposed to supply 3,000 ML of nominal supply per year so the benefit case is the same for the two options.
- The core economic benefits are increased agricultural production, including grapes, and additional wine production.
- The results of the economic analysis are shown in Table 25.

Table 25 Economic analysis results (7% discount rate and medium costs)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Total benefits (\$ million)	142.4	145.1
Total costs (\$ million)	120.9	137.8
NPV (\$ million)	21.52	7.32
BCR	1.18	1.05

- At medium costs and 7% discount rate, the BCRs for Options 1 and 2 are above 1 although Option 2 is lower.
- The likely increase in grape production from new water demand, excluding substitution, is shown in Figure 49.

Figure 49 Forecast new grape production (tons per annum) excluding substitution for Option 1 and 2

- The likely additional jobs from the two options are shown in Table 26.

Table 26 Agricultural and wine FTE positions at full production

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Agricultural production FTE's		
Direct	40	40
Indirect	49	49
Total	89	89
Wine production FTE's		
Direct	131	131
Indirect	144	144
Total	275	275

- The Infrastructure Australia guidelines provide another method to determine employment impacts which focuses on direct impacts. These direct jobs are shown in Table 27.

Table 27 Maximum direct employment (FTE's) – Infrastructure Australia approved method

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Agricultural production FTE's		
Direct	47	47
Wine production FTE's		
Direct	95	95
Construction		
Direct	68	100
210	242	210

5.1.2 Approach

The economic analysis develops a coherent socio-economic narrative of the qualitative and quantitative costs and benefits of two project options. It is supported by a robust and transparent B (CBA).

The goal of economic analysis is to document the economic merit of the options.

The economic analysis approach is as follows:

- Describe the economic base case.
- Identify all cash flows to be considered for the options.
- Where economic impacts are material and quantifiable, quantify the economic benefits and costs (i.e., net cash flows) relative to the base case.
- Estimate the net economic impact, in terms of both the BCR and NPV of the scheme relative to the base case.
- Test the sensitivity of key inputs.

The economic costs and benefits are considered independently of the financing option and the interest paid. The economic assessment measures the economic benefit over time, and then converts that to today's dollars using a range of discount rates (i.e., presenting NPV).

The general parameters and assumptions include model start year, assessment period and discount rates. The starting year and assessment period are shown in Table 28.

Table 28 Starting year and assessment period

Parameter	Unit	Value
Starting year	Year (period)	2023
Assessment period	Number of years	30

Discount rate scenarios, with the medium scenario (7% real) being the central scenario, are shown in Table 29.

Table 29 Discount rate scenarios

Discount rates	Real discount rate, pre-tax (%)
Low	4%
Medium (central)	7%
High	10%

The alignment of these key parameters with the relevant frameworks is outlined in Table 30.

Table 30 Alignment of key economic assumptions

Parameter	Adopted value/s
Discount rate	7% (central) 4% and 10% (sensitivities)
Starting year	2023
Appraisal period	30 years with residual value of asset value included

5.1.3 Base case

The base case for the project is provided in the relevant section. The following are the key points of the base case:

- The base case provides a realistic assessment of the study region in the absence of the project.
- The region is dependent on grape and wine production, and this dependence will continue in the future under the base case.
- Recent grape and wine production has been volatile, driven by changes in growing season rainfall availability and the use of non-rainfall sources has not compensated for recent rainfall.
- In addition, using a range of non-rainfall sources including streamflow and groundwater has had significant ecological impacts.
- The reliance on non-rainfall sources and related ecological impacts will continue under the base case.
- Climate change is forecast to increase temperatures and evaporation in the region, but the rainfall impact will be a change in rainfall patterns which is likely to further increase the need for non-native water sources.

5.1.4 Options

The economic assessment examines two options for the project:

- Option 1 - CVWSS upgrade
- Option 2 - Bundaleer Dam

Detailed description of the options is provided in Section 4.6.

5.1.5 Likely water demand

The two options have been designed to supply a nominal volume of 3,000 ML. The detailed Round 1 demand assessment as part of this project revealed that a 3,000 ML demand maximised customer contributions.

Both options will source water from the River Murray and the 15 year historical reliability of that source is shown in Table 31.

Table 31 Reliability of water products

Water source	Reliability
River Murray	94%

Source: SA WaterConnect, 2021

The reliability of Class 3 water entitlements has 94% over the two decades with only 4 years with less than 100% reliability.

Table 32 Class 3 water entitlement volumes and allocations

Year	SA Entitlement Volume (GL)	Class 3 Allocation that would have been made under the current River Murray WAP (%)
2000-01	1,850	100
2001-02	1,850	100
2002-03	1,850	100
2003-04	1,753	100
2004-05	1,850	100
2005-06	1,850	100
2006-07	1,480	97
2007-08	1,070	34
2008-09	1,160	49
2009-10	1,350	78
2010-11	1,850	100
2011-12	1,850	100
2012-13	1,850	100
2013-14	1,850	100
2014-15	1,850	100
2015-16	1,850	100
2016-17	1,850	100
2017-18	1,850	100
2018-19	1,850	100
2019-20	1,594	100
2020-21	1,850	100
2021-22	1,850	100

Source: SAWater Connect, 2022

The amount of water supplied to customers is then factored by this reliability to show actual average water supply in Table 33.

Table 33 Reliability-adjusted supply (ML)

	Demand	Annual Reliability	Reliability adjusted volume
Option 1 - CVWSS upgrade	3,000	94%	2,820
Option 2 - Bundaleer Dam	3,000	94%	2,820

The demand assessment captured forecast water use that will be used for growth (additional production) and substitution. The implication is that substitution demand will not generate the same economic benefits as the demand which leads to increased agricultural production. The calculation of substitution benefits is provided later in this section.

The average substitution for the likely demand by option is shown in Table 34.

Table 34 Substitution volumes

	Percentage	Volume (ML)
Option 1 - CVWSS upgrade	45%	1,269
Option 2 - Bundaleer Dam	45%	1,269

The impact of substitution on the total demand is shown in Table 35.

Table 35 Nominal supply vs. supply for growth (ML)

	Water for growth	Substitution	Total water use
Option 1 - CVWSS upgrade	1,551	1,269	2,820
Option 2 - Bundaleer Dam	1,551	1,269	2,820

The supply for growth volume is used to generate the agricultural production and wine premium benefits.

5.1.6 Option water use

Both options transport River Murray water, Zone 12 in the River Murray, through infrastructure to Clare Valley customers. Option 2 includes potential water captured from the Bundaleer catchment.

Initial engineering for the PBC indicated the following volumes of water by source (Table 36).

Table 36 Option water volumes (ML)

Source	Option 1 – CVWSS (ML)	Option 2 – Bundaleer (ML)
River Murray water	3,000	2,000
Bundaleer catchment run-off		1,000
Total	3,000	3,000

The following section provides the Clare Valley water use before and after the implementation of the infrastructure option.

The Round 1 demand assessment for this PBC requested that respondents provide a breakdown of existing water uses. The Round 1 demand assessment captured the water use by source for an 'average year' as shown in Table 37.

Table 37 Water use by source – Round 1 demand assessment – 'average year water use'

	Average year water use (ML)
Groundwater	500
Surface water	500
River Murray source	2,700
SA Water – winter water / off-peak	2,000
SA Water – summer nights/ time of day	500
SA Water – Statewide Water	200
Total	3,700

The two options have been designed to supply a nominal volume of 3,000 ML. The detailed Round 1 demand assessment as part of this project revealed that a 3,000 ML demand maximised customer contributions.

The average substitution for the likely demand by option is shown in Table 38.

Table 38 Substitution volumes (nominal supply)

	Percentage	Volume (ML)
Option 1 - CVWSS upgrade	45%	1,350
Option 2 - Bundaleer Dam	45%	1,350

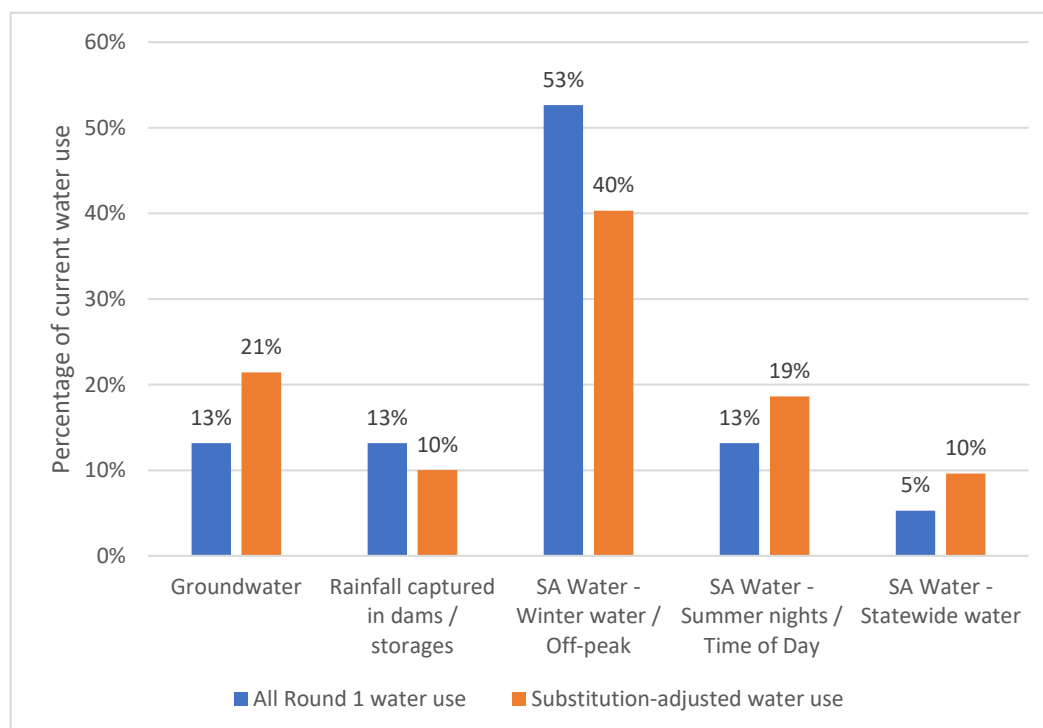
The impact of substitution on the total demand is shown in Table 39.

Table 39 Nominal supply vs. supply for growth (ML)

	Water for growth	Substitution	Total water use
Option 1 - CVWSS upgrade	1,650	1,350	3,000
Option 2 - Bundaleer Dam	1,650	1,350	3,000

The likely allocation of the substitution volume (approximately 1,350 ML) can be calculated based on the current water use of the respondents who requested water that would be used for substitution. Analysis between the average current water use by source of all respondents versus the average current water use of respondents who requested water for substitution is shown in Figure 50.

Figure 50 Average current water use by source of all respondents versus the average current water use of respondents who requested water for substitution



The analysis indicates that substitution water demand respondents have higher usage of groundwater, summer nights water and Statewide water. This aligns with stakeholder responses

about the salinity of groundwater and the cost and capacity constraints of summer nights and Statewide water.

The lower representation of rainfall captured in dams/storages as well as winter water likely indicates that these sources will be not highly substituted due to lower costs and capacity constraints.

Indicative substitution by water source is provided in Table 40.

Table 40 Indicative substitution volumes by source, percentage of substitution volume and percentage of total volume

Source	Substitution volume (ML)	Percentage of substitution volume (1,350ML)	Percentage of total volume (3,000ML)
Groundwater	450	33%	15%
Surface water (dams and storages)	150	11%	5%
Native water sources subtotal	600	44%	20%
SA Water – winter water/off-peak	100	7%	3%
SA Water – summer nights/time of day	460	34%	15%
SA Water – Statewide Water	190	14%	6%
SA Water products subtotal	750	56%	25%
Total substitution	1,350	100%	45%

Source: Clare Valley PWRA – 2019–20 Resource Assessment Clare Valley PWRA – 2019–20 Resource Assessment. Excludes estimate of stock and domestic – 675 ML.

This substitution volume is then subtracted from Round 1 demand current water use as shown in Table 41.

Table 41 Water use by source: Round 1 demand assessment ‘average year water use’, potential substitution volume and after-substitution volumes (ML)

	Round 1 average year water use (ML)	Substitution volume (ML)	Existing water use – post-option implementation (ML)
Groundwater	500	450	50
Surface water (dams and storages)	500	150	350
River Murray source	2,700		
SA Water – winter water/ off-peak	2,000	100	1,900
SA Water – summer nights/time of day	500	460	40
SA Water – Statewide Water	200	190	10
Total	3,700	1,350	2,350

Source: Clare Valley PWRA – 2019–20 Resource Assessment Clare Valley PWRA – 2019–20 Resource Assessment. Excludes estimate of stock and domestic – 675 ML.

The substitution volumes by source are then compared to the five-year average water consumption by source from the Clare Valley Prescribed Water Resource Area assessments.

Table 42 Substitution volumes by source and five year average water consumption by source from Clare Valley PWRA assessments

Source	Clare Valley PWRA - five year average	Substitution volume (ML)	Percentage of total volume (3,000ML)
Groundwater	915	450	49%
Surface water (dams and storages)	812	150	18%
Native water sources subtotal	1,727	600	35%
SA Water – winter water/ off-peak	1,540	100	6%
SA Water – summer nights/ time of day	385	460	120%
SA Water – Statewide Water	154	190	123%
SA Water products subtotal	2,078	750	36%
Total substitution	3,805	1,350	35%

Source: Clare Valley PWRA – 2019–20 Resource Assessment Clare Valley PWRA – 2019–20 Resource Assessment. Excludes estimate of stock and domestic – 675 ML.

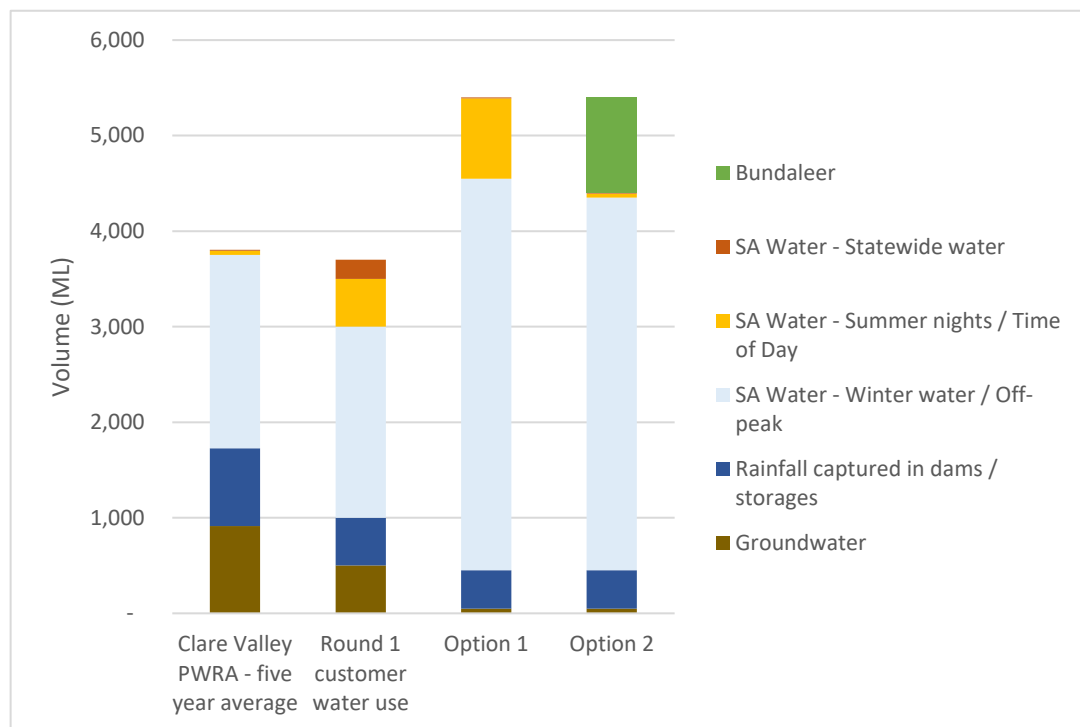
The substitution volumes are larger than the five year average for summer nights and Statewide water products as these use of these products have risen substantially in the last two years.

The options will deliver water from the sources as shown in Table 43.

Table 43 Water volumes by source – Option 1 and 2

Volumes	Option 1 - CVWSS	Option 2 - Bundaleer
River Murray allocations (SA Water – winter water/off-peak)	2,200	2,000
River Murray allocations (SA Water – summer nights/time of day)	800	
Bundaleer catchment run-off		1,000
Total	3,000	3,000

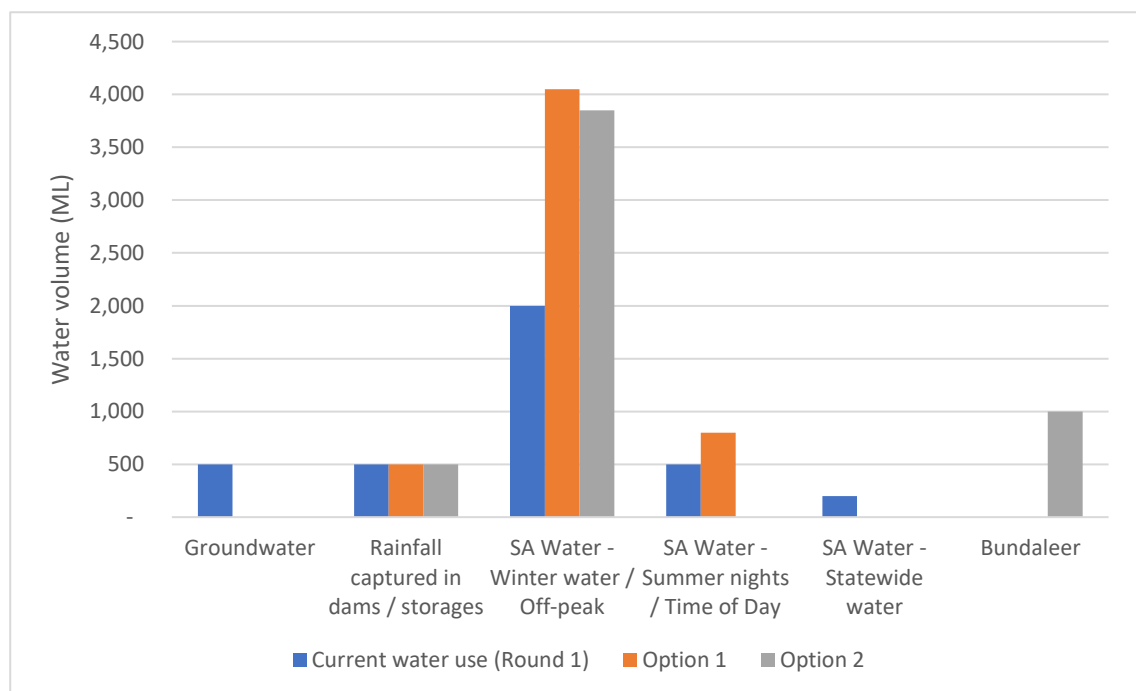
The implication for water use in the Clare Valley, including the water used for growth (new production) compared to the historical water use from the PWRA, is shown in Figure 51.

Figure 51 Water use by source – current average water use, Option 1 and Option 2

Source: Clare Valley PWRA – 2019–20 Resource Assessment Clare Valley PWRA – 2019–20 Resource Assessment. Excludes estimate of stock and domestic – 675 ML.

The future water use of the options has substantial increase in winter water with a reduction in groundwater and Statewide water. The summer nights usage increase slightly even with the forecast substitution.

The analysis indicates that total water consumption is 5,350 ML per year, up from 3,700 ML with a reduction in groundwater and Statewide water while winter water increases substantially.

Figure 52 Change in water source use – current use, Option 1 and Option 2

5.1.7 Economic benefits

The options will generate multiple economic benefits for the region including:

- new demand for water to increase agricultural production of grapes and other agricultural products and other enterprises
- increased wine production
- substitution of existing demand from low quality water sources.

The options supply the same volume of water for the same customers, so the economic benefits are the same for both options.

5.1.8 New demand for irrigated agriculture

The economic benefits of the project are largely improved irrigated agricultural production in the region for water that will expand existing production or enable new production. They are calculated based on key inputs:

- Demand assessment – how much water is demanded by customers.
- Water supply availability – supply-constrained demand is assumed.
- Reliability of the water product – how much water will customers likely receive per year.
- Likely water use – how water will be used for which enterprise.
- Net margin of water use – how much economic value will be generated by each megalitre of water used by customers.

5.1.9 Data sources

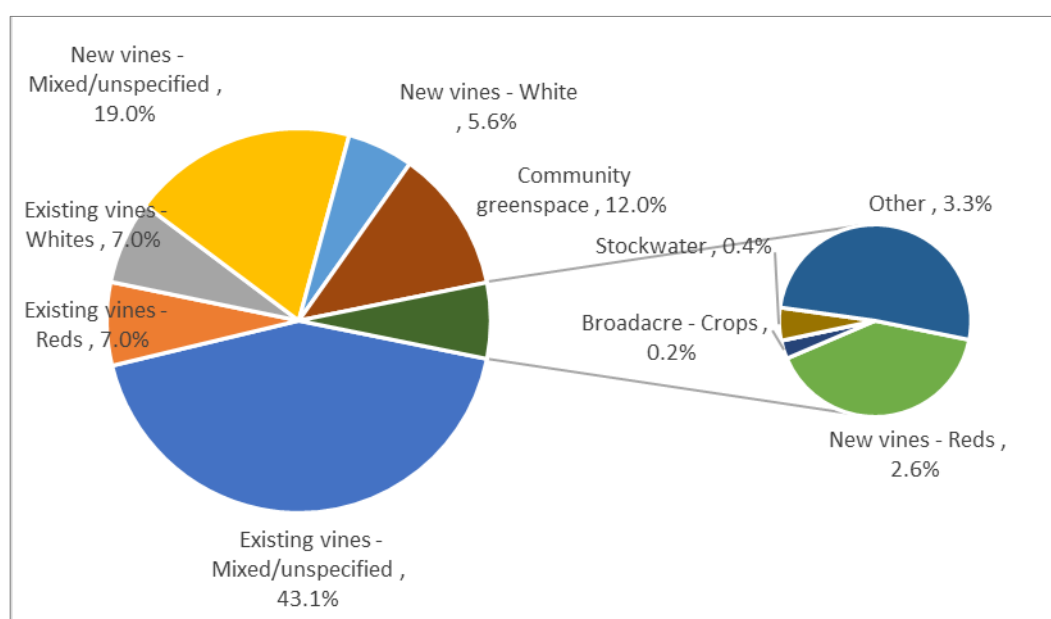
The overall economic benefit depends on the enterprise mix, water use by enterprise in the region and the net margin of each enterprise. The data used in this analysis were gathered from a range of sources including:

- demand assessments and further consultation with potential customers
- previous literature provided by the state government
- agronomist input.

Detailed data was collected through the demand assessment process and on-the-ground consultation, including several stakeholder meetings and engagements. This has informed the proposed enterprise mix and water use used to calculate the total economic benefit.

5.1.10 Enterprise mix for growth demand

The proposed water uses to expand existing production or enable new production, based on responses to the demand assessment is shown in Figure 53.

Figure 53 Proposed water uses

5.1.11 Irrigating Existing Grape vines

Over 50% of the water for growth will be applied to existing grape vines. Net margins were generated based on potential customer responses and consultation with agronomists. A summary of the volume-weighted net margins of existing grape vines is shown in Table 44.

Table 44 Existing grape vine net margins

Crop	Gross Revenue (\$/ha)	Fixed and Variable Costs (\$/ha)	Irrigation Water Use (ML/ha)	Net margin (\$/ML)	Yield (t/ha)
Existing vines - Mixed/unspecified	8,087	5,342	0.7	5,521	4.9
Existing vines - Reds	13,198	9,548	0.7	6,686	8.0
Existing vines - Whites	10,122	2,961	1.1	7,064	8.6

Source: Information provided by customers in Round 1 demand assessment

5.1.12 Irrigating new grapevines

Irrigators also provided information on likely demand for irrigating new grapevines. These grapevines must be established so there is an additional cost associated with grapevine establishment included this net margin.

Cost of establishing a new vineyard

Agronomists provided an indicative cost per hectare for establishing a new grapevine. These costs are shown in Table 45.

Table 45 Vineyard establishment costs and production uptake per hectare

Category	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Site Preparation (\$/ha)	3,600						3,600
Vines and Planting (\$/ha)		4,500	300				4,800
Trellis (\$/ha)		12,500	1,100				13,600
Irrigation setup / equipment (\$/ha)		5,500					5,500
Vine training (\$/ha)		5,500	5,000	2,000			12,500
Total (\$/ha)	3,600	28,000	6,400	2,000	-	-	40,000
Production (%)		0%	0%	40%	70%	100%	

Source: Information provided by Peritus Ag agronomists

The annualised establishment costs are then subtracted from the net margin of new vines.

Net margins of new grape production

Respondents to the Round 1 demand assessment also provided indicative revenue and cost information for new vines to generate volume-weighted net margins as shown in Table 46.

Table 46 New vine net margins

Crop	Gross Revenue (\$/ha)	Fixed and Variable Costs (\$/ha)	Irrigation Water Use (ML/ha)	Net margin (\$/ML)	Yield (t/ha)
New vines - Mixed/unspecified	15,346	9,193	1.2	2,608	7.7
New vines - Reds	16,741	9,743	1.1	3,732	10.6
New vines - Whites	11,300	6,727	0.9	2,239	6.9

Source: Information provided by customers in Round 1 demand assessment

5.1.13 Other net margins

Other net margins for the remaining 15% of water applied to non-grape agricultural and other enterprises are shown in Table 47.

Table 47 Non grape agricultural and other enterprise net margins

Crop	Net margin (\$/ML)
Broadacre - Crops	85
Community greenspace	45
Intensive Livestock	1,145
Stock water	489
Other (mushroom compost facility and accommodation)	56,250

Source: Information provided by customers in Round 1 demand assessment

5.1.14 Wine premium

The grapes grown within the Clare Valley can be processed into Clare Valley Geographic Indicator (GI) wine. The restriction on the use of Clare Valley label means that there is a clear economic benefit to processing grapes into wine.

The grapes, therefore, produced by the project will generate a wine premium. The value of the wine premium is a gross margin (revenue minus variable costs).

Wine prices

Wine prices have been sourced from the Wine Australia Export Dashboard and follow-up consultation with Wine Australia indicates that these prices are suitable as wine prices for key varieties and average.

Table 48 2022 wine prices for Clare Valley (\$/L)

	Wine prices (\$/L) - 2022
Existing vines - Mixed/unspecified	9.22
Existing vines - Reds	9.41
Existing vines - Whites	9.07
New vines - Mixed/unspecified	9.22
New vines - White	9.07
New vines - Reds	9.41

Source: Wine Australia Export Dashboard

Gross operating costs

The wine production assumptions were sourced from the Wine Australia Gross Margin Ready Reckoner. The Round 1 demand assessment determined the proportion of production occurring at each facility size as shown in Table 49.

Table 49 Wine gross costs per facility size – processing, storing and packaging

Size	Micro	Small	Medium	Large	Major
Grape capacity	0-100t	100t-750t	750t-5,000t	5,000t-20,000t	+20,000t
Gross cost inc. packaging (\$/L)	9.0	8.0	7.0	6.0	5.0
Weightings	13%	40%	33%	13%	0%

Source: Wine Australia Gross Margin Ready Reckoner

The weighted average wine gross cost assumed for Clare Valley in this economic analysis is \$7.50/L.

The resulting profit associated with the use of grapes in wine production includes the cost of the grape juice which avoid double counting the value of the grapes. The result is a wine premium associated with the new grape production that is added to the economic benefits of the project.

Weighted wine premiums

The wine premiums per ML of water used by the project for grapes is shown in Table 50

Table 50 Weighted average wine premiums (\$/ML)

Region	Weighted average price (\$/ML)
Clare Valley	2,312

5.1.15 Substitution of existing sources

Several potential customers noted that the new water will be used to offset existing sources. The proposed substitution in Clare Valley is likely to replace existing poor water quality sources as noted in the base case. The two benefits from improved water quality are:

- increased yields
- reduced vine mortality.

The base case examined the salinity of the existing water resources and annual reports on the Prescribed Water Resource Area (PWRA). The salinity of water resources in Clare Valley along with the 5 year average water use of these sources is shown in Table 51.

Table 51 Water use and salinity

Water source	Five-year average water use (ML)	Average salinity (mg/L TDS)
Groundwater	915	3,500
Surface water	812	1,000
Imported River Murray water	2,078	300
Weighted average	3,805	1,219

Source: PWRA annual assessments

The weighted average salinity for Clare Valley water sources is 749 mg/L.

A 2019 study by the Western Australian Department of Primary Industries and Regional Development examined the yield impacts of applying saline water to a range of enterprises. For this analysis, it is assumed that the substitution occurs for primarily grapes.

The relationship between water salinity and yield for grapes is shown in Table 52.

Table 52 Relationship between yield and salinity for grapes

Yield loss	0%	10%	25%
Salinity of irrigation water (ppm TDS)	570	969	1,539

Source: Western Australian Government, *Salinity and Plant Irrigation*, <https://www.agric.wa.gov.au/water-management/water-salinity-and-plant-irrigation>

The resulting avoided yield loss for grapes is 5% in Clare Valley. The economic benefit generated by applying higher quality water are these percentages of the existing wine grape margins. The economic benefit is approximately \$1.04 million per year.

The second substitution benefit for irrigators is the reduction in vine mortality as applying high salinity water decreases the life span of grapevines. The existing grapes that is likely to be irrigated with substituted water is 972 ha in Clare Valley based on current water use.

The assumed average grape vine lifespan is 70 years while an assumed compromised grapevine life span is 30 years. The economic benefit is the reduced annual grapevine replacement costs. The benefit of this reduced expenditure on vine replacement is approximately \$320,000 per year at full scheme operation.

5.1.16 Environmental benefits

There are likely to be environmental benefits from reducing dependence on native water sources (groundwater and surface water). However, there are no stated intentions to reduce native water sources, so no benefits have been included in this analysis.

Further analysis on potential environmental benefits if the native water source regime is changed can be conducted as part of a Detailed Business Case.

5.1.17 Residual value

It is expected that the life of the project will be far longer than the approved assessment period of 30 years, so a residual value is calculated. Recent consultation with Infrastructure Australia indicated that residual values can be appropriate, particularly for long-lived assets such as pipelines.

Infrastructure Australian guidelines indicate that the residual value should be based on either the long run benefits and costs (net benefits stream) or the estimated market value at the end of the analysis period.

We have conservatively used the lower of the two methods for the central economic case which is the asset value. For completeness, project sensitivities are provided with no residual value adopted and under the net benefits stream approach for comparison.

The net benefits methodology discounts the total benefits of the project less the total operating costs after the appraisal period and discounts them back to Year 30 (final year of the appraisal period).

Table 53 Residual value at year 30

Approach	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Asset value	52.5	73.4
Net benefits stream	98.1	115.8

These values are then discounted back to present values from year 30.

5.1.18 Economic benefits summary

The economic benefits for the two options are shown in Table 54.

Table 54 Economic benefits summary - two options – (Present value, \$ million, 7% discount rate)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Agricultural Production	89.0	89.0
Wine Premium	33.3	33.3
Improved yield with improved water quality	10.2	10.2
Avoided Loss of Existing grapevines	3.1	3.1
Residual Value	6.9	9.6
Total	142	145

The agricultural and other enterprise benefits generate the highest economic benefits with the wine premium providing additional benefits.

The residual value is an additional benefit and sensitivity analysis is provided for the economic results without the residual value. The residual value is higher for Option 2 because the capital expenditure is higher for Option 2 as discussed in the next section.

5.1.19 Economic costs

The economic costs associated with the scheme include:

- Capital and operating costs.
- Opportunity costs associated with the base case.
- Environmental costs.

5.1.20 Capital and operating costs

The capital costs for the two options are shown in Table 55.

Table 55 Medium capital costs – (\$million, real)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Pipeline, Fittings and Allowances	15.9	49.2
Pump Stations	1.3	12.6
Storages	27.7	3.9
Preliminaries	7.7	11.2
Contractor Costs	4.6	6.7
Land and Utilities	2.8	0.2
Total	60.0	83.8
Contingency	12.0	16.8
Total	72.0	100.6

The annual operating costs for the two options are shown in Table 56.

Table 56 Operating costs (\$million, real)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Fixed Costs		
Water Supply Charge	5.42	3.56
Maintenance	0.24	0.27
Staffing allowance	0.30	0.30
Total	5.96	4.12
Variable Costs		
Pumping Cost	0.04	1.07
Total	0.04	1.07
Asset Renewal		
Pipelines	0.22	0.65
Pump Stations	0.04	0.22
Storage	0.61	0.09
Total	0.87	0.95

Detailed information on the capital and operating costs is provided in the financial analysis section.

5.1.21 Opportunity costs associated with the base case

The creation of new vineyard will generate an opportunity cost for the loss of existing production. Based on the likely current use of this land being cattle and/or sheep, an opportunity cost for the lost production has been calculated as the lost economic value add from these industries.

Table 57 Opportunity cost calculations for both options

	Option 1 and 2
New hectares of grapes (ha)	374
Sheep - GVAP/ha	30
Annual opportunity cost (\$)	11,222

This opportunity cost is included in the costs associated with the options

5.1.22 Environmental costs

The management of the direct environmental costs of the project are included in capital costs of each option.

5.1.23 Benefit-cost ratios and NPV

The BCR's and NPV's based a 7% real, pre-tax discount rate and medium capital and operating costs, are shown in Table 58

Table 58 Economic analysis results (7% discount rate and medium costs)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Total benefits (\$ million)	142.4	145.1
Total costs (\$ million)	120.9	137.8
NPV (\$ million)	21.52	7.32
BCR	1.18	1.05

At medium costs and 7% discount rate, the BCRs for Options 1 and 2 are above 1 although Option 2 is lower.

The economic results using a 4% discount rate and medium costs are shown in Table 59.

Table 59 Economic analysis results (4% discount rate and medium costs)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Total benefits (\$ million)	218.2	224.6
Total costs (\$ million)	153.1	167.8
NPV (\$ million)	65.03	56.82
BCR	1.42	1.34

The economic results using a 10% discount rate and medium costs is shown in Table 60.

Table 60 Economic analysis results (10% discount rate and medium costs)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Total benefits (\$ million)	98.6	99.8
Total costs (\$ million)	100.5	118.3
NPV (\$ million)	(1.90)	(18.45)
BCR	0.98	0.84

5.1.24 Sensitivity analysis

Several sensitivity analyses have been undertaken for the options. This sensitivity analysis is shown in Table 61.

Table 61 Option sensitivity analysis – medium costs and 7% discount rate

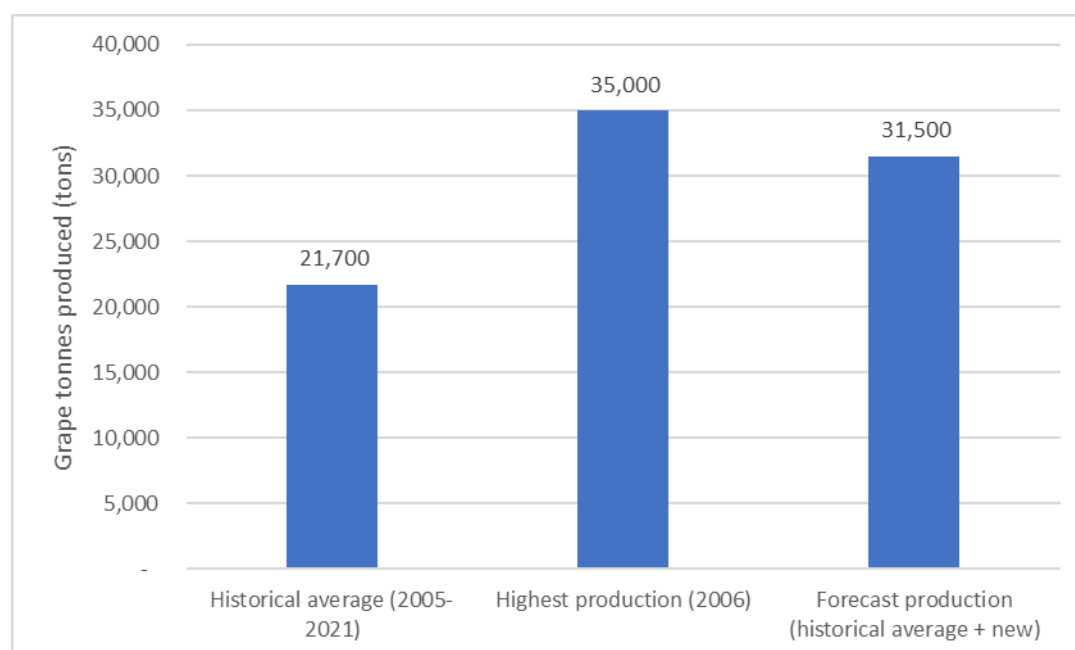
Case Name	Option 1 - CVWSS upgrade		Option 2 - Bundaleer Dam	
	Economic BCR	Economic NPV	Economic BCR	Economic NPV
Base Case - Asset Value	1.18	21.52	1.05	7.32
Benefits Stream Residual Value	1.18	21.52	1.05	7.32
10% increase in Capital Costs	1.12	15.20	0.99	(1.44)
20% Increase in Capital Costs	1.07	8.88	0.93	(10.21)
10% increase in Operating Costs	1.12	15.75	1.02	2.31
20% Increase in Operating Costs	1.08	9.98	0.98	(2.71)
20% decrease in Net Margins	1.03	3.72	0.92	(10.47)
10% decrease in Net Margins	1.10	12.62	0.99	(1.58)
10% Increase in Net Margins	1.25	30.41	1.12	16.22
50% Substitution	1.10	11.89	0.98	(2.31)
60% Substitution	0.94	(7.37)	0.84	(21.57)
70% Substitution	0.78	(26.63)	0.70	(40.83)
Low Capital Cost	1.29	31.34	1.18	22.08
High Capital Cost	1.08	11.04	0.95	(8.44)
No Wine Premium	0.90	(11.80)	0.81	(26.00)
50% Wine Premium	1.04	4.86	0.93	(9.34)
On Farm Losses from Evaporation 5%	1.13	15.40	1.01	1.21
On Farm Losses from Evaporation 10%	1.08	9.29	0.96	(4.91)

The most significant impact on the net economic benefits of the options is the change in substitution volumes and reduction in wine premium. A 50% reduction in wine premium would still result in a positive NPV for Option 1.

5.1.25 Additional grape production

The likely increase in grape production from new water demand, excluding substitution volume accounts for 45% of likely water demand, is shown in Figure 28.

Figure 54 Forecast new grape production (tonnes per annum) excluding substitution for Option 1 and 2



Source: Wine Australia, Regional Snapshot – Clare Valley

5.1.26 Additional revenue

The forecast additional revenue generated by the project at full production is shown in Table 62.

Table 62 Gross revenue of project at full production (\$ million)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Agricultural production	10.5	10.5
Wine production	54.3	54.3
Total	64.8	64.8

5.1.27 Jobs created by project

Table 63 outlines the FTE new employment positions (jobs) which is common across both options.

There are two main categories:

- full-time jobs of direct agricultural employment
- full-time jobs of indirect agricultural employment in support industries, such as farm input suppliers (e.g., fertilizer, seedlings, pesticides, packaging and fuel) and services (e.g., transportation, refrigeration, mechanical, food, accommodation and accountancy).

The estimates of supported full-time jobs have been created using the input-output tables produced by the ABS. The following table presents the direct and indirect agricultural employment that the project supports at full production.

Table 63 Agricultural and wine FTE positions at full production

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Agricultural production FTE's		
Direct	40	40
Indirect	49	49
Total	89	89
Wine production FTE's		
Direct	131	131
Indirect	144	144
Total	275	275

The Infrastructure Australia guidelines provide another method to determine employment impacts which focuses on direct impacts.

For completeness, we have provided these jobs noting that direct jobs only are more relevant for urban projects with mobile labour force while direct and indirect jobs are more appropriate for regional projects.

Table 64 Maximum direct employment (FTE's) – Infrastructure Australia approved method

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Agricultural production FTE's		
Direct	47	47
Wine production FTE's		
Direct	95	95
Construction		
Direct	68	100
Total	210	242

Source: <https://www.infrastructureaustralia.gov.au/sites/default/files/2021-7/Assessment%20Framework%202021%20Stage%203.pdf>

5.2 FINANCIAL ANALYSIS

The financial assessment of the project focuses on three key questions:

- What is the likely total cost (capital and operating costs) associated with the scheme, including intrinsic and contingent risks?.
- If there is sufficient ability for customers to pay for the upfront capital costs of the scheme, or if not, what funding might fill this gap?.
- What are the implications of different types of funding options on the scheme's upfront and ongoing charges?.

To answer these questions, a financial model and risk workshop generated risk-adjusted capital and operating costs as well as likely cashflows of the scheme under several funding assumptions.

The financial outputs are net cash flow and net debt balances in each year over the evaluation period that are discounted at an appropriate rate to calculate net cash flows as well as cost-reflective annual customer charges.

The financial analysis will then be compared to the results of the demand assessment and customer willingness-to-pay in the Affordability section to determine the likely viability of the scheme.

5.2.1 Inputs and assumptions

The key inputs and assumptions for the financial assessment include:

- Scheme timing assumptions
 - Start year and evaluation period.
- Financial assumptions
 - Escalation rates and governance risk appetite (developing, owning and operating entities).
- Funding assumptions
 - Customer contributions; Australian and South Australian Government grant funding; concessional loans.

5.2.2 Timing assumptions

Table 65 outlines assumptions about the timing of cash flows.

Table 65 Timing assumptions

Component	Assumptions/inputs
Model start year	2023
Model evaluation period	30 years in total 3 years for design and construction: starting 1 July 2022 and finishing 30 June 2025 27 years for commissioning and operations: starting 1 July 2025 and finishing 30 June 2052
Base date for escalating real construction and upfront capital cost forecasts	30 June 2022, as the cost estimates were developed in 2021–22 based on prevailing costs
Base date for escalating real ongoing operating cost forecasts	30 June 2022, as the cost estimates were developed in 2021–22 based on prevailing costs
Upfront customer contributions	Discussed in charges section
Ongoing customer charges	Charges will be collected mid-year (on average), commencing in 2026–27
Discount rate (real, pre-tax)	Assumed cost of debt for a water infrastructure developer, owner and operator
Discount date—base date applied to discount cash flows to determine the NPV	30 June 2022

5.2.3 Financial assumptions

The financial assumptions include escalation and discount rates that have been applied in the financial model.

Table 66 Financial assumptions

Component	Assumptions/inputs
Assessment	All references to real dollars in this report refer to FY22 dollars. An evaluation period of 30 years has been adopted for the financial analysis
Escalations	Where nominal costs are provided: - capital and implementation costs are escalated by 3.00 per cent, the 10-year average annual increase of the ABS Producer Price Index (PPI) for other heavy and civil engineering construction from FY08 to FY21. - other real costs (including operating costs) have been escalated by 2.5 per cent per annum. This rate has been determined to reflect the midpoint of the RBA's target interest rate range.
Pricing	The final annual fixed charge comprises of: - fixed operating costs - renewal annuity. The variable charge will comprise variable operating costs, such as electricity for pumping Cost-reflective prices will be calculated to match the escalation rates for costs An infrastructure levy is calculated for the staggered repayment of the customer capital contribution
Capital costs	The financial analysis undertaken for the project is based on raw capital costs presented in the 'Engineering design and costs' section. These raw capital cost estimates have been further developed into low, medium and high real unit price for each key capital item
Operating costs	The operations and maintenance cost assumptions are based on assumed unit quantities and real annual prices.

5.2.4 Capital costs

Capital costs (low, medium and high) have been developed for the projects. These capital costs are described in detail in the engineering sections and appendices.

The capital costs for the two options are shown in Table 67.

Table 67 Capital costs (\$million, real)

	Low Cost	Medium Cost	High Cost
Option 1 - CVWSS upgrade			
Pipeline, Fittings and Allowances	13.5	15.9	18.3
Pump Stations	1.2	1.3	1.4
Storages	24.9	27.7	30.5
Preliminaries	5.8	7.7	9.6
Contractor Costs	3.9	4.6	5.3
Land and Utilities	2.4	2.8	3.2
Total	51.6	60.0	68.3
Contingency	7.7	12.0	17.1
Total	59.4	72.0	85.3
Option 2 - Bundaleer Dam			
Pipeline, Fittings and Allowances	41.9	49.2	56.6

	Low Cost	Medium Cost	High Cost
Pump Stations	11.3	12.6	13.8
Storages	3.5	3.9	4.2
Preliminaries	8.4	11.2	14.0
Contractor Costs	5.7	6.7	7.8
Land and Utilities	0.2	0.2	0.2
Total	70.9	83.8	96.7
Contingency	10.6	16.8	24.2
Total	81.6	100.6	120.9

The medium capital cost for each of the options is the base estimate.

5.2.5 Operating costs

The raw fixed operating costs have been split into:

- Fixed costs.
- Variable costs.

Detail breakdown of operating cost for each of the charges is provided in the economic and financial model.

The operating costs are shown in Table 68.

Table 68 Operating costs (\$ millions, real)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Fixed Costs		
Water Supply Charge	5.42	3.56
Maintenance	0.24	0.27
Staffing allowance	0.30	0.30
Total	5.96	4.12
Variable Costs		
Pumping Cost	0.04	1.07
Total	0.04	1.07
Asset Renewal		
Pipelines	0.22	0.65
Pump Stations	0.04	0.22
Storage	0.61	0.09
Total	0.87	0.95

5.2.6 Renewals annuity

The costs of the project also include a renewals fund contribution needed to renew assets that reach the end of their useful lives. A sinking fund is likely to be used to fund these ongoing costs.

A renewals annuity charges have been developed for the project. The assumptions are shown in Table 69.

Table 69 Renewals annuity assumptions

Factor	Rate
Escalation rate for capex*	2.50%
Escalation rate for renewals annuity charge	2.50%
General escalation rate	2.50%
Interest rate on renewals annuity sinking fund [#]	1.99%

* 10-year average annual increase ABS PPI other heavy and civil engineering construction 2010-2020

[#] 10-year Australian Government bond, 50% 10-year average, 50% 30-day average

The renewals annuity for each of the two options is shown in Table 70.

Table 70 Renewals annuity (\$million, real)

Renewals annuity	Annual renewals annuity
Option 1 - CVWSS upgrade	0.87
Option 2 - Bundaleer Dam	0.95

5.2.7 Funding sources for capital expenditure

There are several funding sources for the scheme including:

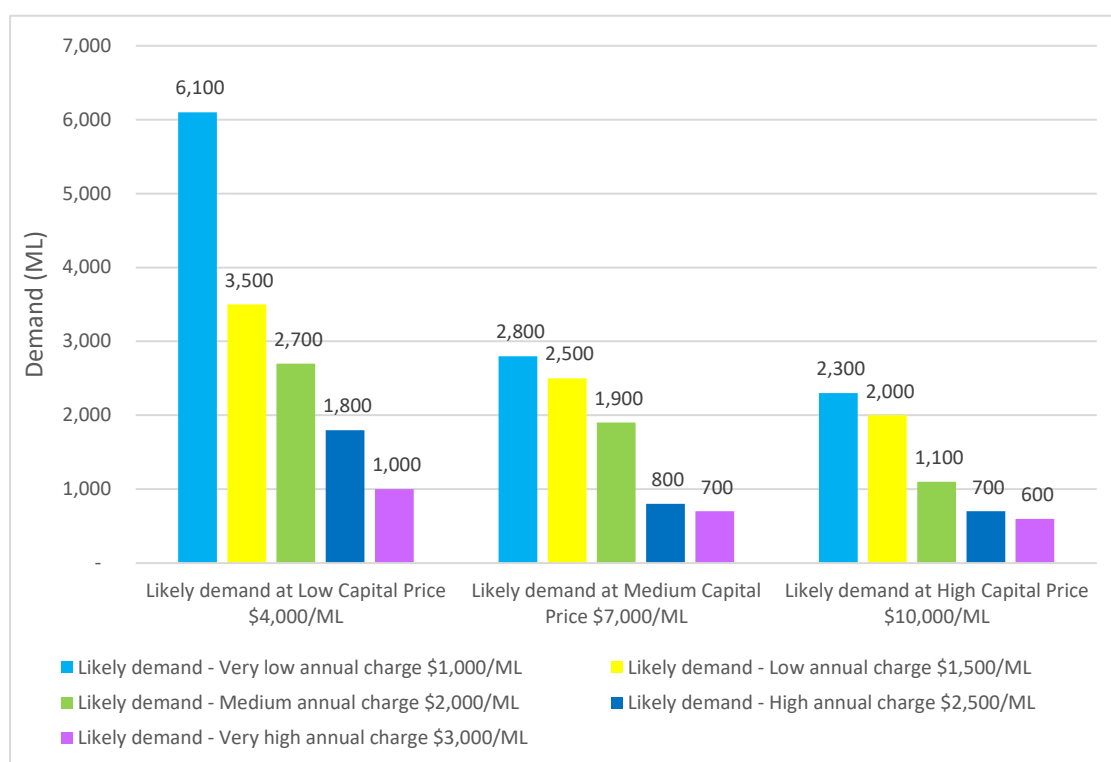
- Customer contribution
- Government funding.

Customer contributions – Upfront and infrastructure Levy

The customer contributions to the project capital expenditure from water sales are based on the assumed prices as per the Round 1 demand assessment and discussions with prospective customers.

The customer contribution is a critical element of the affordability of the project for customers and government. The initial Round 1 demand assessment provides the initial likely customer contribution, but a material customer contribution is important for likely government investment. A commitment of 20-25% of the capital cost provides greater likelihood of government investment.

Figure 55 indicates that a \$4,000/ML capital contribution provides the maximum customer contribution for a 3,000 ML scheme.

Figure 55 Likely demand for new water at different prices – Capital price focus (ML)

Source: Round 1 demand assessment

However, the likely customer contribution for the 3,000 ML is \$12 million. The implication is that capital contributions account for 16% and 11% of capital cost for Options 1 and 2 respectively as shown in Table 71.

Table 71 Capital contribution percentages - \$4,000 per ML Upfront Charge

Funding scenario	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Customer contribution	12.0	12.0
Government	63.5	93.8
Total capex	75.5	105.8
Customer contribution	16%	11%
Government	84%	89%
Total	100%	100%

To illustrate and guide the detailed business case, a set of additional customer contribution scenarios (with associated government contributions have been developed.

These scenarios are:

- 20% of capital cost provided by customer contribution
- 25% of capital cost provided by customer contribution.

The customer contribution per ML and total customer contribution for each of the scenarios (including the \$4,000 ML base case) for Option 1 is shown in Table 72.

Table 72 Customer contribution scenarios – Option 1

Customer contribution scenarios	Upfront Charge (\$/ML) - rounded	Total contribution (\$million)
\$4,000/ML	4,000	12
20% of capital cost	5,000	15
25% of capital cost	6,000	18

The customer contribution scenarios for Option 2 are shown in Table 73

Table 73 Customer contribution scenarios – Option 2

Customer contribution scenarios	Upfront Charge (\$/ML) rounded	Total contribution (\$million)
\$4,000/ML	4,000	12
20% of capital cost	7,000	21
25% of capital cost	9,000	27

Government contribution

A range of potential customer contributions for Option 1 are shown in Table 74.

Table 74 Option 1- Funding scenario for medium capital costs

Funding scenario	\$4,000 per ML upfront Charge	\$5,000 per ML upfront Charge	\$6,000 per ML upfront Charge
Customer contribution	12.0	15.0	18.0
Government	60.0	57.0	54.0
Total capex	72.0	72.0	72.0
Customer contribution	17%	21%	25%
Government	83%	79%	75%
Total	100%	100%	100%

A range of potential customer contributions for Option 2 are shown in Table 75.

Table 75 Option 2- Funding scenario for medium capital costs

Funding scenario	\$4,000 per ML upfront Charge	\$7,000 per ML upfront Charge	\$9,000 per ML upfront Charge
Customer contribution	12.0	21.0	27.0
Government	88.6	79.6	73.6
Total capex	100.6	100.6	100.6
Customer contribution	12%	20%	26%
Government	88%	79%	73%
Total	100%	100%	100%

5.2.8 Cost-reflective customer charges and revenues

Customer charges are calculated to fully recover operating costs and a renewals annuity for the scheme. Customer charges are separated into tariffs and regions to reflect the costs they are recovering.

Infrastructure levy

The customer contribution is proposed to be recovered over several years to increase affordability. This contribution is, therefore, an infrastructure levy with the following payment schedule.

Table 76 Infrastructure levy payment schedule

Contribution	Total contribution (\$/ML)	Upfront Contribution (\$/ML)	Delay in second payment	Number of Years Repayment
\$4,000/ML - Capital payment made by customers	4,000	1,000	1	4
\$5,000/ML - Capital payment made by customers	5,000	1,000	1	5
\$6,000/ML - Capital payment made by customers	6,000	1,000	1	6
\$7,000/ML - Capital payment made by customers	7,000	1,000	1	7

The infrastructure levy uses a debt facility to pay the construction costs. The debt facility, including accrued interest, is then repaid through a small charge added to the infrastructure levy. The debt facility has proposed interest rate of 2.5% per annum in line with an Australian Government low interest loan.

The interest repayment amount per ML for the debt facility associated with the infrastructure levy is \$38/ML. This payment is the same across the options as it is based on capital contribution from likely demand not the infrastructure costs. The infrastructure levy, therefore, is \$1,038/ML per repayment.

Ongoing charges

The charges for the Clare Valley under each of the options is shown in Table 77.

Table 77 Clare Valley charges (\$/ML) – (medium costs)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Fixed Charge	1,990	1,370
Asset Renewal	290	320
Total Fixed Charge	2,280	1,690
Variable Charge	10	380
Total Annual Charges	2,290	2,070
Infrastructure Levy	1,040	1,040

5.2.9 Financial Net Present Value

The final analysis is the Financial Net Present Value (FNPV) of the project using the assumed cost of debt of 2.5% is shown in Table 78. The FNPV of the two options is zero reflecting that the projects achieve full operating costs and renewals recovery (excluding grants and the infrastructure levy) through customer charges over the lifetime of the options.

Table 78 Financial NPV (\$million, real)

	FNPV at 7%
Option 1 - CVWSS upgrade	-
Option 2 - Bundaleer Dam	-

5.2.10 Potential ongoing support from government

The options have been developed and modelled based on likely demand to reduce the risk of irrigators being unable to pay for the water. However, additional analysis has been undertaken to provide information on the potential size of government support needed to maintain financial viability if demand was to decrease by 10% and 20% for the lifetime of the project. The analysis is shown in Table 79.

Table 79 Net present value of ongoing government support scenario analysis over 30 years

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
NPV of government support – 10% reduction in demand (\$m)	19.10	17.07
NPV of government support – 20% reduction in demand (\$m)	38.21	34.13

5.3 AFFORDABILITY ANALYSIS

5.3.1 Key points

- The affordability analysis examines the potential affordability of the options to:
 - Potential customers
 - Australian and South Australian governments.
- The annual charges of both options are slightly higher (10-20%) than the charges used in the demand assessment to generate 3,000 ML of demand.
- The annual charges for Option 1 and 2 are lower than State-wide and off-peak summer nights (including temporary water license and reservation fee). However, the option charges are higher than the off-peak winter watering charges (including temporary water license and reservation fee).
- Further work should be undertaken on reducing operating costs to ensure that the charges are affordable enough to elicit demand of 3,000 ML.
- The forecast \$4,000/ML customer contribution does not provide a material contribution to the capital costs of the options and then relies on government to provide substantial funding.
- The affordability assessment for government funding indicates that an upfront contribution of at least \$5,000/ML for Option 1 and \$7,000/ML for Option 2 would be required for the customer contribution to contribute 20% of the capital cost.
- A customer contribution of more than 20% (targeting 25%) of the capital cost materially improves the affordability of the project for government.

5.3.2 Approach

The affordability analysis assesses the affordability to customers and the Australian and South Australian governments if it were to financially contribute to the scheme. The affordability assesses:

- difference between cost-reflective water charges and the results of the demand assessment

- the affordability for customers
- Government funding scenarios.

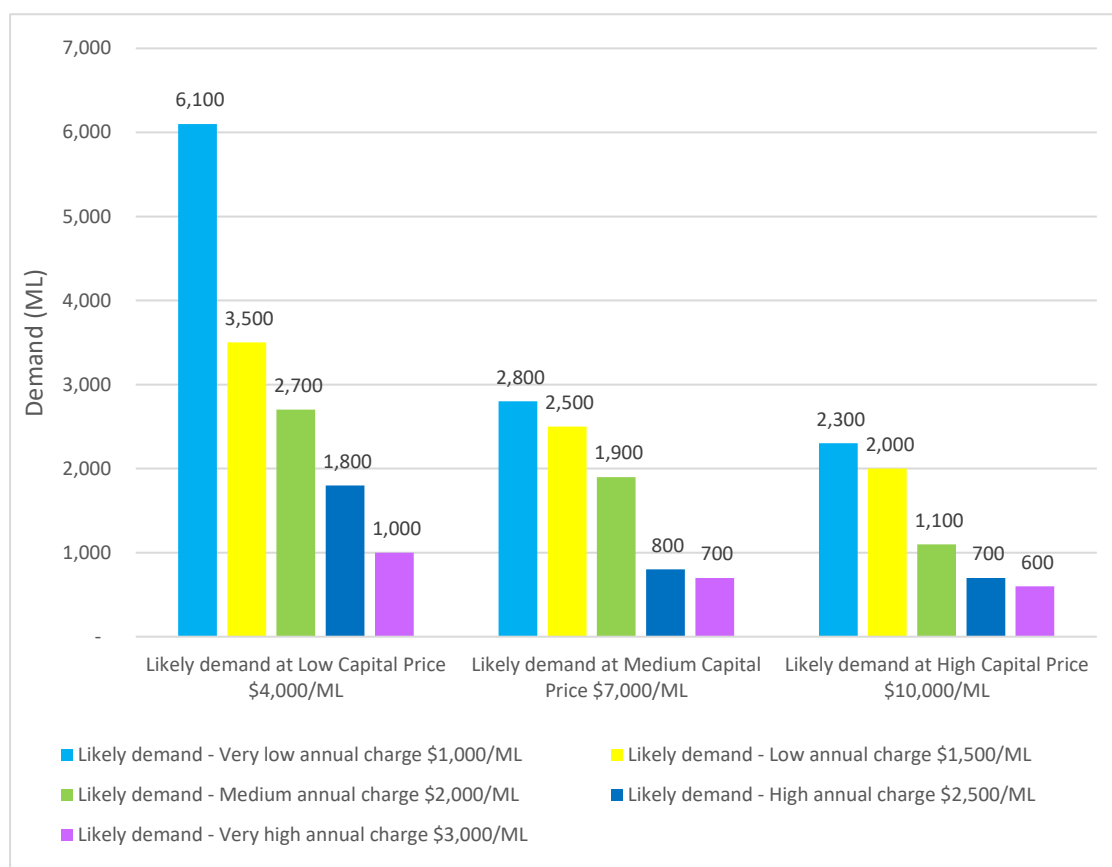
5.3.3 Customer affordability

The customer affordability analysis considers the ability of the customers to afford the upfront and ongoing charges by comparing the results of the demand assessment and current charges in the Clare Valley against cost-reflective charges.

Results of demand assessment

Figure 56 provides a summary of total likely demand for new water at different prices.

Figure 56 Likely demand for new water at different prices – Capital price focus (ML)



Source: Round 1 demand assessment

The implication of the Round 1 demand assessment is that 3,000 ML supply could be supported by customer contributions of \$4,000/ML to \$7,000/ML.

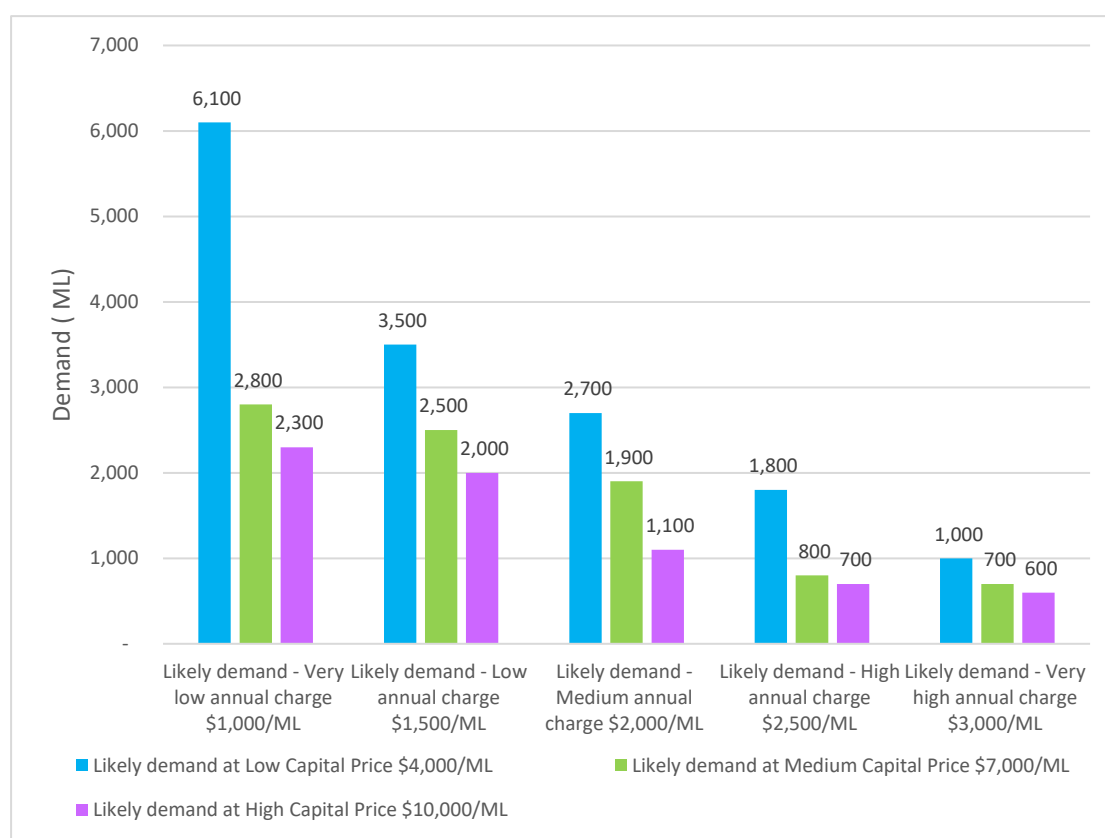
The charges for the Clare Valley under each of the options is shown in Table 80.

Table 80 Clare Valley charges (\$/ML) – (medium costs)

	Option 1 - CVWSS upgrade	Option 2 - Bundaleer Dam
Fixed Charge	1,990	1,370
Asset Renewal	290	320
Total Fixed Charge	2,280	1,690
Variable Charge	10	380
Total Annual Charges	2,290	2,070

The likely total demand is presented below focussing on annual charges (and capital prices).

Figure 57 Likely demand for new water at different prices – Annual charge focus (ML)



Source: Round 1 demand assessment

Annual charges for Option 1 and 2 are approximately \$2,300/ML per annum which has a likely demand of 1,800ML – 2,700 ML depending on the upfront contribution. This indicates that the annual charges are potentially higher than the charges that generates 3,000 ML of demand.

A reduction in operating costs should be a priority for further development of the chosen option.

5.3.4 Comparison to other water sources in Clare Valley

The annual charges should also be compared to existing charges as shown in Table 81.

Table 81 Water charges within the Clare Valley scheme

Charges	\$/ML	Summary
State-wide water		
State-wide water price	2,806	Water usage outside off-peak periods
Winter and summer nights (off-peak)		
Temporary River Murray Licence (average)	200	Seasonal temporary licence to take River Murray Water
Off Peak water transportation – winter watering	1,308	Water usage that has occurred during winter off peak period.
Off Peak water transportation – summer nights	1,790	Water usage that has occurred during 'summer nights'

Charges exclude CVWSS connection fee of \$2,806/ML and an off-peak reservation fee of \$110.

The annual charges for Option 1 and 2 are lower than State-wide and off-peak summer nights (including temporary water license and reservation fee). However, the option charges are higher than the off-peak winter watering charges (including temporary water license and reservation fee).

5.3.5 Australian and South Australian funding

The affordability of the project to the government is based on the economic benefits provided in the economics section and the likely government funding required.

A viable project should include a material contribution from customers to the project. While the demand assessment supports a capital contribution from customers of \$4,000/ML for a 3,000 ML scheme, the remainder of the option capital costs are then provided by government funding.

To assess the impact on the government funding when customer provides a material contribution to the capital costs, two other scenarios were modelled:

- 20% of capital cost provided by customer contribution.
- 25% of capital cost provided by customer contribution.

A range of potential customer contributions for Option 1 are shown in Table 82.

Table 82 Option 1- Funding scenario for medium capital costs

Funding scenario	\$4,000 per ML upfront Charge	\$5,000 per ML upfront Charge	\$6,000 per ML upfront Charge
Customer contribution	12.0	15.0	18.0
Government	60.0	57.0	54.0
Total capex	72.0	72.0	72.0
Customer contribution	17%	21%	25%
Government	83%	79%	75%
Total	100%	100%	100%

A range of potential customer contributions for Option 2 are shown in Table 83.

Table 83 Option 2- Funding scenario for medium capital costs

Funding scenario	\$4,000 per ML upfront Charge	\$7,000 per ML upfront Charge	\$9,000 per ML upfront Charge
Customer contribution	12.0	21.0	27.0
Government	88.6	79.6	73.6
Total capex	100.6	100.6	100.6
Customer contribution	12%	20%	26%
Government	88%	79%	73%
Total	100%	100%	100%

If customers can provide at least 20% of the capital costs through customer contributions, this contribution will materially improve the affordability of the options for government funding.

5.4 SOCIAL IMPACT ASSESSMENT

This section presents the results from a desktop assessment and stakeholder engagement of the key social issues associated with the project.

5.4.1 Key points

- A three-step process has been used to inform this evaluation. It involves identifying impacts, evaluating impacts and then integrating these impacts into the broader PBC.
- Moderate stakeholder engagement has been undertaken as part of the project, revealing a diverse range of views.
- The project is expected to increase the long-term population of the region and create hundreds of new jobs over the longer term.
- There was strong recognition that the climate is drying, and water availability is placing significant seasonal stressors on the region, demonstrating a strong social licence for additional water to be provided.
- Stakeholders provided a range of views on the project. A strong social licence was demonstrated for additional water to be provided to the Clare Valley in the majority of stakeholder consultations undertaken.
- Social baseline analysis indicated that:
 - The estimated population of the Clare and Gilbert Valley region in 2020 was 9,470.
 - The population of the region is steadily increasing slowly by an average of approximately 70 people per year.
 - The population is ageing. The median age of the population of the region was 45.4 in 2015 compared to 47.2 in 2020. The median age for the Australian population in 2019 was 37 years.
 - In the 2016 Census 138 people identified as Indigenous representing 1.5% of the population of the Clare and Gilbert Valley Council area.
 - The mean total income for residents excluding government pensions and allowances in 2020 was \$53,970.
 - The median income of residents in 2020 was \$45,333 as compared to the Australian median of \$51,389 for the same year.
 - 40.3% of houses in the Clare and Gilbert Valley Council area are owned outright as compared to 31% for South Australia overall.
 - 23.1% of residents in the study area are renting as compared to 27.5% for South Australia overall.
 - Education levels are lower than South Australia overall.
 - Manufacturing and agriculture are the largest employers in the region.
 - In 2020 466 people were receiving Job Seeker allowance.
 - Rental availability is at historic lows.

Introduction

This section presents the social impacts associated with the infrastructure developments associated with this project. Findings are based on a desktop analysis and engagement activities undertaken to date.

This desktop analysis relies on secondary data sources, such as Commonwealth and South Australian Government statistics and reporting. It includes an overview of the existing social conditions and values in the study area and an assessment of potential benefits and impacts of the project.

The study area

The proposed reference project will occur in the Clare Valley of South Australia. The study region outlined in this social baseline analysis mainly comprises the Clare and Gilbert Valley Council local government area (LGA) as this is the area in which most of the long-term social impacts will occur. Social impacts that are likely to occur outside the Clare and Gilbert Valley Council area because of the project are also identified where appropriate.

The Clare and Gilbert Valleys Council area is in the Yorke and Mid North Region of South Australia, between 70 and 140 km north of the Adelaide CBD. The Council area is bounded by the Northern Areas Council (north), the Regional Council of Goyder (east), the Light Regional Council (south), and the Wakefield Regional Council (west).

The original inhabitants of the Clare and Gilbert Valleys Council area were the Kurna and Ngadjuri Aboriginal people.

European settlement of the area dates from the early 1840's, with land used mainly for sheep and cattle grazing, and later grain growing and viticulture.

Population growth in the mid-1800's was spurred by nearby copper mining at Burra, slate quarrying at Mintaro, the construction of railway lines and the establishment of numerous small townships.

The Clare and Gilbert Valleys Council area is predominantly rural, with the main township at Clare, and other townships at Auburn, Riverton and Saddleworth. Villages are located at Leasingham, Manoora, Marrabel, Mintaro, Penwortham, Rhynie, Sevenhill, Stockport, Tarlee, Waterloo and Watervale.

Rural land use is wheat and cereal growing, sheep and cattle grazing and viticulture, with some slate quarrying. Tourism is also an important industry.

5.4.2 Methodology

This social impact assessment adopts a three-stage process commonly used in business cases to identify social impacts.

Table 84 The three-step process for undertaking a social impact evaluation

Step 1: Identify impacts	Step 2: Evaluate impacts	Step 3: Integrate outcomes
- Identify stakeholders - Understand the social context and document the baseline - Document the project elements - Identify and describe impacts - Consider and document mitigations - Document opportunities to enhance positive impact - Describe the impacts after mitigation/enhancements	- Assess the likelihood and consequence of impacts occurring with the project - Assess the likelihood and consequence of impacts occurring under the baseline - Assess the likelihood and consequence of negative impacts after mitigations	- Include impacts in the economic analysis - Include relevant elements in reference project and other analyses - Include relevant elements in the appraisal summary table - Update the evaluation register and the risk and benefits register

Source: Building Queensland (2020) Social Impact Evaluation Guide Release 3.

This section builds on previous work done as part of the PBC. Inputs into this section include previous analysis of the stakeholders and service need, and strategic, legal and regulatory, market, public interest and sustainability considerations presented in other sections. The outputs of this section are used to inform the economic, financial and environmental analyses.

Data to further inform this social impact evaluation is derived from Australian Bureau of Statistics (ABS), other published reports and previous studies. This section documents the key findings from the above three-step social impact evaluation process.

5.4.3 Stakeholders

Stakeholders provided a range of views on the project. A strong social licence was demonstrated for additional water to be provided to the Clare Valley in the majority of stakeholder consultations undertaken.

Stakeholder consultation revealed that:

- Some producers in the Valley have no access to water or have very restricted access to surface and groundwater resources.
- Landholders outside of the current irrigation scheme would irrigate more if connected to the CVWSS.
- Irrigators indicated that their preference was for a climate independent source of supply; however, recognised the high cost associated with this option.
- Irrigators indicated that they wanted more certainty and control over water.
- Growers were seeking to raise the profile of wine from the Clare Valley and seeking innovative ways to increase market share.
- A younger generation of wine makers was identified who believed that there were commercial advantages for a product with good sustainability credentials.
- The local Council were strongly supportive of the project and keen to identify how industries other than wine making can benefit from the project.
- It was identified that the industry in the area was at a crossroads due to declining water availability and that several large producers had already pulled out.
- Stakeholders identified that water availability is declining and that an intervention of some type is required.

5.4.4 Social baseline

The following sections provide the social baseline for the project.

Population

The estimated population of the Clare and Gilbert Valley region in 2020 was 9,470. The population of the region is steadily increasing. Table 85 shows the increase in population since 2015.

Table 85 Clare and Gilbert Valley Council population 2011-2020

Year	Population	Change from previous year	Change from previous year (%)
2010	8,759	-	-
2011	8,871	112	1.2
2012	8,961	90	1
2013	9,063	102	1.1
2014	9,136	73	0.8
2015	9,204	68	0.7
2016	9,244	40	0.4

Year	Population	Change from previous year	Change from previous year (%)
2017	9,317	73	0.8
2018	9,379	62	0.7
2019	9,424	45	0.5
2020	9,470	46	0.5

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

Population density

The Clare and Gilbert Valley Council area covers 1,893 sq km and has a population density of 5 persons per square km.

Population growth and population predictions

The Clare and Gilbert Valley Council area has experienced minor population growth over the past ten years. On average the population has increased on average by approximately 70 people every year with the past two years seeing a slowing trend in population growth.

Median age of population

The median age of the population of the region was 45.4 in 2015 compared to 47.2 in 2020 (Table 86). The median age for the Australian population in 2019 was 37 years.

Table 86 Clare and Gilbert Valley Council median age of population

Year	2015	2016	2017	2018	2019	2020	2015
Median Age	45.4	46	46.6	46.8	46.9	47.2	45.4

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

Indigenous population

In the 2016 Census 138 people identified as Indigenous representing 1.5% of the population of the Clare and Gilbert Valley Council area.

Income

The mean total income for residents excluding government pensions and allowances in 2020 was \$53,970. The median income of residents in 2020 was \$45,333 as compared to the Australian median of \$51,389 for the same year.

The income breakdown by earnings brackets in the study area in 2020 is provided in Table 87.

Table 87 Clare and Gilbert Valley Council income breakdown in 2020

Household income	Proportion of study area (%)
Nil	5.7
\$1 - 499	32.4
\$500 - 999	28.20
\$1,000 – 1,999	20.3
\$2,000 – 2,999	2.9
\$ 3,000 +	1.7

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

Housing types and ownership

The number of houses of varying style in the study area as of 2016 is provided in Table 88.

Table 88 Clare and Gilbert Valley Council housing in 2016

Housing Style	Number
Separate House	3,293
Semidetached (Townhouse etc)	122
Flat or Apartment	33
Other Dwelling (caravan, etc)	44
Total Occupied dwellings	3,525

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

40.3% of houses in the Clare and Gilbert Valley Council area are owned outright as compared to 31% for South Australia overall. 23.1% of residents in the study area are renting as compared to 27.5% for South Australia overall.

The housing tenure type in the study area in 2016 is provided in Table 89.

Table 89 Clare and Gilbert Valley housing tenure type in 2016

Tenure	Percentage
Owned Outright	40.3
Owned with mortgage	32.9
Rented	23.1
Not Stated	2.1

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

Median mortgage and rent by year

The median mortgage and rent payments in the study area are presented in Table 90.

Table 90 Clare and Gilbert Valley median mortgage and rent

Payment	2016
Median mortgage repayment (\$ monthly)	1,381
Median rent (\$ weekly)	913

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

Education

The education status of residents in the study area as of 2016 are provided in Table 91.

Table 91 Clare and Gilbert Valley resident education in 2016

Qualifications	Proportion of study area (%)	Average for South Australia (%)
Bachelor or higher degree	10.5	18.5
Advanced Diploma or Diploma	8.2	8.3
Certificate level	22.7	20.1
No qualification	49.6	43.7

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

Employment by Category (2016)

The breakdown of resident employment in the study area as of 2016 is presented in Table 92. Most residents are employed in areas of manufacturing, followed by agriculture, forestry and fishing, and health care.

Table 92 Clare and Gilbert Valley resident employment by category (2016), ranked by proportion of study area (%)

Industry	Count in study area	Proportion of study area (%)	Average for South Australia (%)
Manufacturing	672	12.2	8
Agriculture, Forestry and Fishing	597	10.8	4
Health Care and Social Assistance	512	9.3	14.8
Education and Training	475	8.7	8.7
Retail Trade	470	8.5	10.7
Accommodation and Food Services	349	6.3	6.7
Administrative and Support Services	294	5.3	3.6
Public Administration and Safety	284	5.2	7.1
Construction	264	4.8	7.6
Other Services	240	4.3	3.9
Professional, Scientific and Technical Services	229	4.2	5.5
Transport, Postal and Warehousing	225	4.1	4.1
Financial and Insurance Services	176	3.2	2.7
Wholesale Trade	159	2.9	2.8
Mining	95	1.7	1.2
Rental, Hiring and Real Estate Services	85	1.5	1.3
Electricity, Gas, Water and Waste Services	49	0.9	1.2
Arts and Recreation Services	36	0.6	1.4
Information Media and Telecommunications	18	0.3	1.3

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

Unemployment

In 2020, 466 people were receiving job seeker allowance in the Clare and Gilbert Valley Local Government area.

Place of birth

The place of birth of residents not born in Australia as of 2016 is presented in Table 93. The majority of residents born overseas were born in north-west Europe.

Table 93 Clare and Gilbert Valley resident place of birth

Description	Proportion of study area (%)
Born in North-West Europe (%)	6.5
Born in Oceania and Antarctica (excluding Australia) (%)	0.6
Born in South-East Asia (%)	0.6
Born in Southern and Eastern Europe (%)	0.4
Born in Americas (%)	0.4
Born in Sub-Saharan Africa (%)	0.4
Born in Southern and Central Asia (%)	0.3
Born in North-East Asia (%)	0.2
Born in North Africa and the Middle East (%)	0.1
Total born overseas	9.9

Source: Australian Bureau of Statistics (2021) Data by Region, Clare and Gilbert Valley LGA, <http://dbr.abs>

5.4.5 Reference project impact identification

The following sections describe the social impacts of the proposed project, including the different impacts across the varying options within the shortlist.

Population and demographic impacts

The population of the region is currently 9,470. Population growth has been minor over the past ten years with approximately 70 additional people coming to the region every year. The project has the potential to accelerate population growth, which will have an impact on existing services and housing availability.

The population of the Council area is ageing. The population is on average older than other areas in Australia and the project with its additional employment impacts may be a catalyst to attract a younger generation.

The influx of construction workers for the project may result in a small increase in the population of the study area for the duration of the construction phase. This will impact on community services and facilities in the study area, through increased demand for existing services such as health care. However, this is considered manageable from existing resources.

During operation, the project will provide opportunities to expand existing viticultural and other water using businesses, as well as develop opportunities for new commercial enterprises. This will provide new employment opportunities and help create employment diversity in the study area. However, it should be noted that recent shortages of experience and labour in rural Australia indicate that the existence of jobs alone may not be enough to attract population to the region.

A combined strategy of employment opportunities, affordable housing and positive lifestyle may need to be considered.

The needs of additional seasonal workers required during harvest will also need to be considered.

Indirect employment opportunities are also likely to be created during construction through increased demand for goods and services. This would have positive benefits for residents and local workers.

Housing and accommodation impacts

During construction, demand for accommodation from the construction workforce is generally expected to be for both temporary accommodation, such as hotel and guest accommodation, and permanent accommodation, such as rental housing.

While the project's location near to Adelaide and other well-populated areas provides additional opportunities to house both the construction and permanent workforce nearby to the project, the capacity of the study region to provide additional rental housing accommodation for the construction and permanent workforce is low.

Rental availability is currently low. Neighbouring regional centres that could be expected to provide accommodation for the construction and permanent workforce required for all options under consideration have extremely low levels of rental vacancy. According to the Real Estate Institute of Australia, the rental vacancy rate for Adelaide in December 2020 was 0.6%; the lowest in Australia and significantly lower than the national average of 3.1%.

Increased demand for rental accommodation during construction and operation of the scheme could lead to higher rental prices and house purchase prices, given the high demand and low availability. A strategy for accommodating the construction and permanent workforces will need to be developed.

During operation a significant increase in demand for housing and accommodation can be expected. The region has the advantage of having low-cost land available for development, which would need to be considered as part of the long-term strategy for the development of the scheme.

Labour market impacts

There is no large pool of unemployed workers within the region. The most recent quarterly statistics collected as part of the baseline study indicated that the unemployment rate was low. This indicates that a large proportion of the skilled construction and operational workforce will need to be sourced from outside the region.

The project may be disruptive of the current labour market. The number of jobs available may drive competition for labour and increase the costs of retaining staff for existing businesses. The project will have to compete with other areas to attract appropriately qualified staff to fill construction and operational roles.

Property impacts

Improve existing and new build infrastructure options may have detrimental property impacts. Water pipelines to transport water and infrastructure such as pumping stations and new storages to service customers will also trigger land acquisition or easement requirements. Any additional on-farm infrastructure required to store and use the water will be the responsibility of the individual landholder.

Current landholders within the construction footprints will be disadvantaged. This will be resolved through commercial negotiation between the affected landholders and the proponent. New and existing farming enterprises in the irrigation area will be the greatest beneficiaries of the project.

Community services and facilities

An increase in population during the construction phase for improve existing and new build infrastructure options will increase demand for medical and health services, potentially impacting on service levels. Consultation will need to be undertaken with the relevant health authorities to ensure that potential increases in population and demand for medical and health services can be appropriately managed. It is expected that emergency services and the hospitals will have capacity and capability to respond to most construction-related incidents and emergencies; however,

consultation will be undertaken with the hospitals and emergency services in the preparation of emergency response procedures.

An increase in the number of children relocating to the study area with construction workers and the permanent workforce will impact on childcare services and local schools. Early consultation will need to be undertaken with the relevant education authorities, local schools and child-care providers to manage potential impacts.

Operation of the project will impact on community services and facilities. The potential increase in population will need to be matched by a corresponding increase in available services. The operational phases of the project will result in an additional annual influx of seasonal workers, and the available services will need to be able to cater for this demand.

Governance impacts

The project will make significant demands on all three levels of government. Local government will play a critical role in the coordination and approval of much of the development associated with the reference project and the additional housing and service requirement that the additional population will require. The state government will also be required to assess and approve key parts of the projects while the federal government, in addition to its regulatory role, will need to provide extensive grant funding. Reform options will place extensive demand on government services through changes to long existing regulatory frameworks.

5.4.6 Summary of social impacts and benefits

A summary of the social impacts and benefits resulting from the proposed project is detailed in Table 94.

Table 94 Summary of social benefits and impacts resulting from the project

Summary of social benefits and impacts	Project phase	Nature of the impact	Stakeholders	Significance rating	Assessment Category	Unit of measure (where applicable)	Mitigation measures and strategies	Significance rating post mitigation
Community impacts								
A large, long-term increase in regional employment from expanded increases in grape production, processing and additional tourism	Operation	Positive	Farmers, local community, labour market participants	Major	Quantified	Number of permanent jobs created (FTE)	No mitigation required	Major
An increase in regional employment during the construction phase.	Construction	Positive	Labour market	Major	Quantified	Number of jobs created during construction (FTE)	No mitigation required	Major
Significant demands on existing transport networks and electricity infrastructure along the pipeline route, at storage sites, pipelines and new irrigation area.	Construction and operation	Negative	Infrastructure providers	Major	Quantified	Size of fleet required during construction (count), and power demand during operation (kW)	Inform relevant organisations of the proposed works program and schedule, and engage as part of the planning process	Medium
Potential loss of areas and activities of cultural significance (pipeline route, other infrastructure sites)	Construction and operation	Negative	Traditional owners	Major	Qualitative		Consult with Native Title groups. Undertake a cultural heritage survey and incorporate it in planning a program. Develop a Cultural Heritage Management Plan as part of the	Medium

Summary of social benefits and impacts	Project phase	Nature of the impact	Stakeholders	Significance rating	Assessment Category	Unit of measure (where applicable)	Mitigation measures and strategies	Significance rating post mitigation
							Environmental Impact Statement (EIS) process.	
Competition for skilled labour within the region and outside the region will intensify and may impact on the ability to complete the project	Construction	Negative	Labour market	Medium	Quantified	Increase in skilled labour jobs (FTE)	Undertake workforce skills gap analysis and develop a strategic response	Low
Additional demands on existing services during construction and operational phases	Construction and operation	Negative	Service providers	Medium	Quantified	Unit of measure to depend on service	Inform relevant organisations of the proposed works program and schedule, and engage as part of the planning process	Low
Demand for worker housing during construction may impact on regional housing affordability and supply	Construction	Negative	Regional housing market participants	Medium	Quantified	Median purchase price of housing (\$) Median rental price of housing (\$) Count of suitable worker houses available (number)	Undertake housing supply analysis and develop alternative short-term housing arrangements if required	Low
Demand for worker housing during operation may impact on regional housing affordability and supply for both rental and owner-occupier markets	Operation	Negative	Regional housing market participants	Major	Quantified	Median purchase price of housing (\$) Median rental price of housing (\$) Count of suitable worker houses available (number)	Undertake housing supply analysis and increase the supply of housing for purchase and rental	Medium

Summary of social benefits and impacts	Project phase	Nature of the impact	Stakeholders	Significance rating	Assessment Category	Unit of measure (where applicable)	Mitigation measures and strategies	Significance rating post mitigation
Cultural impacts								
A change in land use to higher value per hectare crops in suitable areas	Operation	Positive	Landowners	Medium	Monetised	Value of land in suitable cropping areas (\$/ha)	No mitigation required	Medium
A large-scale change in land use from broadacre grazing to intensive viticulture will change community numbers and composition	Operation	Negative	Regional community	Medium	Qualitative		Develop a detailed consultation and communication strategy	Minor
Competition for new water sources and cost of water may drive social conflict	Operation	Negative	Regional Community	Medium	Qualitative		Develop a detailed consultation and communication strategy	Minor
A temporary influx of construction workers could have an impact on community cohesion	Construction	Negative	Regional community	Medium	Qualitative		Develop a detailed consultation and communication strategy	Minor
An influx of additional seasonal workers could have an impact on community cohesion	Operation	Negative	Regional community	Minor	Qualitative		Develop a detailed consultation and communication strategy	Minor
Displacement of existing landholders and industry	Operation	Negative	Landholders	Minor	Quantified	Count of landholder/industry turnover (number)	Develop a detailed consultation and communication strategy	Minor

Summary of social benefits and impacts	Project phase	Nature of the impact	Stakeholders	Significance rating	Assessment Category	Unit of measure (where applicable)	Mitigation measures and strategies	Significance rating post mitigation
Personal and property rights								
Access to land along the pipeline route will impact on existing and neighbouring land holders	Construction	Negative	Landholders	Medium	Quantified	Count of land holders impacted (number)	Adequately compensate the landholders	Minor
Quality of life								
Potential impacts on cultural heritage areas and sites from construction of infrastructure	Construction and operation	Negative	Traditional owners	Major	Qualitative		Develop Cultural Heritage Management Plan. Mitigate as part of the EIS process	Major
Lifestyle impacts from construction, and the development of the new irrigation area and supporting infrastructure	Construction and operation	Negative	Regional community	Medium	Qualitative		Develop a detailed consultation and communication strategy	Minor
Temporary impacts during construction on liveability (noise, dust)	Construction	Negative	Regional community	Medium	Qualitative		Mitigate as part of the EIS process	Minor
Restriction on land use within the buffer area	Construction and operation	Negative	Landholder	Minor	Monetised	Total compensation paid to landholders (\$)	Adequately compensate the landholder	Minor

5.4.7 Conclusion of social impact assessment

An assessment of potential social impacts associated with the reference project has been undertaken.

The projects may add to the population of the region through creating additional employment opportunities. The extent of the impacts will be dependent on the options adopted. Options which will provide the largest increase in water availability will also have the largest potentially positive and negative social impacts.

There is no large pool of skilled unemployed labour in the region. The project may drive significant competition for labour within the region and outside the region. Other regional areas of Australia are already experiencing difficulties in attracting and retaining labour.

Providing housing for the constructional, seasonal and operational workforce will be a major challenge for the project. While housing costs are lower in the region in comparison to other areas of the Greater Adelaide area, the number of available properties is also low. Major neighbouring centres are also experiencing a shortage of rental accommodation. Without a strategic approach, the project could significantly increase the costs of housing, exacerbate the current shortage of housing and drive sub-optimal social outcomes particularly for disadvantaged individuals and groups in the region.

Health and community services available in the Clare region are limited, and the large influx of construction, operational and seasonal labour will place extensive strain on the existing services if a major infrastructure option is adopted.

The project will also make extensive demands on the resources of the state government departments and local government in terms of planning approvals and strategic coordination of services.

The project will need to address the social impacts of the development in terms of labour recruitment and retention, housing and services if a better use or new build infrastructure option is adopted.

The cultural heritage impacts on traditional owners from each of the infrastructure options under consideration have not yet been explored in depth.

5.5 ENVIRONMENTAL ASSESSMENT

Green Edge Environmental undertook a high-level desktop environmental assessment to identify the environmental challenges and opportunities for the project.

The high-level desktop environmental assessment is included as Appendix F.

5.5.1 Objectives and scope of works

The high-level assessment has been undertaken to determine if there are any showstoppers associated with the proposed. The assessment included:

- State and Commonwealth Database searches to determine the potential for threatened species to occur
- identification of flora and fauna issues requiring mitigation measures, proposed changes or approaches to mitigate issues, costs and timeframes.

The desktop assessment of the proposed study area utilised the following datasets and sources:

- State threatened flora and fauna databases
- Commonwealth Protected Matters Search Tool

- South Australian Department of Environment, Water and Natural Resources Nature Maps Interactive Tool
- Government of South Australia, Department of Planning, Transport and Industry Location SA MapViewer
- Applicable State Legislation
- Google Earth and other aerial photography.

5.5.2 Findings from the desktop assessment

The project area occurs entirely within the Flinders Lofty Block Interim Biogeographic Regionalisation for Australia (IBRA) region and Broughton (FLB02) subregion. The area has been highly impacted by development and limited habitat opportunities occurs within the proposed works area within the study area. The study area is within the Northern and Yorke Landscape Management Region.

Key findings included:

- 24 fauna and 56 flora species were returned from a search of a 10km buffer of the study area the South Australia Biological Database. Final alignments will be assessed to ensure impacts to the species and their habitat are avoided.
- There are several Weeds of National Significance (WoNS) within the study area, mitigation measures during construction works will ensure these species are not spread further than their current extent.
- There are several local heritage sites within the study area which will need to avoid impact from any new construction work.
- There are several State heritage sites within the study area which will need to avoid impact from any new construction work.
- There is one determined Native Title determination and one undetermined Native Title claim in the study area.
- There is an Indigenous Land Use Agreement (ILUA) over the project area and the impacts of the proposed development will need to be considered further.
- There are several National Parks and Reserves within the study, none will be impacted by the proposed alignment.
- The study area contains several water courses that are likely to be crossed from the proposed infrastructure. The Water Affecting Activity (WAA) Control Policy is made under Section 102 of the *Landscape South Australia Act 2019* (the Act). Section 104 of the Act specifies the activities that may be regulated by a WAA Permit. This will need to be assessed based on the final proposed final alignment.

5.5.3 South Australia Native Vegetation Act and Regulations

Native vegetation in this part of South Australia is protected by the *Native Vegetation Act 1991*. Under the Act if a proponent wants to clear native vegetation for any reason, they need to:

- check whether your proposed clearance is listed in the Native Vegetation Regulations 2017; if it is, clearance is permitted but conditions usually apply
- check whether the native vegetation you are proposing to clear is protected under the Native Vegetation Act 1991.

The *Native Vegetation Regulations 2017* outline the circumstances where clearing native vegetation are permitted, outside of the clearance controls in the *Native Vegetation Act 1991*. The

Regulations allow clearance for activities that are routinely carried out by South Australians, including building new homes, managing farms, upgrading or establishing infrastructure or making recreational trails.

The Regulations seek to balance the requirements of South Australians to clear for everyday activities with the need to protect and restore the remaining native vegetation in South Australia.

Native Vegetation Clearance Approval Pathway

There are four approval pathways for native vegetation clearance in South Australia, these include:

- Pathway 1: Permitted Clearance Without Conditions (self-assessed by proponent, notification to the Native Vegetation Council (NVC) sometimes required).
- Pathway 2: Fire Hazard Reduction (requires Country Fire Service approval).
- Pathway 3: Vegetation Management (requires a Management Plan approved by the NVC).
- Pathway 4: Risk Assessment (requires NVC approval and a Significant Environmental Benefit (SEB) offset):
 - a. Major developments (section 48 Development Act 1993 now the Planning, Development and Infrastructure Act 2016)
 - b. Mining, petroleum and exploration activities
 - c. Other activities where the level of risk associated with the activity is not yet known.

Mitigation Hierarchy

The Regulations place a great emphasis on the proponent applying the Mitigation Hierarchy, a fundamental principle which encourages proponents to consider all possible ways to avoid and minimise clearance to reduce the level of clearance required. Reducing the level of clearance also reduces the SEB offset (where required) and associated cost to the proponent. The NVC assesses whether proponents have adequately applied the Mitigation Hierarchy.

The most appropriate pathway for the proposed project to undertake native vegetation clearance is under Pathway 4 C - Other activities where the level of risk associated with the activity is not yet known and is summarised in Table 95.

Table 95 Pathway 4 C - Other activities requirements

Regulation (Schedule 1 activity)	Description of activity	Proponent must comply with the following additional requirements
Regulation 12(34) - Infrastructure	To allow clearance of vegetation incidental to the construction or expansion of a building or infrastructure (and associated services) where the Minister has declared that the clearance is in the public interest. 'Infrastructure' is defined in the definitions of the regulations and additionally in regulation 12(34).	1. Clearance incidental to the construction or expansion of a building or infrastructure where it is deemed the clearance is in the public interest; and/or 2. Clearance is required in connection with the provision of infrastructure or services to a building or place provided that consent under the <i>Development Act 1993</i> has been obtained; and/or 3. Clearance is undertaken in accordance with an NVC approved Standard Operating Procedure.

5.5.4 Significant Environmental Benefit – Regulation 20

If clearance of native vegetation is permitted under the Regulations as a risk-assessed activity and is subject to the achievement of an SEB offset, the SEB is to be achieved by:

- establishing and managing native vegetation on land as specified by the NVC
- managing and protecting native vegetation that is growing or is situated on land as specified by the NVC
- entering into a Heritage Agreement for the management of specified native vegetation
- acting in accordance with credit, assignment and/or third-party establishment of environmental benefits (Part 4A of the Act).

Table 96 Process to undertake Clearance for 4C ‘Other activities’

General process	Requirements of proponent
Application to NVC	Application to the NVC or in accordance with an NVC-approved Standard Operating Procedure (SOP). Note, you must submit the written permission of the landowner if you are acting on behalf of the landowner for any clearance activity.
Assessment	When deciding for these activities in relation to the information to be provided by an applicant to inform whether approval should be granted, the NVC will assess the level of risk to biodiversity presented by the clearance proposal. The NVC will also assess the proposed clearance against whether there are any other alternatives that involve no clearance, less clearance or clearance of vegetation that is less significant (or has been degraded to a greater extent than the vegetation proposed to be cleared). If an NVC-approved SOP exists, the assessment approach will occur in accordance with the SOP
Approval	NVC approval required, or in accordance with the approval process outlined in the NVC-approved SOP. Proponent is required to develop an SEB Management Plan that will be approved by the NVC for implementation. Clearance is only permitted for these activities if any conditions (including the SEB) that apply to the approval are complied with. Conditions imposed in connection with an approval are binding and enforceable against the person to whom the approval is granted as well as subsequent owners and occupiers of the land. Permitted clearance must be undertaken 2 years within approval being granted, unless otherwise specified.
Significant Environmental Benefit	SEB required in accordance with the Management Plan (or payment into the Native Vegetation Fund). If an NVC-approved SOP exists, the approval of the SEB will occur in accordance with the SOP.

5.5.5 Environmental Protection and Biodiversity Conservation Act

A protected matters search was undertaken to determine if there were any Matters of National Environmental Significance (MNES) in the study area. There is potential for two listed ecological communities, 25 listed threatened species and 12 listed migratory species (refer to Table 97).

Table 97 Matters of National Environmental Significance in the study area

Matters of National Environmental Significance	Count
World Heritage Properties	0
National Heritage Places	0
Wetlands of International Importance (Ramsar Wetlands)	0
Great Barrier Reef Marine Park	0
Commonwealth Marine Area	0
Listed Threatened Ecological Communities	2
Listed Threatened Species	25
Listed Migratory Species	12

5.5.6 Summary

The following was identified through this high-level study:

- Final alignments will be assessed to ensure impacts to the species and their habitat are avoided.
- Mitigation measures during construction works will ensure these species are not spread further than their current extent.
- Water Affecting Activity (WAA) under the Landscape South Australia Act 2019 are likely to be required for works in waterways.
- Local and State heritage sites should be avoided where possible in the final design.
- SEB are likely to be required for native vegetation removal.

5.6 SUSTAINABILITY ASSESSMENT

This section presents the preliminary sustainability assessment outcomes of the project.

5.6.1 Key points

- The ISA 2020 Capital Intentions Statement identifies that sustainability, resilience and liveability must be considered when planning new infrastructure.
- Infrastructure that can help South Australia cope with factors such as a growing population and climate change is recognised as a fundamental underpinning of growth.
- A series of initiatives have been identified that will help align the project with the South Australian Governments Sustainability Commitments. These initiatives include those to address:
 - Climate change and greenhouse gas emission reduction
 - Renewable energy
 - Transport
 - Circular economy
 - Disaster resilience
 - Life below water
 - Life on land
 - Water security.

- This sustainability assessment follows the approach promoted by the Infrastructure Sustainability Council of Australia (ISCA) in version 2 of their assessment framework. It measures a series of sustainability principles across the quadruple bottom line – governance, environment, social and economic.
- The project has the potential to increase the productivity and long-term sustainability of the Clare Valley area and the wider region.
- Social, environmental and economic issues have been considered and are key components of the detailed business case.
- The project will add substantially to the long-term sustainability and resilience of the Clare Valley as wine producing area.
- The most recent assessment by the South Australian DEW for the Clare Valley Water Resources shows that the area is experiencing severe water stress potentially related to climate change.
- Renewable energy production to power treatment assets and water pumping are included in the design brief.
- The project will largely be located on previously disturbed land, with irrigation occurring in areas currently used for agriculture.
- The project will have a positive, long-lasting impact on the Clare Valley production areas and the wider region. It will increase economic activity and create beneficial growth in the region through enabling an increase in production of high-value crops.
- The project may also encourage migration to the area, creating population rise and increased affluence.
- A benefits management plan including clear planning for high-level measurement of benefits has been developed.
- Key actions recommended to improve the sustainability aspects of the project are:
 - Apply for Infrastructure Sustainability Design and As Built ratings through the ISCA.
 - Undertake a stakeholder sustainability workshop to identify direct and indirect governance issues, and economic, environmental and social sustainability risks and opportunities on the preferred option.
 - Assess the carbon footprint of the preferred option and develop a strategy for net zero carbon emissions.
 - Incorporate sustainability and circular economy principles into the tendering process for construction.
 - Identify opportunities for green infrastructure solutions as part of the design process.
 - Develop a water management plan for the project to minimise risks to groundwater and other environmental assets.
 - Undertake an on ground First Nations and colonial heritage assessment.
 - Undertake a skills analysis detailing relevant workforce capacity and capability requirements across all parts of the project life cycle.
 - Incorporate sustainability strategies and initiatives into a detailed business case cost estimate.
 - Develop sustainability indicators for the project.

5.6.2 Introduction

ISA was established and operates under the *ISA Act 2018* to serve as an advisory and assurance body in relation to major State infrastructure projects. The Capital Intentions Statement published by ISA seeks to prioritise infrastructure that contributes to economic and jobs growth and that has the capacity to support and catalyse economic growth by attracting direct investment and improving productivity and access to jobs and markets.

Wine, agribusiness and tourism are identified as key growth drivers for the State; therefore, this project is broadly aligned with the Capital Intentions Statement.

The ISA 2020 Capital Intentions Statement identifies that sustainability, resilience and liveability must be considered when planning new infrastructure. Infrastructure that can help South Australia cope with factors such as a growing population and climate change while increasing the quality-of-service delivery in both urban and rural areas is recognised as a fundamental underpinning of growth.

This section identifies sustainability initiatives that this project can potentially undertake to align with the South Australian Government's Sustainable Development Commitments.

The project is assessed and rated in the areas of governance, environment, social and economic sustainability in line with the approach promoted by the Infrastructure Sustainability Council of Australia.⁹

5.6.3 Sustainability initiatives

Table 98 provides a series of potential initiatives that the project could undertake to align with the relevant South Australia's Sustainable Development Commitments as outlined by the South Australian Government Finance Authority.

Table 98 Potential Project Sustainability Initiatives

Sustainable Development Commitment	How the Project Could Meet the Commitment
Climate Change and Greenhouse Emissions Reduction	- Set Net Zero Carbon Emissions Target for Project. - Establish carbon baseline for each option. - Identify pathway toward Net Zero for each options scope 1, 2 and 3 emissions. - Use low carbon materials in construction – for example low carbon concrete, low carbon piping materials, recycled materials. - Use low carbon construction techniques. - Use electric construction equipment powered by green energy. - Low carbon employee commuting. - Offset remaining emissions with high quality Oxford Principle aligned projects such as reforestation or wetlands. Ensure carbon offsets are delivered within project area to maximise local benefits.
Renewable Energy	- Set renewable energy target. - Use renewable energy for construction and operation requirements either through purchase or construction of renewable energy infrastructure. - Investigate use of in-line hydro for energy generation.

⁹ The South Australian Department of Infrastructure and Transport has made a commitment to obtain Infrastructure Sustainability Design and As Built ratings for all projects with a capital value at or above \$100m. The sustainability rating scheme, developed and administered by the Infrastructure Sustainability Council of Australia, provides the department with the ability to quantitatively measure sustainability performance across the whole infrastructure lifecycle, benchmark against other projects and track progress against sustainability objectives.

Sustainable Development Commitment	How the Project Could Meet the Commitment
Transport	• Provide electric recharging facilities for site equipment that can also be used for public charging.
Circular Economy	• Set Net Zero Waste Target. • Establish methodology to achieve net zero waste.
Disaster resilience	• Ensure water from scheme is available to address potential disasters such as drought, heatwaves and fires.
Life below Water - Life on Land	• Provide carbon offsets to meet Net Zero target requirements where they can maximise biodiversity outcomes locally including reforestation and wetland establishment. • Ensure an allocation of environmental water either from the scheme or through reduction of demand on existing natural sources.
Water Security	• Provide additional imported water to reduce pressure on existing natural sources. • Mitigates against future risk against policy and availability changes to River Murray water.

5.6.4 Sustainability assessment approach

The sustainability assessment follows the approach promoted by the ISCA in Version 2 of their assessment framework. It measures a series of sustainability principles across the quadruple bottom line – governance, environment, social and economic. The level of achievement against each of the principles is rated according to the following definitions:

- **Advanced:** Generates significant additional value and new opportunities not previously evident, such as changing a liability into an asset. 'Designs out' the problem upfront rather than relying on managing impacts later. Solutions generate benefits outside the project boundary.
- **Moderate:** Solutions to significant issues result in multiple benefits through economic, social and or environmental outcomes. Meets immediate community and user needs and will be resilient and efficient into the future. Significant innovation and leading practice are incorporated into the project.
- **Basic:** Avoids harm and negative effects. Solutions create project efficiencies. Solutions have an immediate or short-term focus.
- **Compliant:** Meets legislative and regulatory requirements.
- **Poor:** Fails to meet legislative and regulatory standards. Solutions may result in dis-benefits and negative effects.

The ratings are assigned on the assumption that the recommended actions will be implemented at the post-DBC phase and during implementation of the project. In most cases, the actions are designed to ensure the project meets the 'advanced' rating. In some cases, the recommended actions may be delayed, deferred or not able to be met, due to funding or other constraints. In these instances, the rating may need to be moderated.

5.6.5 Sustainability assessment results

Table 99 summarises the number of principles against each level of achievement. The results of the assessment for each of the sustainability principles are detailed in the following sections.

Table 99 Summary of assessment

Level	Number of principles achieved this level
Advanced	2
Moderate	4
Basic	2
Compliant	-
Poor	-

Governance assessment

Table 100 provides a summary of sustainability assessment level achieved for each of the key Governance principles and provides rationale to support the assessment. Further detailed information to support the rationale have been referenced where relevant.

Table 100 Governance assessment

Principle	Assessment	Rationale
Context	Advanced	The project has the potential to increase the productivity and long-term sustainability of the Clare Valley area and the wider region. Social, environmental and economic issues have been considered and are key components of the detailed business case. The service need being addressed by this project is the supply of reliable irrigation water to support and expand irrigated agriculture and increase social and economic profit in the region. The project aligns with the ISA Capital Intentions Statement. The interrelationships and interdependencies of the wider system that the project will interact with include transition from and operation alongside existing viticulture businesses, existing livestock industries, existing community structure, groundwater and the existing environment. Mitigation strategies to ensure these relationships remain positive have been recommended. The project's key elements are the support for existing irrigated agriculture industries, successful establishment of new irrigated agriculture industries that stimulates the local economy, creates new industries, skills and employment opportunities. This would include the growth of new high-value crops, increasing population growth and economic wealth.
Leadership and management	Moderate	Sustainability is embedded into the definitive business case to ensure that identified and supported actions become part of building the project. In this manner, sustainability becomes an integral and integrated component rather than an add-on at the end of the build. The project is committed to obtaining an ISCA Design and As Built Rating for the project A stakeholder workshop will be undertaken to identify direct and indirect governance issues, and economic, environmental and social risks and opportunities on the preferred option. The sustainability assessment results will be shared with the project team and its actions included in the PBC. Lessons learned from previous irrigation projects around Australia have been incorporated into the PBC including achieving carbon neutrality, the importance of mitigating against future salinity risks, skills and training and education.
Sustainable procurement	Advanced	Sustainability and circular economy principles and targets will be incorporated into the tendering process for infrastructure construction Ensuring that actions to reduce diesel and electricity consumption in both operation plants and vehicles are incorporated into the

Principle	Assessment	Rationale
		procurement process to guarantee their inclusion in contract documentation and implementation by the selected contractor.
Resilience	Advanced	Project design and management recommendations focus on long term use and outcomes by being able to respond to future changes, challenges and trends. Climate change has the potential to threaten the viability of all agricultural and environmentally dependent projects in the future. The project will add substantially to the long-term sustainability and resilience of the Clare Valley region as a wine producing area. The most recent assessment by the South Australian DEW for the Clare Valley Water Resources shows that the area is experiencing severe water stress potentially related to climate change. Rainfall typically ranges from 500 to 620 mm with the higher rainfall in the central and elevated areas. Rainfall at Calcania was lower than average in 2018–19. This pattern was consistently observed across the PWRA and long-term data trends indicate a decline in rainfall. Rainfall in early winter and spring of 2018 was below average and very dry conditions occurred in summer 2018–19 Three streamflow gauging stations are used, one of which (Hill River) recorded the 'lowest on record' and the other two (Hutt and Wakefield River) recorded 'very much below average' streamflow during 2018–19. There is an overall declining trend with 17 of the past 20 years recording a below-average annual streamflow. No flow was recorded on the Wakefield River between July and September 2019. The highest salinity in the Wakefield River in 2018–19 was 5,683 mg/L and 2146 mg/L in the Skillogalee Creek. These values remain within the historical ranges experienced at each site. Water levels in the fractured rock aquifer range from average to lowest on record when compared to their historic range, with a median level of 'below average'. For 40% of the 34 monitoring wells in the area, the observed recovered water levels were lowest on record. Five-year trends in water level showed declining trends in 80% of the wells at a median rate of decline of 0.37 m/y.
Innovation	Moderate	Potential sustainability initiatives have been identified and are aligned to the South Australian Governments sustainability commitments.

Environmental assessment

Table 101 provides a summary of sustainability assessment level achieved for each of the key Environmental principles and provides rationale to support the assessment. Further detailed information to support the rationale have been referenced where relevant.

Table 101 Environmental assessment

Principle	Assessment	Rationale
Energy and carbon	Advanced	Although diesel will be the primary energy source during construction (used to power production plants and ancillary equipment), potential actions and recommendations provided to reduce diesel and electricity consumption (from fossil fuel sources) will be part of the procurement process. Carbon can be sequestered by increasing soil carbon contents. Increasing soil carbon would also bring further benefits that are attractive to farmers, such as increasing soil nutrient and water holding capacities.

Principle	Assessment	Rationale
		An assessment of the carbon footprint of the project should be undertaken and a strategy for net zero should be developed
Green infrastructure	Moderate	Opportunities for green infrastructure solutions have not been identified as yet. Carbon offsets to reach Net Zero goal can be considered as part of a green infrastructure solution
Environmental impacts	Basic	A full assessment of the environmental impacts of the project has not been undertaken. Key environmental risks and mitigation strategies will need to be identified. The project will largely be located on previously disturbed land, with irrigation occurring in areas currently used for agriculture. The pipeline route will follow existing roads and rail corridors. Impacts on surrounding habitats including groundwater-dependent ecosystems and will be minimised through the implementation of a water management plan and through the minimisation of pollutant and nutrient transport. The project is compatible with existing and future land use, as the area is currently used as agricultural land, including grazing.
Water	Basic	As this project will provide water to be used for irrigated agriculture, large amounts of water will be used during operation. Methods to maximize water use efficiency and minimize excessive water use will be implemented. These include using trickle and drip irrigation systems which will minimize water losses through leaching and runoff and only supply sufficient water to meet crop demands. A water management plan for the project to minimise risks to groundwater and other environmental assets should be developed.
Ecology	Basic	A desktop ecological assessment has been undertaken and the results are detailed in the environmental section of this PBC. A detailed on-ground ecological survey of the project area is yet to occur.

Social assessment

Table 102 provides a summary of sustainability assessment level achieved for each of the key social principles and provides rationale to support the assessment. Further detailed information to support the rationale have been referenced where relevant.

Table 102 Social assessment

Principle	Assessment	Rationale
Stakeholder engagement	Advanced	A stakeholder engagement plan has been developed and incorporated into the broader project. Extensive stakeholder engagement has been undertaken
Legacy	Advanced	The project will have a positive, long-lasting impact on the Clare Valley production areas and the wider region. By allowing the production of high-value crops, the project will increase economic activity in the region and create beneficial growth. The project may also encourage migration to the area, creating population rise and increased affluence.
Heritage	Moderate	A desktop First Nations and colonial heritage assessment has been undertaken and numerous sites of cultural heritage identified. A detailed on-ground assessment of cultural heritage will need to be undertaken.

Principle	Assessment	Rationale
Workforce sustainability	Basic	Issues regarding workforce availability and skills have been identified in the social impact assessment. A skills analysis has not been undertaken detailing relevant workforce capacity and capability requirements across all parts of the project life cycle.

Economic assessment

Table 103 provides a summary of sustainability assessment level achieved for each of the key Governance principles and provides rationale to support the assessment. Further detailed information to support the rationale have been referenced where relevant.

Table 103 Economic assessment

Principle	Assessment	Rationale
Options assessment and detailed business case	Advanced	A number of options to secure additional water for the Clare Valley area to support the wine and tourism industries have previously been explored in detail. Strategic and subsequent project options were evaluated by considering environmental, social and economic aspects through the use of a formal assessment techniques Whole-of-life costings adequately incorporated into financial and economic analyses for project options Sustainability strategies and initiatives will be incorporated into the detailed business case cost estimate.
Benefits realisation	Advanced	A benefits management plan including clear planning for high-level measurement of benefits has been developed. Sustainability outcomes will be quantified, monitored and evaluated throughout the project phases and lifetime of the asset against sustainability indicators.

5.6.6 Key actions

Table 104 provides a Summary of key sustainability actions for the project.

Table 104 Key actions

Action	Rationale
Apply for Infrastructure Sustainability Design and As Built ratings through the ISCA for Improve Existing and New Build Infrastructure Options	The South Australian Department of Infrastructure and Transport has made a commitment to achieve Infrastructure Sustainability Design and as Built Ratings. The sustainability rating scheme, developed and administered by the Infrastructure Sustainability Council of Australia, provides the department with the ability to quantitatively measure sustainability performance across the whole infrastructure lifecycle, benchmark against other projects and track progress against sustainability objectives
Undertake a stakeholder workshop to identify direct and indirect governance issues, and economic, environmental and social risks and opportunities for the preferred option	The workshop will provide the opportunity to further develop the key sustainability aspects of the chosen project and the results will be subsequently incorporated into the project design.

Action	Rationale
Assess the carbon footprint of the preferred option and develop a strategy for carbon neutrality and/or net zero	Understanding the overall carbon footprint of the project and developing strategies to meet agreed carbon neutral or net zero targets are central to the long-term sustainability of the project and the meeting of broader government emission goals.
Incorporate sustainability and circular economy principles into the tendering process for construction for Improve Existing and New Build Options.	Ensuring that contractors meet the sustainability goals of the project can be achieved through inclusion in the procurement process
Identify opportunities for green infrastructure solutions as part of the design process	Green infrastructure options such as tree planting or wetlands can provide cost effective solutions for meeting net zero goals.
Develop a water management plan for the project to minimise risks to groundwater and other environmental assets.	Additional water for irrigation in the area and the conversion of grazing areas to grape production has the potential to impact on groundwater assets and other environmental assets. A water plan for the project that aligns with other regional strategies and monitoring programs should be developed
Undertake an on ground Indigenous and colonial heritage assessment.	A cultural heritage assessment should be undertaken for each option that will have potential impacts
Undertake a skills analysis detailing relevant workforce capacity and capability requirements across all parts of the project life cycle.	The social impact section identified that the project may have significant impacts on the existing labour market unless managed appropriately
Incorporate sustainability strategies and initiatives into the detailed business case cost estimate.	Develop appropriate strategies to manage key sustainability aspects of the project and to drive initiatives. Specifically strategies for the project to achieve net zero carbon emission and net zero waste should be prioritised for options that involve construction activities.
Develop sustainability indicators for the project	Sustainability indicators for each option should be developed to measure progress.

6 Consideration of other infrastructure options

6.1 BACKGROUND

During the initial options shortlisting process, the upgrade of the CVWSS and the Bundaleer Dam options were identified as the leading two options. This assessment was predominantly based on affordability for customers, funding scenarios and economic criteria. Further analysis was undertaken in these two preferred options which is outlined in the previous chapters.

Additional stakeholder engagement was undertaken following the completion of the initial shortlisting process and the additional analysis. Feedback received advocated for two options to come under further consideration as part of the preliminary business case, specifically:

- A lower cost augmentation of the CVWSS.
- A climate-independent recycled water solution.

6.2 AUGMENTATION OF THE CLARE VALLEY WATER SUPPLY SCHEME – LOWER COST OPTION

As outlined in previous sections, the current CVWSS is constrained in meeting the needs of current and potential water customers during peak demand periods. The two main aspects of the constraint are:

- The network not extending to several properties which have a demand for water.
- The network not having capacity to meet customer's irrigation requirements during peak demand periods.

However, it is noted that there is typically additional capacity that exists in the CVWSS during off-peak and shoulder demand periods (e.g., during winter).

Two measures have been considered to address the constraints:

- Extend the current CVWSS network to those properties not connected.
- Include on-farm and/or network storage to receive off-peak water from the CVWSS for delivery and usage during peak demand periods.

The CVWSS upgrade considered in the PBC is a simple approach which has focused on developing four community storages and a new non-potable delivery network.

- **Community storages** – The four storages would receive water from the CVWSS during off-peak periods. The storages have been designed to be of a non-potable standard. This is to reduce the project's capex, which is achieved even with the resulting additional cost of developing a new non-potable delivery network.
- **Non-potable delivery network** – Water from the four storages would be distributed through a new non-potable delivery network to existing CVWSS customers and new customers without a current connection to the CVWSS. The establishment of a non-potable delivery network may provide future opportunities with alternative non-potable water sources.

This option could be a conservative approach when estimating the capital and operating costs of an upgrade of the CVWSS. There could be several elements which may reduce the capital and operating costs of an upgrade with further investigation, including consultation with industry and SA Water.

Elements which may reduce capital and operating costs of an upgrade include:

- Augmentation of the existing CVWSS potable delivery network to increase capacity to meet customers' irrigation requirements during peak delivery periods.
- Extension of the existing CVWSS potable delivery network to those potential customers who are not currently connected.
- Incentives for the private construction of on-farm storage to increase customers' capacity to receive water during off-peak periods.

Notwithstanding, the option as it is currently presented delivers a positive economic case, which would only be improved with lower capital and operating costs.

As with other options, the CVWSS could further be supported by the non-infrastructure options identified in the preliminary business case, which will support the established service need being met.

Therefore, the case for the lower cost augmentation of the CVWSS option to be considered further in a detailed business case is strong.

6.3 CLIMATE-INDEPENDENT RECYCLED WATER SOLUTION

All existing water supplies in the Clare Valley are from climate dependent sources. This was raised as a concern through consultation with industry due to the declining quality of native sources and the uncertain long-term availability of River Murray water.

Furthermore, there could be a potential negative perception of the use of climate-dependent River Murray water for irrigation, particularly for a premium wine product for which sustainable marketing is critical.

The Bundaleer Dam and the CVWSS options are based on supply from the River Murray.

An option to treat water from the Bolivar WWTP was identified for further investigations as part of the preliminary business case's initial long-list option screening. The assessment of this option identified several challenges:

- Capex affordability – based on 25% customer contribution to capex.
- Opex affordability – based on the operating expenses being recovered through annual charges (treatment of water to 300-400 ppm, 575 m lift, storage, 92 km trunk main).

The expressed demand of between 1.1 GL and 3 GL did not provide adequate scale for a Bolivar Recycled Water option to be affordable to customers.

However, there is a strategic position to include this option on the short-list for further investigation as part of a detailed business case. This is based on:

- A strong community preference for a climate-independent source for the region's long-term sustainability and viability. This was demonstrated through industry's responses in the Round 1 demand assessment process.
- Establishing demand in a 'green corridor' between Two Wells and Auburn/Clare Valley, increasing scale and improving customer affordability.
- The potential for increased demand over 3 GL for water in the Clare Valley with a climate-independent source.
- The scale of the Barossa New Water project, which may increase scale 8.6 GL to 13 GL, reducing annual charges/pro-rata contribution from Clare Valley customers.
- The potential for reliability projections and policy of the River Murray to change.
- The potential for a staged program of works – e.g. new non-potable network developed as a first stage.

In recognition of the above strategic considerations, a Bolivar Recycled Water option (or an alternative climate-independent option) should be considered further as part of a detailed business case.

Section C – Recommendations and Planning

7 Procurement and delivery strategy

7.1 INTRODUCTION

This section provides a preliminary assessment regarding the procurement and delivery of a preferred project, following a detailed business case. This section considers:

- Delivery strategy.
- Market considerations.
- Contracting model.

Further consideration of the above will be undertaken during the development of the detailed business case and with further engagement with key stakeholders, including government departments, CVWGA and SA Water.

7.2 DELIVERY STRATEGY

7.2.1 Potential proponents

There are three options for the build, ownership, and operations roles of the project:

1. **SA Water** – South Australian Government-owned major water business, which supplies urban, industrial and agricultural water throughout the state. SA Water currently own and operate the CVWSS.
2. **A customer-owned, not-for-profit entity** – A entity which is focused on the delivery affordable and reliable water to its shareholders. Typically, these entities are seeking to make a profit but rather recover operating charges and asset renewal costs through annual charges. Examples of such entities in established wine regions include Barossa Infrastructure Limited in the Barossa Valley and the Creeks Pipeline Company Limited in the Langhorne Creek and Currency Creek regions.
3. **A private, third-party operator** – There are many examples where a private, third-party operator either builds, owns and/or operates water infrastructure throughout Australia. An example of an irrigation scheme in South Australia is Willunga Basin Water. This scheme operates in the premium wine-producing McLaren Vale region 25 km south of Adelaide and has supplied recycled wastewater for agriculture since 1999. The scheme receives water from SA Water's Christies Beach WWTP which supplies reliable water which does not require desalination.

This scheme is owned and operated by Water Utilities Australia, a privately-owned company which owns a further three water schemes, including the Lightsview Rewater Supply located 7 km north-east of the Adelaide central business district.

However, the challenge for a private, third-party operator is their desire for a return on investment which would have to be included in annual charges – placing further affordability pressures on them for prospective Clare Valley customers.

7.2.2 Ownership and operating models

Models for the future delivery of the two shortlisted options are limited to the relatively low volume of water delivered by the project (3,000 ML) and the limited capacity to fund additional overhead costs.

The additional overhead costs of establishing and operating a customer-owned, not-for-profit entity may cost between \$200,000 to \$400,000 when compared to those additional costs incurred by SA Water.

These additional costs would be around governance, financial management, operations and maintenance, communications, and insurances. SA Water would benefit from the existing scale, capability and expertise of their existing business. Costs in these ranges would lead to an increase in annual charges between \$67 and \$133 per ML.

This suggests that SA Water may be best place to be considered as the preferred developer, operator and owner of the preferred option. However, further consideration of the above will be undertaken during the development of the detailed business case and with further engagement with key stakeholders, including government departments, CVWGA and SA Water.

7.3 MARKET CONSIDERATIONS

7.3.1 Key points

- There is likely to be capacity and interest within Australian construction companies to construct the Clare Valley project.
- However, the timing and delivery method is important to receive sufficient interest from the potential contractors to create a competitive tender process. There is significant demand for contractors from other infrastructure sectors (e.g., road and other civil projects).
- Previous assessments have indicated contractors are positive about undertaking water infrastructure projects—both wanting to be involved and being capable of the construction.
- The capability exists in the market to deliver the project. Typically, this ability would reside with a tier one and some tier two contractors with a proven track record and capacity to deliver projects of this scale, risk profile and complexity.
- Feedback from local representatives indicated local companies may not have enough capacity or expertise to undertake a lead construction role by themselves, but could provide support through equipment hire, provision of materials and subcontracting arrangements (including specific components of the project, such as small dam construction). A structured engagement and project briefing process with local contractors is encouraged to increase awareness of local capacity and maximise local content on the project.
- The main areas of focus for construction of the project are the unknown below ground conditions for pipeline installation; the interface with accessing water from SA Water's existing CVWSS, Bundaleer Dam and/or Morgan-Whyalla pipeline; dam construction and/or augmentation; and managing construction through productive farmland and alongside rural roads.
- There is some uncertainty about the flow of work in the short to medium term, in particular in relation to private sector projects. This may make capacity available during this period as some private sector projects may not proceed. However, this may be replaced by increased Australian and state government infrastructure spending.
- Infrastructure Australia's Infrastructure Market Capacity report released in October 2021 outlined an unprecedented level of infrastructure activity. This is because of the Australian Government's commitment to investment as part of an economic recovery roadmap to address the impacts of the COVID-19 pandemic.
- This increased investment presents several challenges and risks, including the ability of the market to meet demand so the projects can avoid excessive cost escalation, improve value for money and be delivered on budget and on time.

- Infrastructure Australia identifies several initiatives to drive industry productivity and innovation in response to these challenges. These include active portfolio and pipeline management to smooth investment and manage resource constraints, and improved front-end engineering and design to avoid waste. However, these must be balanced with managing risk averse engineering consultants with no incentive to produce cost effective outcomes.
- In conclusion, the contracting market will be able to deliver the project, subject to further consideration of market conditions prior to tendering, particularly when the impacts and response to the COVID-19 pandemic are better understood.

7.3.2 Objectives

The objective is to make an initial assessment of the capability and interest of construction companies to deliver the project. The appetite of market participants to undertake a project has an impact on the preferred delivery model and the level of competition within the market at project tendering stage.

This section identifies the capacity of the construction market, and the issues that impact on the appetite of companies to participate in a future tendering process.

7.3.3 Approach

The enthusiasm for potential contractors to participate in early market sounding is influenced by whether contractors believe a project is likely to be funded and developed in a reasonable timeframe.

Contractors and other private sector entities have limited resources to investigate and bid for projects. They dedicate these limited budgets towards projects that are more likely to be built and projects for which they believe they can deliver a competitive proposal.

Construction funding for this project is yet to be committed from either the Australian or the South Australian Government, and the commencement date of the project is uncertain. As a result, testing the depth of the market and assessing the market risk appetite and the availability of interested contractors have limited value, because these factors vary over time, in particular following the impacts of the COVID-19 pandemic.

Once evidence becomes available that shows project funding is likely and firm timeframes are established, a comprehensive market engagement and communication process would be necessary to ready the market to receive the tenders. It is likely that such a process would succeed in positively engaging suitable contractors. The process would support the development of the procurement strategy and delivery model and allow the tenderers to assemble bid teams. Communicating well in advance of the date that tenders will be released improves the quality of the bid teams and thereby also the quality of the tender results.

7.3.4 Contracting tiers

There is no definitive classification for each tier of company—tiers are specific to a region and/or market—but tiers can generally be identified by some typical features (Table 105). The tier of a construction company reflects the company's capacity to take on certain projects; its capacity in turn typically depends on its size, resources, experience and financial position.

Typically, the capacity to deliver a higher-value and higher-risk project would reside with a tier one contractor with a proven track record. Tier one contractors are the largest and most experienced and have a strong financial position. These contractors typically are engaged on large commercial projects, such as motorways, railways, hospitals and major water and energy projects, with contract values ranging from hundreds of millions of dollars to billions of dollars. It is expected that South Australian-based tier one companies would be readily able to mobilise for this project.

Lower-risk and lower-value projects may be delivered by tier two and three contractors (potentially such as this project), including those located locally.

Projects delivered by tier one contractors may offer scope for the involvement of smaller tier two and three contractors through sub-contractor arrangements. However, tier two contractors may have an opportunity to participate directly through increasing their capability and capacity through a structured engagement process and the coordination of similar projects to enable experience and capability to be developed. Structuring the project into one or more work packages could open opportunities for tier two contractors and make the pricing sharper. This may make a project less attractive to the large players, so care must be exercised. Project components with smaller value and limited risk placed upon the contractor may be suitable for lead contracting roles undertaken by tier two or three contractors.

A contractor's ability to finance cash flow during construction (particularly with retentions and liquidated damages) is a significant part of a contractor's willingness to tender.

Table 105 Features of tier one, two and three construction companies

Tier one	Tier two	Tier three
Tier one contractors are typically the largest and most experienced and have a substantial financial position. This tier typically is engaged on large commercial projects, such as motorways, railways and hospitals, with contract values ranging from hundreds of millions of dollars to billions of dollars. They have the expertise, resources, and finances to deliver large-scale projects.	Tier two companies typically secure work that is under the threshold of a tier one company. Tier two companies can take advantage of smaller overheads and administrative functions, and therefore tend to be more competitive on a medium-sized project than a tier one contractor. For large contracts undertaken by a tier one company, tier two and three companies will typically be engaged as subcontractors. Tier two contractors can be more cost-competitive than tier one contractors, as they do not have the additional costs of management, higher margins, corporate offices and overheads. They usually own plant and equipment and have access to experienced machine operators.	Tier three companies usually take on small projects, up to \$5 million. They may also support tier one and two companies on a larger project under a subcontractor, where specific expertise and/or additional resources are required. It is considered that local tier three companies could support the successful tier two companies. Tier three contractors can be more cost-competitive than tier one contractors, as they do not have the additional costs of management, higher margins and overheads. They also usually own plant and equipment and have access to experienced machine operators. Tier three companies are also more likely to be found in the regional areas with reduced establishment costs.

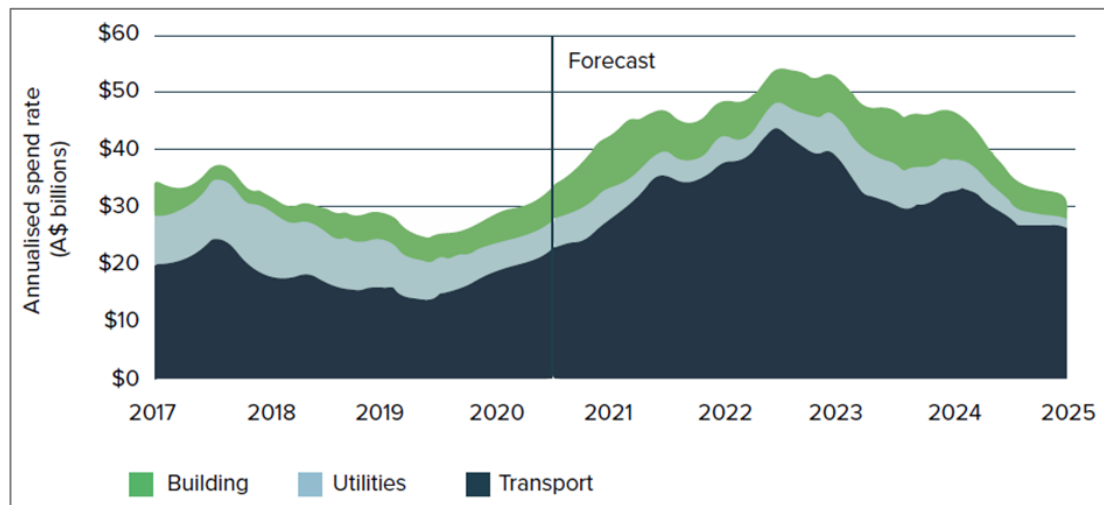
7.3.5 Market capacity

Infrastructure Australia released their Infrastructure Market Capacity report in October 2021. The report outlines the opportunity and the challenges associated with Australia's significant public infrastructure pipeline. There is an unprecedented level of infrastructure activity because of Australian Government's commitment to investment as part of an economic recovery roadmap to address the impacts of the COVID-19 pandemic.

The report focused on 634 major public infrastructure projects across transport, utilities and building and includes 430 projects worth \$218 billion to be completed by 2025. This spend is forecast to peak at over \$52 billion in 2023 (Figure 58). This represents a near doubling of

investment in major infrastructure over the next three years and many multiples beyond the investment rate experienced as a response to the Global Financial Crisis.

Figure 58 Infrastructure costs by sector



Source: Turner & Townsend and BIS Oxford Economics commissioned by Infrastructure Australia (2021)

However, this increased investment presents several challenges and risks, including the ability of the market to meet demand so the projects can avoid excessive cost escalation, improve value for money and be delivered on budget and on time.

The September 2021 Australian Infrastructure Plan from Infrastructure Australia outlines a reform agenda to drive industry productivity and innovation in response to these challenges. Key reforms include:

- Active portfolio and pipeline management to smooth investment and manage resource constraints.
- Improved front-end engineering and design to avoid waste.
- Increased collaboration with industry to support capacity and capability development.
- Embedding digital practices, including supporting definitions, systems and processes.
- Increased public sector capacity and capability to act as a model, mature client.

The improved front-end engineering and design to avoid waste (dot point two above) must be balanced by incentivising engineering consultants to produce cost effective designs that avoid risk-averse and overly expensive solutions which can put a project's viability at risk.

7.3.6 Market assessment

Estimating and bidding for a job is expensive for a contractor, requiring sufficient resources to properly quantify and manage risks. Where risks cannot be adequately quantified with the resources available, the cost estimates increase as the risk cost allocation for each risk increases. For example, the uncertainty surrounding below ground conditions for laying pipelines.

There is a limit to the frequency that contracting companies can be engaged on a project. Construction companies are generally unwilling to devote time and resources to considering a project unless they believe that it is likely to proceed. Generally, government support for a project is required before significant contractor resources will be expended.

The main areas of focus for construction of the project are the unknown below ground conditions for pipeline installation; the interface with accessing water from SA Water's existing CVWSS and/or

Morgan-Whyalla pipeline; dam construction and/or augmentation; and managing construction through productive farmland and alongside rural roads.

The more that these risks can be understood prior to tendering, the less the risk premium included in proposed construction costs will be.

Discussions were held with local representatives to learn about the depth and skill of local contracting markets. Feedback from local representatives confirmed that tier one contractors are not present in the region, but that several local contractors should be encouraged to participate in the build by supplying equipment hire services and construction materials and taking up subcontracting roles (including specific components of the project, such as small dam construction). These companies have had exposure to large-scale earth moving and civil projects and would be capable to undertake aspects of the project.

The capability exists in the market to deliver the Clare Valley project. Typically, this capacity would reside with a tier one and some tier two contractors with a proven track record and capacity to deliver projects of this scale, risk profile and complexity.

The head contractor will need to hold federal safety accreditation, due to the size of the Australian Government contribution. This accreditation is typically held by tier one contractors, and some tier two contractors, particularly those involved with Australian Government-funded projects. The costs associated with maintaining accreditation, such as systems upkeep, accreditation fees and auditing, limits the number of contractors with accreditation. For a contractor with federal safety accreditation, the systems and processors required by the Federal Safety Commissioner must be utilised on all work that the contractor performs, irrespective of a requirement for them to be held on any individual job. Early engagement with potential contractors is critical for this requirement to be understood, to allow contractors to plan to either obtain accreditation or develop a partnership with a contractor who is already accredited, in particular for tier two contractors who should be encouraged to participate.

However, there is significant scope for tier one contractors to use regional tier two and three contractors. A tier one contractor could engage several smaller tier two and tier three construction contractors with local experience and resources. Participation of local contractors can be encouraged if the proponent facilitates project briefings and registers the interest of potential sub/contractors to support inclusion of local content. A local content participation plan will also be required of the tenderers and form part of the tender evaluation process.

However, tier two contractors may have an opportunity to participate through increasing their capability and capacity through a structured engagement process and the coordination of similar projects to enable experience and capability to be developed. Once project funding is confirmed, consideration must be given to the allocation of project risk and the conditions of a construction contract to ensure an effective and efficient delivery model is adopted.

7.3.7 Conclusion

The market assessment has indicated that it is likely to have capability to deliver the project. The construction market in South Australia was resource-constrained before the impacts of the COVID-19 pandemic. There is some uncertainty about the flow of work in the short to medium term, in relation to private sector projects. This may make capacity available as some private sector projects may not proceed. However, this released capacity may be absorbed by other additional Australian and State government infrastructure spending.

Once project funding is confirmed, further evaluation of market conditions will be necessary, as well as significant consideration of the allocation of project risk and the conditions of a construction contract, to ensure an effective and efficient delivery model is adopted. Early engagement and support for tier two contractors to support their participation in the project should be encouraged.

7.4 CONTRACTING MODEL

7.4.1 Key points

- Further market engagement and analysis is required prior to a final delivery model being finalised. A hybrid early contractor involvement (ECI) and design and construct (D&C) contracting model is recommended for consideration, where two to three short-listed contractors are funded to be involved in an initial six-month detailed design process for the project. These contractors are then invited to submit a proposal for the D&C of the project. The model allows the various engineers (geotechnical, design and construction) to collaborate progressively and respond to issues as they arise.
- Minimising cost of tendering by providing comprehensive information will be important.
- A preferred contractor will be selected based on their full detailed design and overall value to the project through appropriate probity and procurement procedures.
- Applications for approvals will be based on the selected detailed design and design development supported by the preferred contractor throughout the approvals period.
- There may be opportunity to coordinate with other regional water infrastructure projects on tendering and delivery models to address some risk with an uncertain construction market. Appropriate scheduling of projects may allow contractors to coordinate and resource delivery teams for programs of work and multiple projects. This would drive efficiency and knowledge transfer leading to better project outcomes. This could exist with the potential synergies between this project, Barossa New Water and Northern Water Supply projects.
- Significant market and proponent engagement is recommended to be undertaken during post-DBC activities.
- Further understanding of the preferred project proponent/s and construction and operating entities is required prior to determining whether the project is presented to the contracting market as one work package or multiple discrete work packages.
- Like most irrigation projects, the project needs a cost-effective delivery model to be economically viable.

7.4.2 Delivery model assessment

The choice of an optimal model depends on various factors, including the complexity and scope of the project, the level of innovation required, timeframes, cost certainty, risk, and more.

Table 106 Delivery models

Model	Characteristics
Traditional delivery model options	
Construct only The proponent retains full responsibility for design and documentation (via engaging a design consultant) and tenders for construction contractors. Example: Keepit Dam Safety Upgrades, NSW	The project scope and works are routine, uncomplicated, and of a small to medium size and duration. The project content is well-defined, having gone through a consolidated/peer reviewed design process. The timeframe for project delivery is not compressed, allowing the design and construction to be conducted sequentially. Construction innovation is not considered a priority. The geotechnical and design engineers tend to be somewhat removed from the construction engineers, as their interests are not aligned. The proponent is willing to retain design risk as it relates to the construction, as well as most other risks. There can be opportunity for variations, due both to design and scope battery limit changes. Design omissions and most changes are the responsibility of the proponent and tend to be priced highly by the contractor. The proponent has suitably skilled and experienced resources to manage the project delivery. The contractor is not incentivised to innovate to reduce costs for unanticipated developments, as these all add to the contractor's margin. Innovation and problem-solving can therefore be inhibited.
Early tenderer involvement (ETI) As a subset of the 'construct only' delivery model, this model involves selecting shortlisted competing contractors to participate in value engineering and refinement of a client's preliminary designs. Examples: Shannon Creek Dam, Clarence Valley Council Mt Crosby East Bank Water Treatment Plant, Centrifuge Upgrade Project, Seqwater	In addition to the points noted under 'construct only': A relationship (collaborative) contracting environment is desirable. The scope is well-defined. Involving the contractor early helps to identify the most effective method to procure and manage the construction. There is scope for value engineering/refinement of existing design documentation. There is market interest and scope for competition. This approach can lead to some doubts about current, fully market-tested pricing.
Design and construct (D&C) The proponent contracts with a single entity that is responsible for both design and construction of the project. Examples: Tasmanian Irrigation's Tranches One and Two irrigation schemes, Tasmania	The project scope and works are routine, uncomplicated and well-defined. It is desirable to fast-track the project timeframe, by undertaking design and construction activities partially in parallel. A degree of innovation in the design is desirable. A high degree of cost certainty at the time of award is desirable.

Model	Characteristics
Meander Dam Construction Project, Tasmania Bootawa Dam Water Treatment Plant, NSW	The proponent has suitably skilled and experienced resources to manage the project delivery. There is a preference to have a single point of responsibility for design and construction. There is an opportunity to realise benefits by combining the design and construction and bringing together innovation and experience from the geotechnical, design and construction engineering progressively through the project as issues arise. There can be opportunity for variations, particularly due to scope battery limit changes. Building is undertaken at a predetermined price. The high cost of tendering is a serious concern with this approach. Pre-tender assessments, including geotechnical and design, significantly decrease the risk and remove significant unknowns for a contractor. This should lead to lower tendered prices.
Early contractor involvement (ECI) As a subset of the D&C delivery model, this model involves engaging a construction contractor prior to commencing a project to work in collaboration with the project sponsor.	In addition to the points noted under D&C: There is a perceived benefit of involving the contractor early to assist with scoping the project and outcomes. A relationship (collaborative) contracting environment is desirable. This approach can make it difficult for the principal to be sure that the price paid is appropriate with the prevailing construction market.
Design, construct, maintain and operate (DCMO) The proponent contracts with a single entity that is responsible for design and construction of the project, as well as the operations and maintenance components. Examples: Adelaide Desalination Plant, SA Kurnell Desalination Plant, NSW	In addition to the points noted under D&C: There is a desire to have a single point of responsibility for the design, construction, operational and maintenance phases. There is an opportunity to realise benefits by combining design, construction, operations and maintenance into one package. Innovation across the whole-of-life of the facility or infrastructure is desirable and achievable. There is a desire/opportunity to realise efficiencies in the ongoing operations and maintenance components of an asset and associated service/s. A premium will be paid to transfer longer-term operating risk to the contracting entity, particularly if some of these risks can be better managed by the proponent. This approach can make it difficult for the principal to be sure that the price paid is appropriate with the prevailing construction market.

Model	Characteristics
Alliance The proponent enters a transparent 'open book' co-operative contracting arrangement with the private sector, wherein unforeseen risks and benefits are essentially shared. Examples: Wyaralong Dam, Queensland Logan River Catchment Project, Queensland Burnett Water Project, Queensland Hinze Dam Stage 3 Construction, Queensland Eildon Weir Improvement Works, Victoria	The project is complex or high-risk. The scope is unclear, and the risks are unpredictable. A high level of innovation is required, particularly in resolving technical challenges or maximising operating efficiencies and performance. A transparent relationship is possible and desirable. A flexible schedule is desirable. A knowledge transfer between parties is highly desirable. Risks are best managed collectively and collaboratively. Close involvement of the owner can add value. There is sufficient capacity and capability to resource the alliance. This approach can make it difficult for the principal to be sure that the price paid is appropriate with the prevailing construction market.
Managing contractor The proponent engages a head contractor to coordinate, engage and manage the design, procurement, and construction, while retaining the ability to directly influence the design development. It is often delivered under a negotiated capped price (guaranteed construction sum (GCS)).	The project is complex or high-risk. The scope is unclear, and the risks are unpredictable. There may be significant time constraints, necessitating bundled delivery. A high level of innovation is required, particularly in resolving technical challenges or maximising operating efficiencies and performance. A transparent relationship is possible and desirable. Delivery is essential, but a flexible schedule is desirable. A knowledge transfer between parties is desirable. Risks are best managed collectively and collaboratively. Close involvement of the owner can add value. There is capacity and capability to resource the process. This approach can make it difficult for the principal to be sure that the price paid is appropriate within the prevailing construction market. The GCS can drive cost savings beyond the comfort of the proponent, and GCS cannot be preserved where the scope battery limits change.
Partnership delivery model options	
Availability payment public private partnership (PPP) A Special Purpose Vehicle (SPV) receives a guaranteed fixed payment from the proponent in return for	There is a major and complex capital investment program, requiring effective management of risks associated with construction, operations and maintenance. The private sector has the expertise to deliver the project and there is good reason to think it will offer value for money.

Model	Characteristics
delivering a project on behalf of the public sector (i.e., an availability payment). Examples: Mundaring Weir Water Treatment Plant, WA	The public sector can clearly define its needs as service outputs that can be adequately measured and contracted in a way that ensures effective, equitable and accountable delivery of public services in the long term, and risk allocation between public and private sectors can be clearly made and enforced. The assets and services identified as part of the partnership scheme are capable of being costed on a whole-of-life long-term basis and there is scope for innovation. The value of the project is sufficiently large to ensure that procurement costs are not disproportionate. The technology and other aspects of the sector are stable and not susceptible to fast-paced change. Or, if the technology relevant to the project is subject to rapid change, the private sector can allow for an appropriate technology refresh without impacting service requirements and/or introducing significant pricing uncertainty. Long-term planning horizons apply, with assets used far into the future. This model may be difficult to reconcile with the 50 per cent contribution from the National Water Grid Fund, where the payment is against a milestone for construction of infrastructure only.
Build, own, operate/transfer (BOO/T) A SPV builds, owns and operates an asset for a specified period, during which time the SPV is entitled to collect user charges. Examples: Prospect Water Filtration Plant (NSW) Macarthur Water Filtration Plant (NSW)	In addition to the points noted under 'Availability payment PPP': An element of demand/revenue risk is transferred to the private sector. Project returns depend in part on the user charges expected to be collected during the operations phase. The State may be required to make capital contributions during the construction phase to help fund the project. The State may be required to underwrite a minimum level of demand for the project (usually only sufficient to cover the debt obligations of the SPV). It is applicable to greenfield or brownfield projects (but most used for brownfield projects in the current environment). Residual risk may be transferred to the private sector under BOO. This model may be difficult to reconcile with the 50 per cent contribution from the National Water Infrastructure Development Fund, where the payment is against a milestone for construction of infrastructure only.

7.4.3 Work packages

Further understanding of the preferred project proponent/s and construction and operating entities is required prior to determining whether the project is presented to the contracting market as one work package or multiple discrete work packages.

Awarding one work package to a single contractor provides that contractor with the flexibility to switch resources between several work fronts, thereby leverage efficiency gains. Construction work on the project is relatively similar overall, which provides overlap of standardised equipment and the skilled personnel required; therefore, if work at a location is delayed, the resources can be redeployed to other areas.

The construction of the storage dams is an element of the project that may benefit from a separate works package.

In addition, there may be opportunities to have the project proponent purchase specific items for the project and make them available to the contractor to remove any contractor mark-up. Items may include property outlets, pipeline fittings and pipe. However, the scope of this opportunity may be limited if the purchasing power of the proponent is less than that of the contractor.

7.4.4 Delivery models

The delivery model assessment was developed in a way that can allocate the construction risk related to below-ground conditions and weather to the contractor. This is because the contractor is best able to manage these risks and inject cost-effective responses to issues that arise. Payment arrangements would be set with reference to the predetermined milestones set in the project funding agreement with the Australian and/or South Australia governments. It is important that the model facilitates the effective and innovative collaboration between geotechnical, design and construction engineers at all stages of the design and construction delivery as the risk profile for the project progresses and changes. It is also very important that the current civil construction market pricing is applied in this assessment because the economics of irrigation projects are challenging, and without strong cost management from the project outset, many viable irrigation projects will not proceed to construction. This must be considered alongside securing sufficient interest to ensure a competitive tender process.

The following evaluation criteria were applied to assess the models of delivery:

- Contractor appetite, capability and competition:
 - market appetite (i.e., existence of players with the relevant skills, expertise and capacity)
 - extent to which the model achieves competitive tension.
- Risk management:
 - appropriate allocation of risk to the party best placed to manage that risk at the lowest cost
 - efficient risk management and/or mitigation
 - ability to manage the procurement process and contractual arrangements.
- Stakeholder and scope management:
 - ability of the model to ensure that delivery of the project is consistent with stakeholder interest, and stakeholder expectations are effectively managed
 - ability of the model to effectively manage scope change requests by stakeholders and minimise impact on cost, time and quality.
- Quality, whole-of-life design and maintenance:
 - quality of the design and the constructed facility

- meeting service specifications/requirements
 - robustness and functionality of the design
 - allowing for future proofing and flexibility
 - extent to which the model promotes a whole-of-life management solution, including the incentive to optimise life cycle, general maintenance and interrelated service provision.
- Cost minimisation:
 - ability of the model to reduce capital costs and, where appropriate, operational costs
 - extent to which the model achieves cost optimisation through competitive tension.

The delivery models were rated on a scale of 1 to 10 for 'likelihood of success', with 10 representing the highest likelihood of success (Table 107) when measured against the criteria.

Table 107 Assessment of delivery models against evaluation criteria

Delivery model	Evaluation criteria					Likelihood of success	Comments
	1	2	3	4	5		
Construct only	8	7	6	8	6	Likely (35)	Although tender prices are likely to be encouraging, the final price will be adversely affected by variations on design and scope changes. This approach will also lack the innovation in design and the agility to cost-effectively respond to arising construction issues, because the contractor has little incentive to keep pricing down and to find the most cost-effective options.
Early tenderer involvement (ETI)	8	6	6	7	8	Likely (35)	Payment would need to be made to facilitate the ETI before any milestones have been met.
Design and construct (D&C)	9	4	1	4	9	Possible (27)	This option is very good at building to a predetermined price if good tendering, contract formation and administration are used diligently. There is an opportunity to realise benefits by combining the design and construction and bringing together innovation and experience from geotechnical, design and construction engineering progressively through the project as issues arise. This makes for an agile and innovative team that can respond effectively to challenges as they arise right through the project, with resultant good risk management.
Early contractor involvement (ECI)	9	9	6	7	8	Very likely (39)	ECI will bring some innovation and construction experience to the table, but this is likely to be at the expense of an open competitive market tender process on the final design. This can be offset to a degree by an open process to select the contractors for an ECI process. The ECI contractors would need to be paid for their early involvement which will substantially increase pre-project go ahead costs. Two or three contractors will need to be paid to develop a detailed design between the approval of the DBC and the project go ahead.
Design, construct, maintain and operate (DCMO)	4	9	2	4	3	Unlikely (22)	The margin required for another independent entity to maintain and operate would be high and not warranted, given that more value is created by the maintenance and operation being undertaken by a body consisting predominantly of irrigator representation, as has been successfully implemented across South Australia. It is unlikely that a constructor would naturally have the necessary skills, experience and appetite to maintain and operate without partnering with another entity.
Alliance	4	3	7	7	3	Possible (24)	The alliance would require large outlays to set it up, thus adding greatly to the administrative burden of the project. This project would be small to carry the overheads associated with an alliance. The effect on cost rules out an alliance for this project despite it scoring well on the other criteria.
Managing contractor	7	3	7	5	4	Possible (26)	The option could be used as a variation to ECI, with the same strengths and weaknesses. Using a tier one contractor is like using a managing contractor. However, a managing contractor does not normal carry much risk.

Delivery model	Evaluation criteria					Likelihood of success	Comments
	1	2	3	4	5		
Competitive alliance	6	2	7	7	4	Possible (26)	As for the alliance delivery model, but with even higher initial administrative costs upfront.
Availability payment public private partnership (PPP)	4	6	2	6	1	Very unlikely (19)	The economic success of new irrigation projects depends on the pricing of the new water being sufficiently attractive to entice businesses to take on the considerable risk of establishing new agricultural enterprises in a new area. However, to take on the risk associated with an availability payment through a PPP, the private sector would have to price the water too high to attract sufficient investment in the water. No community-based irrigation schemes have been funded in this way in Australia. If this were feasible, there would be no need for the National Water Grid Fund and other government funding support.
Build, own, operate/transfer (BOO/T)	4	6	2	6	2	Very unlikely (20)	This option has many similarities with the PPP immediately above, but with the addition of the transfer. The weaknesses of this approach are as above.

From the analysis above, a competitive ECI process scored the highest. However, further market engagement and analysis is required prior to a final delivery model being recommended.

A competitive ECI process would commence with two or three contractors depending on the availability and interest of suitable contractors at the time of selection and the capacity of the proponent to manage multiple contractors. There would be competition until the end of the detailed design and tender period, after which only the preferred contractor would be taken forward and paid to respond to the demands of the approvals and design development phase. A D&C contract can be drawn up based on the preferred design which will assist with the management of variations from the time of contract award. Unfortunately, the pricing of the cost of the approval conditions cannot be competitive unless a Construct Only delivery is used and then the advantages will be more than off-set by the variations which inevitably eventuate as the project progresses. The latter are the bigger risk to a cost blow-out, as these occur after the project go-ahead.

7.4.5 Tendering process

The civil contracting market needs to be informed of the project's progression through public notices well before tenders are released. The tender process should be open to all civil construction companies, in accordance with sound probity and procurement practices through a pre-qualification process to win participation in a paid competitive ECI process. The assessment criteria should be clearly stated in the conditions of tender/pre-qualification so that each contractor will be able to assess the cost of making a submission. Two or three civil contractors should be paid to participate in the competitive ECI taking the design to a pre-determined level, where upon a comparative assessment can be made and a preferred contractor chosen. A contract would then be put in place for the whole project with conditions based on project funding becoming available. The work required to support the approvals phase, between contract award and project funding approval would be to a schedule of rates.

During prequalification, companies go through a process of providing evidence of capability, experience and capacity, so that a prequalified limited bid list can be compiled. Companies on the prequalified list are then offered the opportunity to tender or participate in an ECI competitive process with two or three participants depending on capacity in the civil contracting market. This requires very careful real-time analysis of each company's resources and work commitments. Companies are reluctant to declare all the information required to keep such an assessment current and are at times tendering for more than one job. The time delay between the detailed design and achieving the necessary approvals is not defined and therefore it is not possible to forecast a contractor's available capacity when the project is finally approved and funded.

However, this then raises the very real problem of the high cost of tendering when so many companies expend the resources to bid but are unsuccessful. Because of the significant amount of time and effort to submit a proposal, large companies usually rely on winning one in three tenders because of the cost involved. For a company to hold its cost of tendering down for this they must do less work, which in turn leaves more unknowns. These must be addressed through higher contingencies, which leads to a higher bid price. One of the most effective ways to avoid this is to keep the cost of tendering low by providing the contractors the information they need as part of the tender documents. This means spending more money on the process of preparing tender documents.

It is recommended that two or three contractors be paid to be involved in an initial six-month detailed design process for the project. These contractors are then invited to submit a revised and final proposal for the D&C of the project based on a project specification and a common set of conditions of tender and contract. The model allows the various engineers (geotechnical, design and construction) to collaborate progressively and respond to issues as they arise. This initial detailed design period reduces the cost for the construction company to consider the project and

prepare a tender for the D&C contract. This would improve the likelihood of a highly competitive tender process with short-listed contractors that have been paid for their initial design. As outlined above, the process to select the two to three shortlisted contractors to undertake initial detailed design would be through a fully open prequalification process. Once the detailed designs have been developed over six months and tender submissions made, one of the tenderers would be chosen to take the project forward, as only one design can be taken into the one-to-two-year approvals phase.

The preferred contractor would then have to support the approvals period with further detailing of the design and delivery plan as feedback is received from the approving authorities. The tendered price would have to be adjusted once the approval conditions are known. The conditions of contract used would be an Australian Standard and the rules for valuing variations invoked.

In addition, the project should be coordinated with other regional water infrastructure projects. This extends to tendering and delivery models to address risk with an uncertain construction market and to allow for the capture of value through collaboration and the experience with other projects. Appropriate scheduling of projects may allow contractors to coordinate and resource delivery teams for programs of work and multiple projects. This would drive efficiency and knowledge transfer leading to better project outcomes. Furthermore, coordination would avoid proponents going to the construction market at the same time reducing tendering competition. Significant market and proponent engagement is recommended to be undertaken during post-DBC activities.

There may be opportunity to create value through coordinating the activities of the Barossa New Water project and the Northern Water Supply project, which is investigating the viability of a desalination plant and distribution pipeline in the Upper Spencer Gulf. Each project is very similar in terms of construction requirements, and the expertise and construction crew skill acquired delivering one project could be leveraged in the delivery of the other. This will result in the best construction teams maintained for a greater proportion of the projects and this feeds directly into higher productivity and lower construction costs.

In the lead-up to prequalification, it is important that the project is seen by the tenderers as being a desirable project to win because the likelihood of making their margin is high. Notification of the release of prequalification tenders well in advance will also allow them to assemble high-quality bid teams.

Longer allowable construction timeframes also make a project more useful to contractors, as they will have more opportunity to coordinate the work with other work commitments.

7.4.6 Risk management

Within the contracting plan, each risk will be allocated to the party best able to manage that risk. A construction risk management plan will be developed and updated by the proponent if the project proceeds to tendering.

Where appropriate, there should be a preference to transfer risk to the contractor. Provided there is sufficient information available, the contractor will price that risk and thus contribute to the proponent's understanding of total project cost prior to contract award. To ensure that this does not increase the contractor's risk margin and increase prices more than necessary, all relevant information should be shared, and the pre-tender investigation should be as comprehensive as reasonably practicable whichever delivery model is adopted. Further to the work conducted for the DBC, additional geotechnical investigations could be undertaken by the proponent prior to the release of tender documents and provided to potential bidders to reduce the uncertainty associated with below-ground conditions. The contractors may provide a lower quote because of less uncertainty. Great care should be taken not to provide interpretation of the data as this can be a trigger for variations.

This transfer of risk (from proponent to contractor) requires a tendering or contract formation procedure that gives the contractors ample access to the site to make any further investigations they deem necessary. To facilitate this process, a funded initial design period of approximately six months will be necessary to develop a detailed design followed by support for the securing of approvals.

Another risk and cost for the contractors will be cash flow during construction. This will need to be carefully addressed in the contract documents to reduce the quantum of financing needed by the contractors through construction and the risk that accompanies large expenditures that cannot be claimed immediately. The contract sums involved are large and will cause significant additions to the tendered sums if not planned and perhaps eliminate some competent smaller contractors.

A performance-based approach allows the contractor maximum opportunity to apply the advantages of its specific plant and equipment and its experience to maximum effect, along with any design opportunities it can identify, principally in constructability.

7.4.7 Recommendation

Further market engagement and analysis and confirmation of the contracting entity is required prior to a delivery model being finalised. A hybrid ECI and D&C contracting model is an option to be considered further with a funded initial six-month detailed design period for two to three shortlisted contractors. A base cost can then be prepared by each to allow selection of a detailed design to go forward to the approvals process. The tendered price will need to be updated when all the approval conditions are known before the final go-ahead is given. Once the detailed design and final price is known, the contract will still be a D&C to manage any changes that become necessary through the project delivery. Following the selection of a contractor, the approvals period will need to be subject to escalation as the duration cannot be defined under the existing regulations. There will also need to be a cap on the duration of this period as the contractor will have to hold resources to cover the commitment to the project.

If there is a cap on the funding in line with the economic return for the project, it may be necessary to declare this to the prospective tenderers before tendering starts. A prerequisite of this option is that the proponent has access to suitably skilled and experienced resources to manage the project delivery, to ensure they are contractually and technically well-informed. In addition, an experienced facilitator should be engaged to run a competitive tender process, oversee the contract formation, and set up the contract administration.

An ECI and D&C contracting model allows a progressive and innovative collaboration between geotechnical design and construction engineers, so that they can respond to issues as they arise right through the delivery of the project.

It has been shown that this collaboration can yield substantial productivity gains, which, in this model, accrue to the contractor. This promotes a highly innovative and productive collaboration between geotechnical design and construction engineers, with the best people available throughout the project delivery.

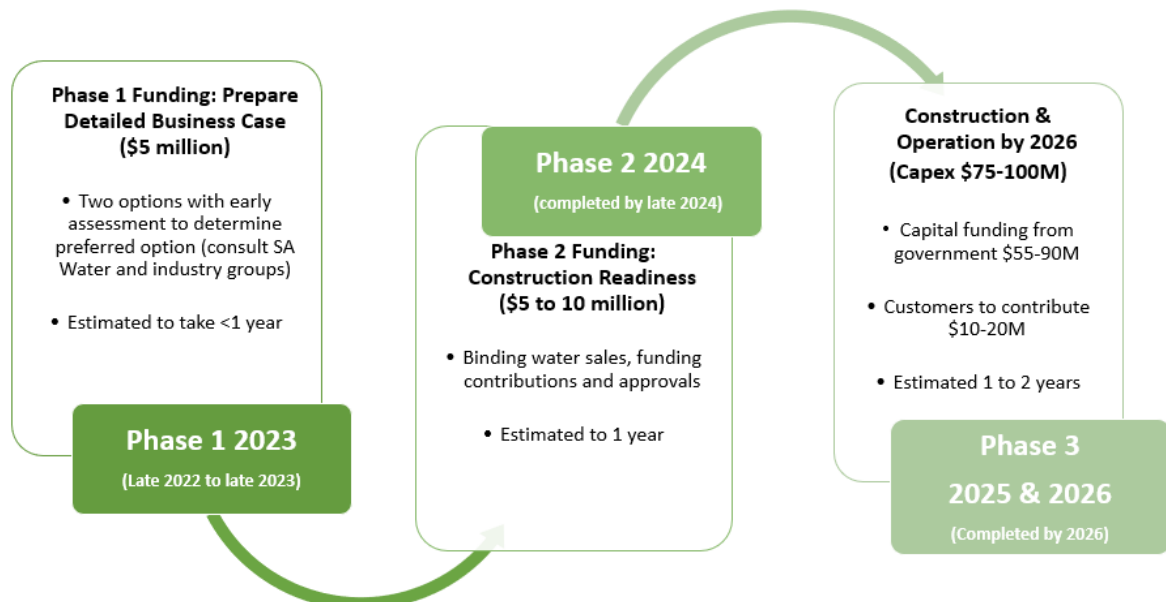
8 Project management

8.1 PROJECT PLAN AND SCHEDULE

The next step for this project is to secure \$5 million in funding for the detailed business case from the Australian Government. If the detailed business case succeeds, it will move to construction readiness (\$5 to \$10 million funded by government) and then construction, to be funded by customers and government.

The funding of \$5 million for the detailed business case is estimated based on experience from similar projects throughout Australia and funded from the National Water Grid Fund. A detailed cost estimate will be developed upon a formal funding application being submitted.

Figure 59 Next steps for the Clare Valley Water project



As outlined above, new water could be delivered as early as 2026 and commence addressing the problems and opportunities identified in this PBC for the project.

8.2 COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT

Appendix A outlines the stakeholder engagement plan for the project. It is considered that this is a 'live' document that will be updated as the project progresses through the remaining project phases of pre-construction activities, construction, and operations.

The plan documents the principles, approach and activities when involving those who have an interest in, or may be impacted by, the development of the project's detailed business case.

8.2.1 Engagement objectives

The engagement objectives initially focus on the DBC phase of the project.

Specifically, the engagement objectives are to be considered throughout each phase of the development of the project (e.g., detailed business case, construction, etc):

- Identify engagement opportunities for internal and external stakeholders to ensure there is an appropriate level of consultation, feedback and input into the process for the entire development of the project.
- Ensure stakeholders are aware of the progress of the project and how it will impact them.
- Provide opportunities for key stakeholders to raise concerns, provide constructive feedback and/or seek additional information during the development of the project.
- Facilitate planning across the Clare Valley that is integrated with industry to minimise red/green tape and maximise economic benefit.
- Seek to align with other related South Australian Government engagement in the region.

8.2.2 Engagement process

A seven-step stakeholder engagement process has formed the basis for the development of the engagement plan.

The 7 activities are illustrated in summarised in Table 108.

Table 108 Key engagement activities and purpose

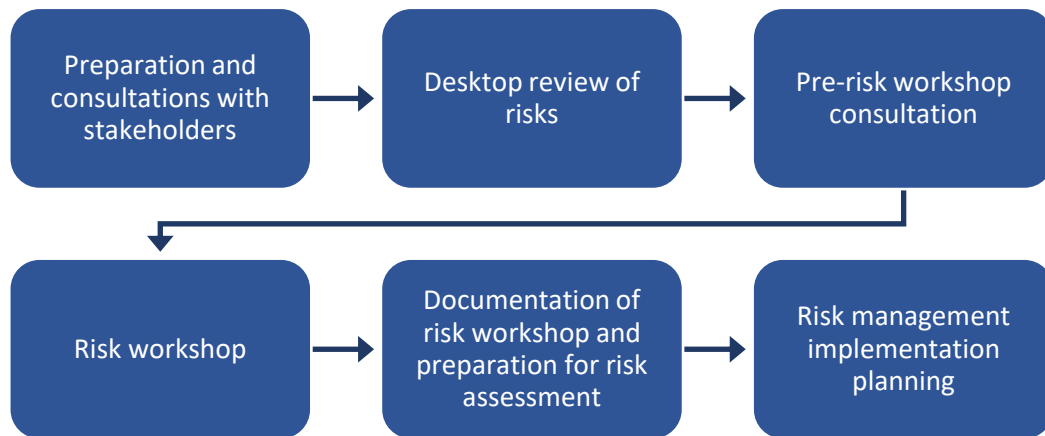
Activity	Purpose
Understand the context	Understanding the context of the proposed project assists with managing risk and enables stakeholder engagement to be tailored effectively
Identify stakeholders	Identifying stakeholders ensures the engagement activities are focused
Establish the purpose of engagement	Clarifying the purpose of the engagement helps to focus on objectives and maximise impact
Establish the level of participation	Establishing the level of participation ensures stakeholders are effectively engaged. It also means engagement activities are resource effective and focused
Develop an engagement plan	An engagement plan documents the approach and design necessary to address objectives and meet stakeholder needs
Implement and monitor engagement	Effective implementation and monitoring of engagement ensures planned activities achieve the objectives. By monitoring the engagement plan it is easier to manage risks, address issues as they arise, and participate or communicate any significant delays
Share lessons learned	Sharing lessons learned will inform and improve future practice, reduce risk and increase the quality of business cases

8.3 RISK ASSESSMENT AND MANAGEMENT

Appendix G outlines the risk management process and procedures used throughout the PBC assessment process, including risks related to the development, construction, funding and operation of the project (project risks). The adopted process is aligned with the requirements of the relevant business case frameworks, best practice in water infrastructure feasibility assessments and aligned with Australian Standard AS ISO 31000:2018 Risk Management—Guidelines.

8.3.1 Risk management process

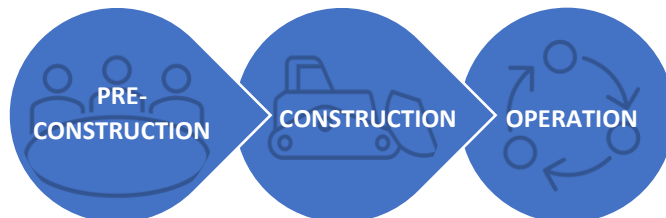
Planning for the medium- and long-term project risks requires a systematic process that incorporates stakeholder consultation, strategic planning, workshops, and implementation planning. Figure 60 shows the six-stage process for the preparation of the risk analysis and final version of the risk section.

Figure 60 Project risk planning process**8.3.2 Consultations with stakeholders**

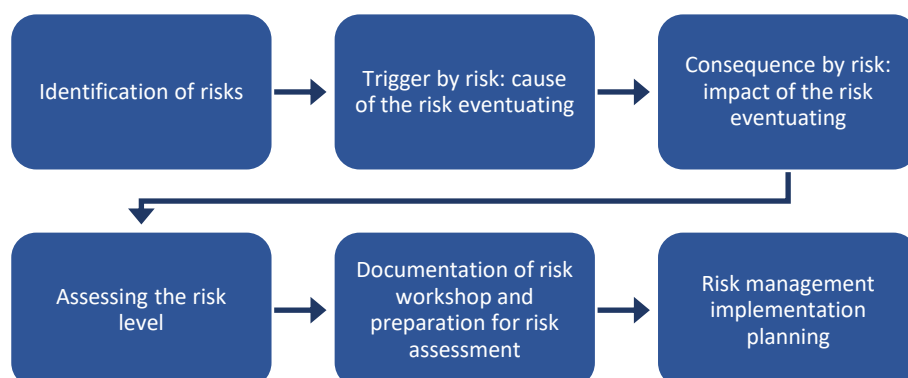
Formal and informal consultation has been undertaken with multiple project stakeholders to understand their respective views on the project risks and emerging issues that may require management.

8.3.3 Risk Workshops

An internal risk workshop with the business case advisor included facilitated discussion on a range of risks, including the identification of risks, assessment of consequences and analysis of available mitigation activities. The risk workshops covered three key periods of the project following the completion of a DBC, being:

Figure 61 Key project periods

The risk assessment and analysis process utilised during the risk workshop is shown in Figure 62.

Figure 62 Risk workshop process

The risk planning process consider risks across 10 broad categories:

Figure 63 Risk categories



A risk catalogue was developed to identify, summarise, and assess all 42 project risks. The catalogue is designed to be a living document that can be updated by the project proponent throughout the development, construction, and operation of the project.

8.3.4 Risk Register

Table 109 summarises 39 of 43 project risks identified as either as high or extreme prior to mitigation measures being considered.

Table 109 Extreme and High Project risks pre-control measure

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
1	Demand	Demand is lower than projected	Extreme (25)	Comprehensive engagement process to confirm demand during a Round 2 demand assessment. A robust Round 2 demand process will provide greater confidence for a successful pre-construction binding water sales. Explore additional area / customers for Round 2 demand assessment and binding water sales. Ensure annual charge is affordable for growing grapes/making wine (<\$2,00/ML). Water agreements backed by long-term agreement with SA Water to provide supply certainty and price guidance.	High (18)
3	Benefits realisation	BCR lower than 1	High (21)	Consultation with decision makers regarding other project benefits. Include commentary of other economic, social and environmental benefits outside the BCR calculation in the PBC. More detailed analysis as part of the DBC.	High (18)
4	Benefits realisation	Operating costs are too high	High (21)	Strategic design approach to improve efficiency and reduce operating costs. Further discussions and guidance from SA Water regarding bulk water price.	High (18)
5	Benefits realisation	Capital costs are too high	High (21)	Consider strategic approach to timing of delivery and construction. Strategic tendering model and delivery model strategy. Explore options for synergies with other SA Water assets.	High (18)
8	Benefits realisation	Percentage of substituting existing water is underestimated	High (18)	Information gathered from Round 1 and other customer engagement including in analysis.	Medium (14)
9	Benefits realisation	Net margins are materially different to model	High (18)	Information gathered from Round 1 and other customer engagement including in analysis. Most recent data from industry (e.g., Wine Australia) included in the analysis.	Medium (14)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
10	Benefits realisation	Yield is materially different to model	High (18)	Information gathered from Round 1 and other customer engagement including in analysis. Most recent data from industry (e.g., Wine Australia) included in the analysis. Continued on-farm industry assistance to support optimum yields.	Medium (13)
11	Benefits realisation	Infrastructure is insufficient to meet water needs (120-day delivery period too long)	High (18)	Clear water trading framework to allow trading/sharing of unused capacity. Support in customers exploring on-farm water storage options. Potential for additional delivery capacity to be purchased to allow water to be delivered over a shorter period. Potential to consider reduced irrigation period (e.g., 100 days) during post-PBC stakeholder engagement in preparation for pre-construction, binding water sales.	Medium (13)
12	Funding	Affordability for government/s (PBC estimates require significant government support)	Extreme (24)	Clear assessment of the wider economic benefits of the project to justify contribution. Demonstrate on-going viability of the project from the customers.	High (18)
13	Funding	Affordability for government/s (binding water sales fall materially short)	Extreme (24)	Comprehensive engagement process to confirm demand during a Round 2 demand assessment. Pre-construction binding water sales process. Comprehensive engagement process to convert Round 2 into binding water sales. Explore additional area / customers for binding water sales. Ensure annual charge is affordable for growing grapes/making wine (<\$2,00/ML).	High (18)
14	Funding	Substantive difference between PBC and design cost	Extreme (24)	Detailed analysis during the development of a DBC, including P90 estimates. Independent technical review of DBC P90 cost estimate. Commence design process early to allow additional time for solutions to identified and implemented. Regular review of market conditions to understand price movements, including impacts of COVID-19.	High (18)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
15	Approvals and land access	Failure to secure planning approval from Local, State and Federal Governments	High (18)	Close engagement of Local, State and Federal Government. Continued advocacy for project.	Medium (14)
16	Approvals and land access	Failure to gain access to land	Extreme (24)	Frequent and genuine engagement with potential landholders, including potential storage locations. Consideration of route selection - favour alignments where dealing with landholders receiving water. Alternative alignments considered (e.g., road reserves).	High (18)
17	Environment and sustainability	Failure to achieve approvals	Extreme (24)	Detailed analysis during the development of a DBC. Development of the best strategic approvals pathway and process. Engagement with Government.	High (18)
18	Environment and sustainability	Environmental perception of the project is negative	High (21)	Detailed analysis during the development of a DBC, including further stakeholder engagement. EIS consider and analyse these impacts and management strategy.	Medium (14)
19	Environment and sustainability	Reliance for the scheme on the availability of River Murray water	High (21)	Detailed analysis during the development of a DBC, including update consideration of the reliability of River Murray. Investigate the outright purchase, leasing and short-term trading of water entitlements and allocations from the River Murray to underpin reliability.	Medium (14)
20	Social and community	Protest group(s) oppose the project	High (21)	Detailed analysis during the development of a DBC, including further stakeholder engagement. Implement a sustainability strategy for the project. Seek out green credentials for the project.	Medium (13)
21	Social and community	Unable to get people for construction	High (18)	Strategic planning involving state and local government for workforce planning.	Medium (13)
22	Cultural heritage and Traditional Owner opportunities	Project does not meet aspirations of Traditional Owners	High (21)	Consider Traditional Owner allocations. Explore Traditional Owner enterprises. Develop Cultural Heritage Management Plan. Close engagement with Traditional Owners.	High (18)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
23	Cultural heritage and Traditional Owner opportunities	Unable to get the Cultural Heritage Management Plan agreed	High (21)	Close engagement with Traditional Owners. Consider Traditional Owner allocations. Explore Traditional Owner enterprises.	High (18)
24	Cultural heritage and Traditional Owner opportunities	Conflict between traditional owner groups	High (21)	Develop high level understanding of boundaries of the project and impacted Traditional Owner groups. Consider engagement with broader Traditional Owner groups that are impacted by the project	High (18)
25	Strategic	Project does not proceed to a DBC	Extreme (24)	Government and stakeholder support of project. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.	High (22)
26	Strategic	DBC lack engagement and leadership from local stakeholders	Extreme (24)	CVWGA is recommended to have a lead role in the development of the DBC. CVWGA is supported by other stakeholders, incl. government and SA Water.	High (18)
27	Strategic	Inadequate funding of a DBC	Extreme (24)	Government and stakeholder support of project. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.	High (18)
28	Strategic	Project proceeds to implementation without an appropriate DBC	Extreme (24)	Government and stakeholder support of project. Recognition of the importance of the DBC process. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.	High (18)
29	Strategic	Federal – change of government	High (21)	Early engagement with new Commonwealth Minister and at Commonwealth officer-level. Advocacy for the project across party lines to keep the project apolitical.	Medium (13)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
30	Strategic	State – lack of bipartisan support	High (21)	Advocacy for the project across party lines to keep the project apolitical.	Medium (13)
31	Strategic	Project is delayed and tied up in Government processes	High (21)	Adopt strategic apolitical approach to project advocacy. Commence DBC activities to keep momentum.	Medium (13)
32	Construction and tendering	Seasonal variations / weather	High (21)	Develop a strategic procurement plan that incorporates constructor into project planning. Consider alternative procurement models. Implement strategic works plan.	Medium (13)
33	Construction and tendering	Unexpected ground conditions	High (21)	Strategic staging of project to identify and manage risks. Provide for uncertainty and allow for innovation in contract model. Undertake geotechnical investigations during DBC. Provide geotechnical information to contractors and provide access to site during tendering.	Medium (14)
34	Construction and tendering	Market does not have the capacity to deliver the project	Extreme (24)	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market.	High (18)
35	Construction and tendering	Cost estimate is too low	High (22)	Detailed analysis during the development of a DBC, including P90 estimates. Implement procurement model that make project attractive to Tier 1 developers (such as an alliance model). Consider strategic approach to risk and liability ownership for construction.	Medium (14)
36	Construction and tendering	Market prices are high (hot market)	High (22)	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market.	High (18)
37	Construction and tendering	Late changes in works (e.g., demand is lower than projected resulting in smaller project)	High (21)	Comprehensive engagement process to confirm Round 2 demand. Strong conversion of demand into binding water sales. Explore additional area / customers for binding water sales.	Medium (14)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
				Ensure annual charge is affordable for growing grapes/making wine (<\$2,00/ML).	
38	Construction and tendering	Suitable materials are not available and affordable	High (18)	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Consider strategic approach to risk and liability ownership for construction.	Medium (14)
39	Construction and tendering	Market prices are high (cost escalation and inflation)	Extreme (24)	Detailed analysis during the development of a DBC, including P90 estimates. Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market. Continued to be informed of market conditions and current pricing and potential impacts on project estimates. Consider strategic approach to risk and liability ownership for construction.	High (18)
40	Construction and tendering	Dam safety issues at Bundaleer Dam reduces the capacity of the scheme	High (18)	Further investigations in the dam safety of Bundaleer Dam and the potential operating levels during the additional design work in the DBC.	Medium (14)
41	Operations	Water pricing strategies are unsuitable	High (21)	Clear transparency with price setting, policies and strategy. Preference for capital investment which reduces operating costs.	Medium (13)
42	Operations	Insufficient scale unable to provide an affordable and sustainable operating model	High (21)	Engagement with SA Water during DBC to determine most effective and efficient operating model, including consideration of SA Water operating the scheme as part of the CVWSS. Develop strong delivery model for best practice operations. Strategic approach to scheme rules to provide structure and necessary flexibility.	High (18)

9 Key findings

In summary, the PBC provides a robust body of evidence to progress the project to a detailed business case – the next phase of investigations.

There is a compelling case for government to progress a modest investment in water infrastructure in the Clare Valley, to deliver improvements to a critical input and an identified constraining factor for future prosperity in the region. Two options identified during this PBC have demonstrated economic viability, justifying further government investment.

The project is vital to improve the availability and security of water to underpin the important wine and grape growing industries in one of Australia's premium wine regions. This improvement to the region's water supply will smooth out the boom–bust burden that recent droughts (2018, 2019) have imposed in the Clare Valley. This will allow consistent production of 31,500 tonnes of grapes annually and increase investment to secure the valley's viable future through unlocking new employment, tourism and community wellbeing opportunities.

Businesses have demonstrated their strong support the project, expressing demand for above 6 GL of additional water. However, around 3 GL of demand is more likely when pricing and potential funding scenarios and their impacts on customer affordability are considered.

Four infrastructure options have been recommended to be progressed with further investigations – the CVWSS upgrade, the Bundaleer Dam, a climate-independent recycled water solution and a lower cost augmentation of the CVWSS. These options should be considered alongside the identified non-infrastructure solutions, such as improved water trading arrangements and increasing the support for existing and new water users, in the detailed business case.

The CVWSS upgrade and the Bundaleer Dam options have been examined further as part of this preliminary business case. This assessment demonstrates that they are economically viable and will provide significant regional employment opportunities. Both options will create around 560 to 660 full-time on-going and construction jobs.

A climate-independent recycled water solution and a lower cost augmentation of the CVWSS have been advocated by stakeholders for further investigation.

Prior to finalising the options to be considered as part of the detailed business case, a review of key considerations impacting the four options is recommended, including:

- The current status and indicative cost estimates of the Barossa New Water project and the opportunity for a climate-independent solution for the Clare Valley to be incorporated.
- A detailed review of the Round 1 demand assessment and the current design and delivery requirements of the CVWSS with SA Water and investigate where additional demand can be serviced through the current CVWSS delivery network or through minor network augmentations.
- A review of the hydrology of Bundaleer Dam to understand the available inflow into the storage for the project.

As with the vast majority of irrigation projects, the challenge is the affordability of up-front, one-off capital and on-going annual customer charges. This is particularly the case in the Clare Valley, where the region is located a significant distance away from potential water sources (e.g., the River Murray and recycled water options in greater Adelaide), increasing the cost of moving the water to Clare Valley water users and placing additional pressure on their annual charges.

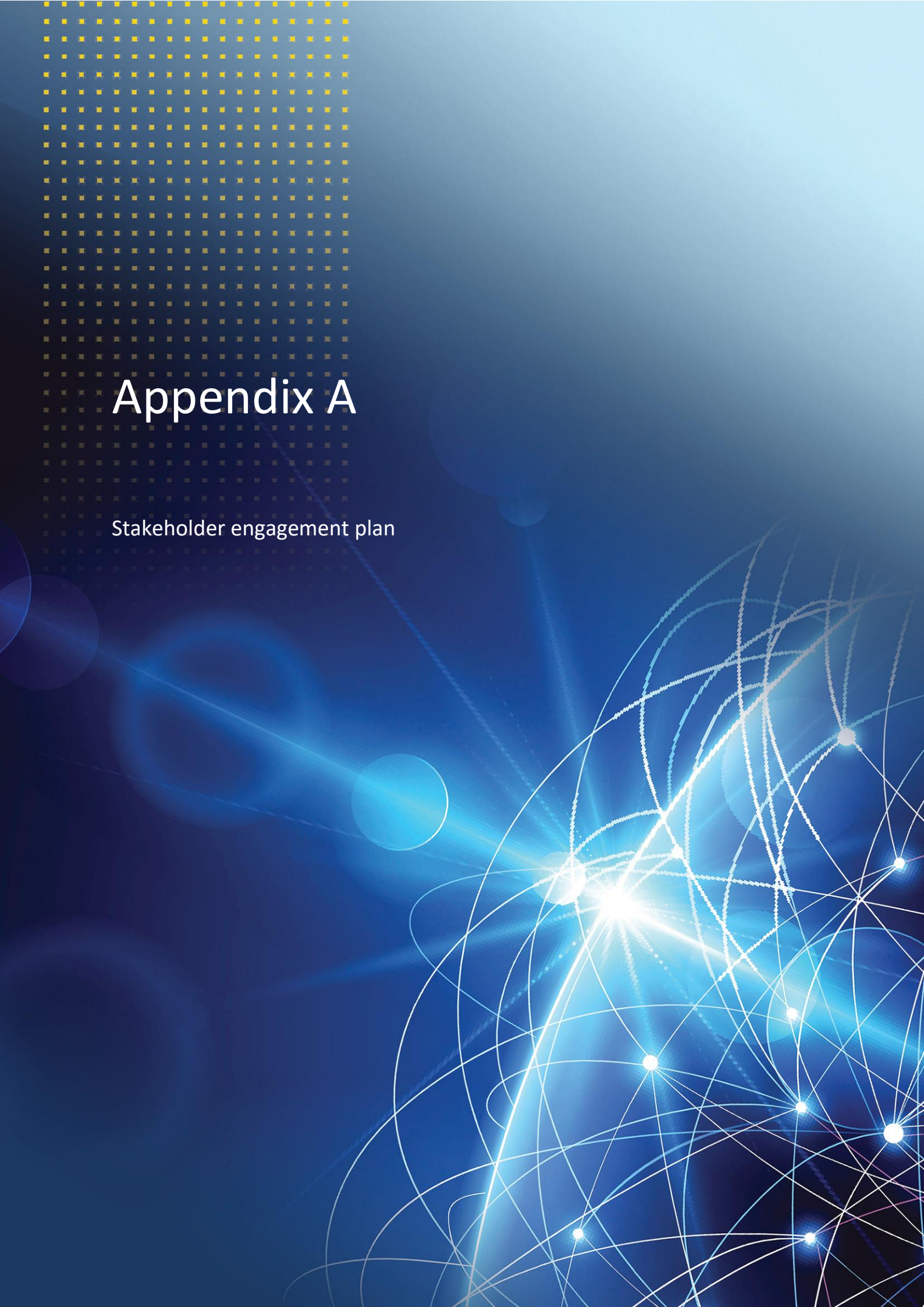
The affordability and willingness to pay for additional water was tested in detail in the preliminary business case. This analysis should be built upon during the detailed business case with a further demand assessment to increase certainty of demand and funding scenarios, including the quantum of government investment to meet the expected shortfall between customer capital contributions and the capital expenditure of the project.

No showstoppers or technical fatal flaws have been identified through the initial engineering design process. Further detailed engineering design effort – along with social, sustainability, environmental and cultural heritage assessments – is required as part of a detailed business case to verify findings.

Facilitating engagement with local community during the development of the detailed business case is essential for the success of the detailed business case and the project. The CVWGA will play a critical role in coordinating the regional input from local water users and other regional bodies, including Regional Development Australia (Yorke and Mid North), local council and the Northern and Yorke Landscape Board. Therefore, it is vital the CVWGA are actively involved in the delivery of the detailed business case to develop and maintain community trust in the project and ensure customer-investors are considered in the identification and development of an affordable solution.

Furthermore, SA Water, as a significant infrastructure owner and operator in the region, is an important and essential stakeholder in the detailed business case. In particular, SA Water would be well placed to construct and/or operate options that involve augmenting the capacity or reach of the CVWSS.

The budget of \$5 million for the detailed business case is estimated based on experience from similar projects throughout Australia and should be funded from the National Water Grid Fund. It is acknowledged that a detailed cost estimate will be developed upon a formal funding application being submitted.



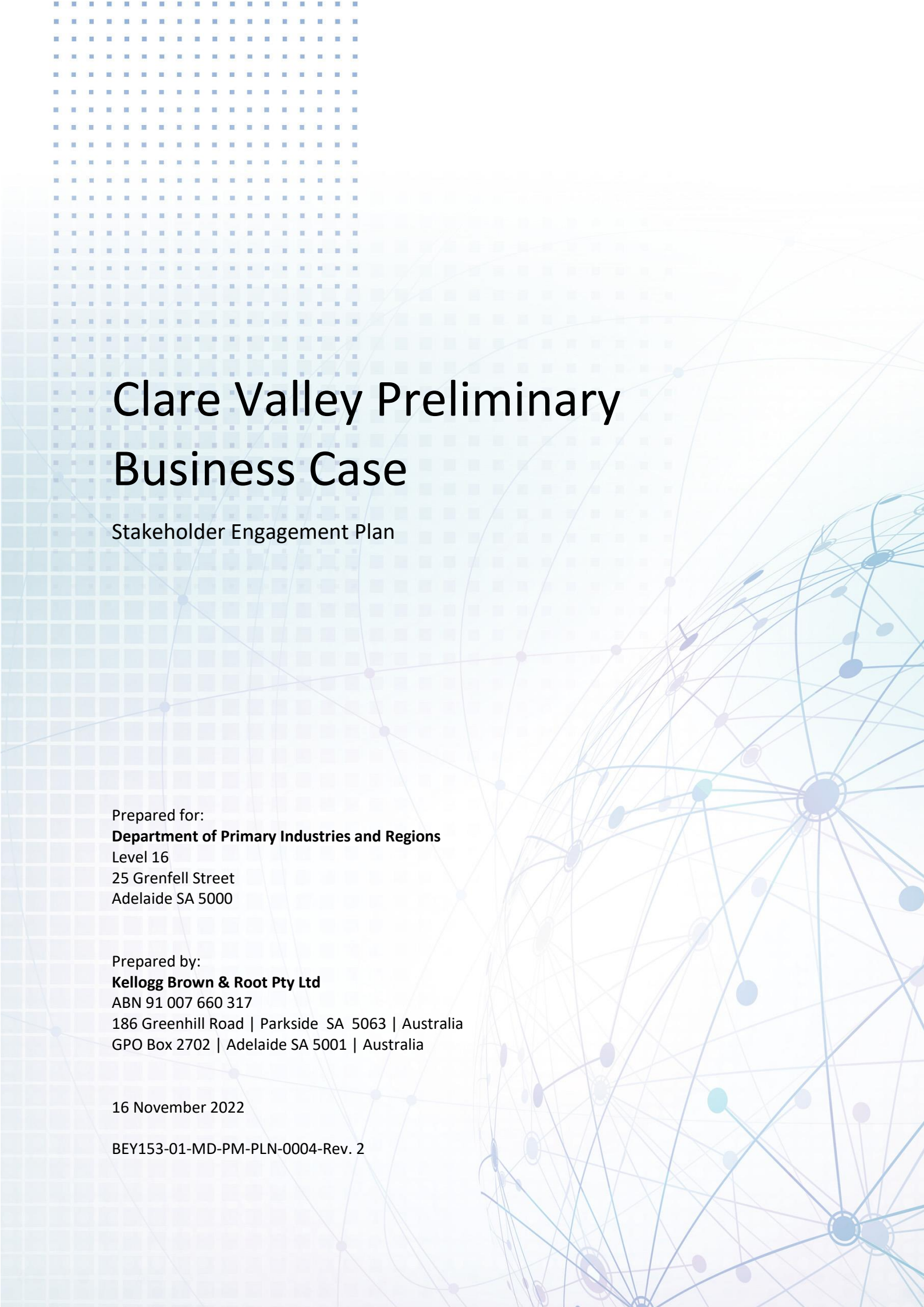
Appendix A

Stakeholder engagement plan



Clare Valley Preliminary Business Case

Stakeholder Engagement Plan



Clare Valley Preliminary Business Case

Stakeholder Engagement Plan

Prepared for:
Department of Primary Industries and Regions
Level 16
25 Grenfell Street
Adelaide SA 5000

Prepared by:
Kellogg Brown & Root Pty Ltd
ABN 91 007 660 317
186 Greenhill Road | Parkside SA 5063 | Australia
GPO Box 2702 | Adelaide SA 5001 | Australia

16 November 2022

BEY153-01-MD-PM-PLN-0004-Rev. 2

Limitations Statement

The sole purpose of this report is to outline the stakeholder engagement plan in accordance with the scope of services set out in the contract between Kellogg Brown & Root Pty Ltd (KBR) and Department of Primary Industries and Regions ('the Client').

Revision History

Revision	Date	Comment	Signatures			
			Originated by	Checked by	Technical Approval	Project Approval
0	21.03.2022	Issued for Use	PJS	LC	—	PJS
1	01.04.2022	Issued for Use	PJS	LC	—	PJS
2	16.11.2022	Issued for Use	PJS	LC	—	PJS
			<i>PJS</i>	<i>LC</i>		<i>PJS</i>

Contents

Section	Page
1 OVERVIEW	1
1.1 Purpose of the stakeholder engagement plan	1
1.2 Alignment with South Australian Department of the Premier and Cabinet's Better Together: Principles of Engagement	1
1.3 Project background	2
1.4 Governance framework	3
1.5 Engagement contacts	3
2 ENGAGEMENT OBJECTIVES	4
2.1 Client objectives	4
3 STAKEHOLDER ENGAGEMENT PROCESS	5
4 CONTEXT	7
4.1 Key project drivers	7
4.2 Project status	7
4.3 Community perception	7
4.4 SWOT analysis	8
5 IDENTIFIED STAKEHOLDERS AND THEIR INTEREST	10
5.1 Key project stakeholders	10
6 LEVEL OF PARTICIPATION	14
6.1 Stakeholder scoring	14
6.2 Form of participation	14
7 ENGAGEMENT PLAN	19
7.1 Key areas of stakeholder engagement	20
7.2 Roles and Responsibilities	24
7.3 Risk management strategies	24
7.4 Impact of Covid 19	26
7.5 Privacy	27
7.6 Detailed stakeholder engagement plan	28
ATTACHMENT 1 – ROUND 1 DEMAND ASSESSMENT ENGAGEMENT PLAN	34

List of abbreviations

AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
BNW	Barossa New Water
CVWGA	Clare Valley Wine and Grape Association
CVWSS	Clare Valley water supply system
DBC	Detailed business case
DTF	Department of Treasury and Finance
FPIC	Free, prior and informed consent
ISA	Infrastructure SA
KBR	Kellogg Brown & Root Pty Ltd
NAIS	Northern Adelaide irrigation scheme
NWGA	National Water Grid Authority
NWGF	National Water Grid Fund
PBC	Preliminary business case
PIRSA	Department of Primary Industries and Regions
PRG	Project Reference Group

1 Overview

1.1 PURPOSE OF THE STAKEHOLDER ENGAGEMENT PLAN

The stakeholder engagement plan documents the principles, approach and activities when involving those who have an interest in, or may be impacted by, or during the development of the project's preliminary business case.

The plan is supported by a stakeholder engagement register which records the key engagement activities and provides a detailed summary of the key findings arising from the engagement with the stakeholders identified in the plan. These findings are integrated throughout the PBC to help inform and support the service need, identifying and assessing the reference project, establishing impacts, implementation planning and managing risks.

When developing the stakeholder engagement plan, several guidelines have been considered, including:

- South Australian Department of the Premier and Cabinet's Better Together: Principles of Engagement.
- International Association of Public Participation (IAP2).
- Infrastructure SA's Business Case Template – recommended contents for Stakeholder Management Plan.

1.2 ALIGNMENT WITH SOUTH AUSTRALIAN DEPARTMENT OF THE PREMIER AND CABINET'S BETTER TOGETHER: PRINCIPLES OF ENGAGEMENT

The South Australian Department of the Premier and Cabinet's Better Together: Principles of Engagement outlines six engagement principles to provide a consistent approach across government and to guide best practice.

Table 1 outlines the six engagement principles South Australian Department of the Premier and Cabinet's Better Together: Principles of Engagement and their key characteristics.

Table 1 Alignment with South Australian Department of the Premier and Cabinet's Better Together: Principles of Engagement

Principles	Key characteristics
We know why we are engaging	Know your engagement's purpose Understand the public's level of interest Communicate clearly Measure your impact Plan for flexibility
We know who to engage	Who is affected and interested? Connecting with community leaders Moving beyond the stakeholder list Hard-to-reach groups and individuals Collaborating Connectors, 'mavens' and salespeople Local Government
We know the history	Determining what we already know Researching background information

Principles	Key characteristics
We start together	Building relationships Working together towards outcomes
We are genuine	Honest intent Listening to understand People at the centre Accessibility Recognition and celebration Closing the feedback loop
We are relevant and engaging	Shape your engagement tools for your participants Be creative

1.3 PROJECT BACKGROUND

This Stakeholder Engagement Plan is for the Clare Valley Water Supply Preliminary Business Case (PBC) scope being delivered by Kellogg Brown & Root Pty Ltd (KBR).

The South Australian Government is investigating water supply and delivery options that would provide security for existing and new Clare Valley water users and address unmet demand.

The Department of Primary Industries and Regions (PIRSA) has partnered with the Clare Valley Wine and Grape Association (CVWGA) and other government agencies and organisations including the Department of Treasury and Finance (DTF), the Department for Environment and Water (DEW), Infrastructure SA (ISA) and SA Water, to investigate water supply and delivery options that would provide security for existing and new Clare Valley water users and address unmet demand.

The objective of investigating water supply and delivery in the Clare Valley is to identify an affordable, reliable, long-term and sustainable solution that meets the water demand of Clare Valley primary producers.

Broadly, the Clare Valley Water Project aims to develop a scheme that will:

- Increase reliability and overall productivity of the Clare Valley primary industries.
- Provide climate resilience by starting the growing season with a local storage that has been filled with a significant volume of water during the off season.
- Support regional economic stimulation through increased investment and tourism.
- Improve utilisation of State owned infrastructure.
- Allow irrigators to make informed, long term investment decisions within the region.
- Encourage industry growth, providing enhanced employment opportunities.

A solution would be expected to include such elements as:

- Water of a suitable quality for local primary producer's needs, available at required volumes during peak use periods at an affordable price.
- Significant storage to manage supply availability and demand requirements across each year.
- Trunk main infrastructure to transport water from the identified source to the Clare Valley.
- Pipe, pumping infrastructure and a local distribution network to deliver water to Clare Valley producers.

The objective of the Clare Valley Water PBC is to review, assess and shortlist options to identify a viable solution to meet the water demand of producers in the Clare Valley, based on projected

affordability and reliability, prior investigations undertaken to date, grower and industry engagement on demand potential and investment readiness, environmental assessment of the impacts of increased water application in the region, economic and financial analysis of options compared with a do nothing approach and funding model options.

1.4 GOVERNANCE FRAMEWORK

PIRSA, on behalf of the Minister for Primary Industries and Regional Development, and in collaboration with CVWGA, SA Water, DEW and DTF and supported by ISA, is leading the project.

A cross-agency Project Reference Group (PRG) has been established to coordinate the planning and preparatory work required and comprises representatives from PIRSA, CVWGA, SA Water, DEW, DTF, ISA, supported by commercial, legal, technical and probity advisors, as required.

To support CVWGA with the project, two local industry groups have been established by the CVWGA and as part of Probity and Communications Protocol document:

- Advisory Group, comprising of:
 - Chair, CVWGA; CEO, Clare and Gilbert Valleys Council; CEO, Northern Areas Council; CEO, Regional Development Australia Yorke & Mid North and Regional Manager, Northern & Yorke Landscape Board.
- Working Party, comprising of members of the CVWGA water sub-committee.

PIRSA has engaged KBR as the principal business case advisor to lead the development of the preliminary business case.

1.5 ENGAGEMENT CONTACTS

PIRSA's point of contact for stakeholder engagement is:

- Julie Wedderburn – Project Manager and Contractor's Representative (julie.wedderburn2@sa.gov.au and +61 8 84290442)

KBR's stakeholder engagement lead is:

- Angus MacDonald – Study and Stakeholder Engagement Lead (angus.macdonald@kbr.com and 0488 444 973).

2 Engagement objectives

2.1 CLIENT OBJECTIVES

The engagement objectives initially focus on the preliminary business case stage of the project, to be completed by July 2022.

Specifically, the engagement objectives are to be considered throughout each phase of the development of the project (e.g. preliminary business case, detailed business case, construction, etc):

- Identify engagement opportunities for internal and external stakeholders to ensure there is an appropriate level of consultation, feedback and input into the process for the entire development of the project.
- Ensure stakeholders are aware of the progress of the project and how it will impact them.
- Provide opportunities for key stakeholders to raise concerns, provide constructive feedback and/or seek additional information during the development of the project.
- Facilitate planning across the Clare Valley region that is integrated with industry to minimise red/green tape and maximise economic benefit.
- Seek to align with other related South Australian Government engagement in the region, including Clare Valley Strategic Water Supply Study, led by PIRSA.

PIRSA, CVWGA, SA Water, DEW, DTF, ISA and KBR will ensure approved Government and project messaging remains up to date and consistent and will collaboratively communicate key messages to stakeholders in ways that reduce risks for the project.

3 Stakeholder engagement process

A seven-step stakeholder engagement process has formed the basis for the development of the engagement plan.

The seven activities are illustrated in Figure 1 and summarised in Table 2.

Figure 1 Key engagement activities

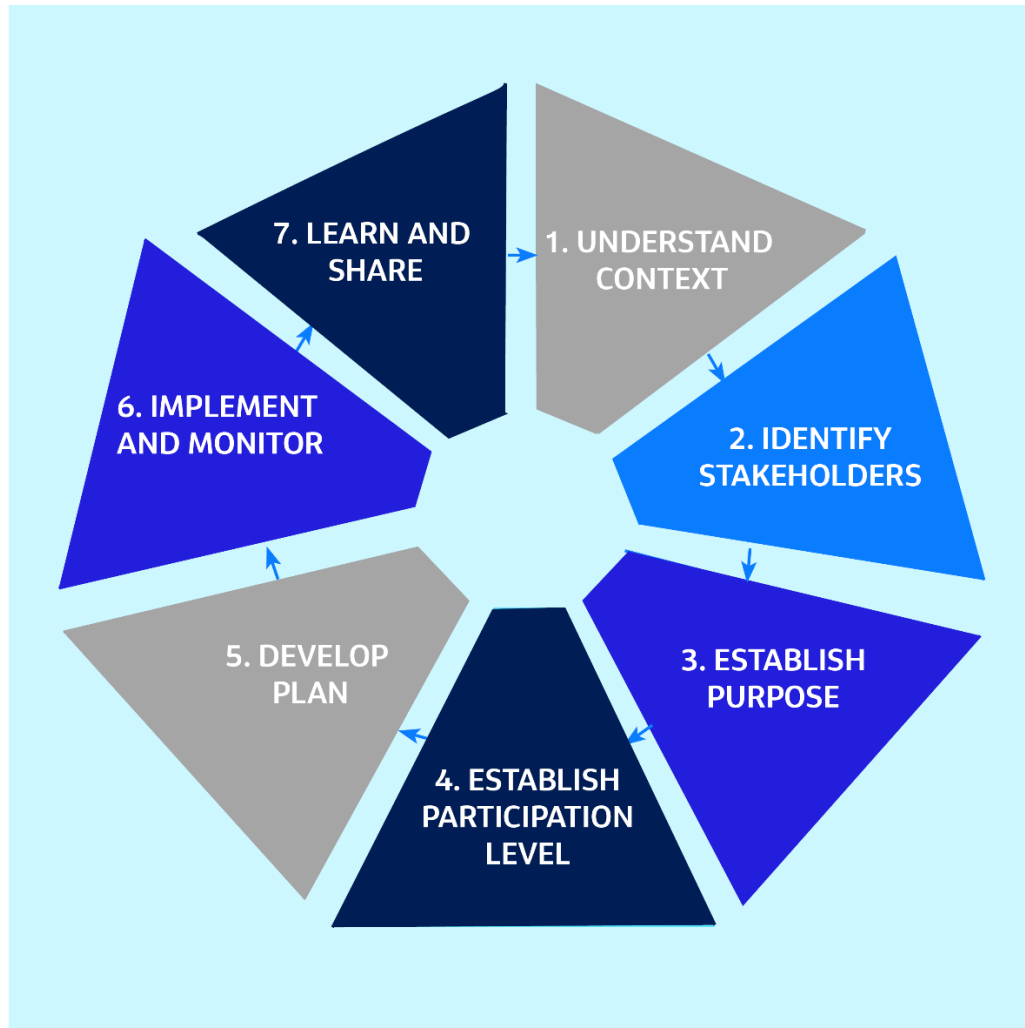


Table 2 Key engagement activities and purpose

Activity	Purpose
Understand the context	Understanding the context of the proposed project assists with managing risk and enables stakeholder engagement to be tailored effectively
Identify stakeholders	Identifying stakeholders ensures the engagement activities are focused
Establish the purpose of engagement	Clarifying the purpose of the engagement helps to focus on objectives and maximise impact
Establish the level of participation	Establishing the level of participation ensures stakeholders are effectively engaged. It also means engagement activities are resource effective and focused
Develop an engagement plan	An engagement plan documents the approach and design necessary to address objectives and meet stakeholder needs
Implement and monitor engagement	Effective implementation and monitoring of engagement ensures planned activities achieve the objectives. By monitoring the engagement plan it is easier to manage risks, address issues as they arise, and participate or communicate any significant delays
Share lessons learned	Sharing lessons learned will inform and improve future practice, reduce risk and increase the quality of business cases

4 Context

4.1 KEY PROJECT DRIVERS

Industry demand for new water in the Clare Valley is driven by the constraints to existing water sources, including decreasing rainfall and surface water capture, declining groundwater quality and yield and volume restrictions and pricing structure on imported River Murray water dictated by pipeline and system limitations. There is little or no capability to increase water supply from any of these existing sources, potential for reduced supply and/or security of supply from some of these sources and, although there is considerable unrealised grape yield capability and significant vine expansion opportunities, the region's growth is limited.

The project seeks to develop a short list of options for improved water security and sustainable pricing for new water sources in the Clare Valley to offset impacts from declining rainfall, surface water and underground water availability. Sustainably securing the region's water resources will support existing primary industry production and jobs in the region whilst enabling opportunity for increased investment, revenue and employment in the Clare Valley and across South Australia and Australia.

Potential key drivers for the project can be summarised as:

- Increase productivity for local primary industries and other beneficiaries of new water.
- Assist in generating employment opportunities.
- Facilitate economic benefits for the broader region.
- Improve climate resilience of primary industries.
- Provide access to secure and affordable water.
- Support other industries in Clare Valley.

4.2 PROJECT STATUS

Building on the joint announcements on 18 September 2021, the South Australian Government announced its plans via a media release on 17 February 2022 to undertake a preliminary business case for the Clare Valley from the Minister for Primary Industries and Regional Development.

On 18 September 2021, the National Water Grid Authority (NWGA) announced a funding commitment from the National Water Grid Fund (NWGF) to progress the preliminary business case.

In February 2022, PIRSA engaged KBR to develop the preliminary business case.

The success of the project's development is dependent on on-going communication and engagement with the wider community, industry representatives (e.g., CVWGA, and across government agencies).

4.3 COMMUNITY PERCEPTION

The project was stimulated through primary producers voicing their concerns regarding water scarcity and the impending impact of changing weather conditions. This led to establishment of a Clare Valley Project Reference Group to progress project development.

A key element of the community engagement approach to be undertaken by the Business Case Advisor is to understand the perceptions, attitudes and issues that have been raised and are being

felt within the community. To be effective in the type and timing of engagement, the Project Team will be required to consider and address these perceptions.

4.4 SWOT ANALYSIS

Strengths

- There is strong government, regional and industry awareness on the need for additional water for the Clare Valley Region.
- There is a strong SA Government and established industry commitment and support for investigating the feasibility of delivering new water infrastructure to the Clare Valley Region through a preliminary business case.
- There is recognition that a region-wide focus on one major industry sector will be essential to addressing the current water resource constraints.
- The CVWGA is an identifiable, highly representative and supported industry voice.
- There is an established irrigation network infrastructure and organisation for a portion of the Clare Valley (SA Water's owned and operated Clare Valley water supply system (CVWSS)) – SA Water owned and operated.
- SA Government has taken a multi-agency approach to the project governance to ensure that all relevant departments/agencies have direct input and project ownership.

Weaknesses

- Limited formal, cropping and livestock voice.
- Lack of understanding of the expected decline in supply of non-sustainable water resources.
- Uncertainty of project funding for future stages of the project (e.g. detailed business case and construction).
- Perception of potable water quality and existing pricing as the only solution and potential lack of understanding of quality, security and cost of alternative water supplies.
- Potential lack of understanding of the impact inappropriate salinity levels has on the viability of wine grape production, wine approvals for export and soil sodicity.

Opportunities

- Opportunity to work closely with CVWGA to garner support for the project to be adopted/advocated by PIRSA, and across governments and stakeholders state-wide.
- Non-infrastructure constraints (e.g. policy and regulatory matters could be part of a solution).
- Programs could be developed to support industry uptake of new water made available through new infrastructure to better ensure that intended economic outcomes from the project are realised and that regional businesses adjust and modernise their business models, water use efficiency and uptake of new technology.
- Positive experience of McLaren Vale grape growers and some Barossa Valley grape growers in utilising treated wastewater to grow premium grapes at lower risk and with improved environmental credentials.

Threats

- Separate proposals from other industry operators to growers, PIRSA and the Australian Government have the potential to cause confusion and erode trust and relationships.

- Political interests or individual/business conflicts of interest so the project's Probity and Communication Protocols plan needs to be effective.
- Delays to project delivery could impact timelines and confidence in consultation and process.
- Perceived lack of engagement in the process or excluded stakeholders/regional producers could undermine support for new infrastructure and create context for criticism.
- Key stakeholders rescind support or voice.
- Potential for 'free-riders' amongst existing CVWSS customers who may benefit from improved water security without committing to purchase additional water.
- Consultation fatigue resulting from previous water demand surveys within the region.
- Potential competing public policy objectives at a state and Federal level, including the use of River Murray and the opportunity for substitution, SA Water and ESCOSA obligations, NAIS Stage 1 commitments and EPA objectives.

5 Identified stakeholders and their interest

Stakeholders of the project are those who may affect, be affected by, or perceive themselves to be affected by a decision, activity, or outcome of a project.

Stakeholders, and their importance to the project, will change through the development process (e.g., during proposal development, project delivery and operations) and will be continually reviewed and evaluated.

Engagement activities and findings arising from engagement with key stakeholders will be updated and recorded in the stakeholder engagement register through the project (refer to Section 3). Findings will be incorporated to the development of the project and its assessment in the PBC. For example, the reference design will be based on feedback received in the demand assessment and the social impact assessment based on targeted discussions and workshops.

5.1 KEY PROJECT STAKEHOLDERS

Table 3 provides a summary of identified stakeholders and their interests in the project. This summary has considered those stakeholders identified during earlier investigations. A stakeholder's interest will clarify the purpose of the engagement and focus on objectives. This is further expanded in Section 7.

Table 3 Key project stakeholders

Stakeholder category	Stakeholder	Interest/s
Internal stakeholders		
Project partners	National Water Grid Authority	Lead commonwealth government agency
	Department of Primary Industries and Regions	Lead state government department Administrative facilitator for the preliminary business case study
	Steering Committee	Project governance
	Clare Valley project reference group	Project operations and agency coordination
	KBR	Lead consultant for preliminary business case study
Australian Government		
Departmental Ministers	Minister for Agriculture, Drought and Emergency Management	Alignment with commonwealth objectives and plans
	Minister for Resources, Water and Northern Australia	Infrastructure that is properly planned and timed
	Minister for Infrastructure, Transport and Regional Development	Investment decision/approval of any further investigations and any resulting project outcomes
	Minister for the Environment	Environmental approvals/requirements

Stakeholder category	Stakeholder	Interest/s
Elected representatives	South Australian Senators and Federal Members of Grey and adjoining electorates representing study area	Alignment with commonwealth objectives and plans Infrastructure that is properly planned and timed State, regional and local economic, social, and environmental impacts
Australian Government departments and authorities	Department of Infrastructure, Transport, Regional Development and Communications	Review of business cases Alignment with commonwealth objectives and plans
	Department of Industry, Science, Energy and Resources	
	Department of Agriculture, Water, and the Environment	
	Infrastructure Australia	
	Murray–Darling Basin Authority	
	Regional Investment Corporation	
South Australian Government		
Premier and Departmental Ministers	Premier and Minister for Tourism	Investment decision/approval Alignment with other South Australian Government department objectives and plans Infrastructure investment that is properly planned and timed
	Treasurer	
	Minister for Primary Industries and Regional Development	
	Minister for Environment and Water	
	Minister for Planning and Local Government	
	Minister for Infrastructure and Transport	
Minister for Trade and Investment		
Elected representatives	South Australian State Members of Wakefield and adjoining electorates representing study area	Alignment with state objectives and plans Infrastructure that is properly planned and timed Local economic, social, and environmental impacts
South Australian Government departments, authorities, and corporations	Department of the Premier and Cabinet	Alignment with other South Australian Government department objectives and plans
	Department for Environment and Water	

Stakeholder category	Stakeholder	Interest/s
	Department of Treasury and Finance	Infrastructure investment that is properly planned and timed
	Department of Health and Wellbeing	Review, input, and feedback on the preliminary business case
	SA Water	Alignment of parallel water studies in the region
	Infrastructure SA	Ongoing management and delivery activities – in particular, coordination of overlapping project stakeholder management activities
	Essential Services Commission of SA	
	SA Environmental Protection Authority	
Local government		
Councils	Clare and Gilbert Valleys Council	Job creation in the region Advancing the area’s status as an attractive place to invest Infrastructure location and planning Increasing agricultural and related industry production Impact on environment and community
Council representative group	Local Government Association South Australia Legatus Group	Support and advocacy
Community and business		
Private and public water operators	SA Water	Potential for bulk water supply Opportunities for synergies and complementary infrastructure development Potential project interfaces
Contractors and service providers	Contractors Potential project partners Service providers	Opportunities for operation models, contracts, and delivery models
Industry peak bodies	Primary (local) Clare Valley Wine and Grape Association Secondary (State/National) South Australian Wine Industry Association Australian Grape and Wine Wine Australia Wine Grape Council of South Australia Primary Producers SA Food SA	Improved conditions for industry sectors Advancing the region’s status as an attractive place to invest
Community groups	Local community groups	Local regional advocates for water supply security Local and regional advocates for environmental

Stakeholder category	Stakeholder	Interest/s
Landholders	Landholders in the study region who are impacted by the project.	Impact on existing water supply and environment Access to property
Potential customers	Parties (current and potential landholders) interested in buying water from the project.	Solutions to water supply issues Access to secure water Business growth and profitability
Research and environmental groups	Australian Wine Research Institute Rural Industries Research and Development Corporation	Maximise benefit of increase of water availability Minimisation and/or mitigation of environmental impacts Monitoring and reporting activities
Traditional owners/Aboriginal cultural heritage	Ngadjuri nation Karna nation	Explore opportunities, concerns, expectations, needs and aspirations regarding the project Any Native Title or Aboriginal cultural heritage considerations
Business/Regional development	Regional Development Australia Yorke and mid North	Removing impediments to business growth and regional economic prosperity Improved conditions for residents, industry, and other sectors Advancing growth Job creation in the region
Other landholders in the region, including the location of treatment plants, storage, and pipelines	Owners and operators of operations that will not directly benefit from the projects	Ensure that potential projects do not adversely impact on their business operations
Media	Plains Producer newspaper Other local media outlets	Coverage of the business case progress Advertisement of engagement opportunities

6 Level of participation

In determining the level of participation of each stakeholder, the following specific information has been identified:

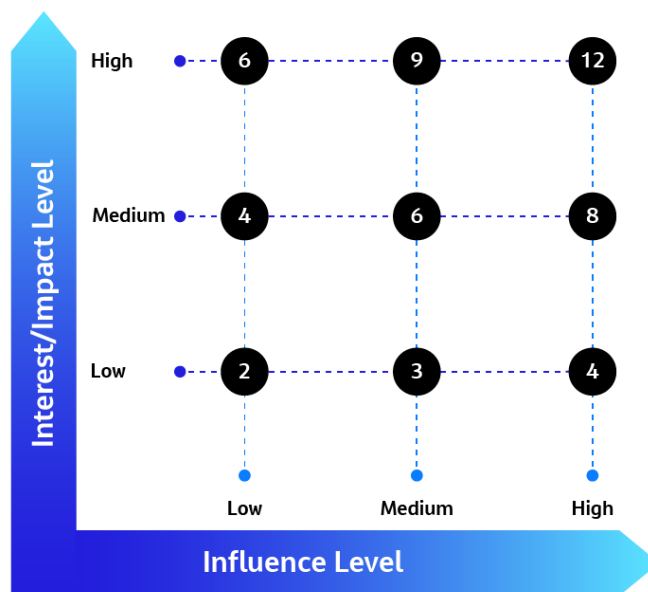
- Extent of stakeholder interest and influence in service need/reference project.
- A stakeholder 'score'.
- Level of participation (inform, consult, involve, collaborate, empower).

The steps balance the benefits of better outcomes through improved articulation of the service need with the risks of engagement in the process.

6.1 STAKEHOLDER SCORING

Each stakeholder is assigned a score based on their interest in (impact) and influence on the project. A stakeholder's score will inform their level of participation—inform, consult, involve, collaborate, empower. The scoring matrix used in this process is outlined in Table 4.

Table 4 Stakeholder scoring matrix



The scoring matrix uses a standard multiplier to develop a total score which combines the overall influence and interest the stakeholder has regarding the project. For example, a stakeholder with a medium influence and interest level would receive a score of 6, such as a potential contractor. The Steering Committee has high influence and interest level would receive a score of 12. Table 9 contains a score for each stakeholder.

The higher the score the more importance and rank that was associated with the stakeholder for the project. By scoring each stakeholder in this way it gives guidance to the level of engagement participation required over the course of the project.

6.2 FORM OF PARTICIPATION

Establishing the level of participation ensures that project stakeholders are effectively engaged. It also allows engagement activities to be effective and focused.

The South Australian Department of the Premier and Cabinet's Better Together: Principles of Engagement uses the International Association for Public Participation (IAP2) Public Participation Spectrum which defines five types of participation (Table 5).

Table 5 Types of stakeholder participation

Participation	Description	Engagement commitment	KBR's approach
Inform	Providing information to stakeholders	We will keep you informed	We avoid this approach in face-to-face engagements Our draft publications can be circulated in advance to inform
Consult	Obtaining stakeholder feedback on alternatives for potential courses of action or decisions made	We will keep you informed, listen to, and acknowledge concerns and provide feedback on how your input influenced the decision	Apply in public meetings if views are not somewhat informed We try to avoid merely acknowledgement, rather we articulate how the issues are impacting our thinking
Involve	Working directly with stakeholders to ensure that concerns and aspirations are understood and reflected in policy or proposals	We will work with you to ensure that your concerns and issues are directly reflected in the alternatives developed and provide feedback on how your input influenced the decision	This is our minimum standard for stakeholder engagement generally (e.g., customers) We will clarify and document issues raised and articulate how that may and did impact our approach
Collaborate	Partnering with stakeholders	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible	This is our minimum standard for higher scoring stakeholders (e.g. CVWGA) We also take this approach with the regulators (e.g., EPA and water planning)
Empower	Placing final decision-making in the hands of the stakeholder	We will implement what you decide	This is the approach that we prefer to take with the steering committee and the working group

The allocation of different stakeholder groups to these participation levels is set out in Figure 4.

KBR's model of engagement for this project is focussed on the higher participation end of the spectrum of participation above. We strongly believe in listening, incorporating the issues that stakeholders raise and providing feedback on the way stakeholder views have shaped our solutions and recommendations. The relationship with the custodians of the project is collaborative and where possible empowering.

- **Involve** is our minimum standard for most interactions. This will be our demand assessment approach with customers; however, significant customers will move to **collaboration** to refine the products and processes to meet commercial and community needs.
- Our aim is to **collaborate** where time allows. The options analysis process, for example, **collaborate** and **empower** – articulating the communities need/opportunity, whilst bringing data to support the views set out.

- **Empower** is used in the steering committee and working group during workshops, document review, including preliminary business case chapters and demand assessment documentation.

We build on this thinking and incorporates the following elements:

- **Form** – Levels of participation (Inform, Consult, Involve, Collaborate and Empower) based on the IAP2 model.
- **Timing** – provides an indication of the timing of engagement activities based on participation level (e.g., draft report stage).
- **Content** – provides an indication of the type of questions and discussions that will be undertaken based on participation level (e.g., Do you support this option?).

Figure 2 and Figure 3 provide an example of the stakeholder engagement model adopted.

Figure 2 Level of participation strategy for project stakeholders

Form	Inform	Consult	Involve	Collaborate	Empower
Timing	Draft final report consultation	One workshop in the middle of the project and consultation at draft final and final	Multiple workshops with discussions on key findings during the project	Multiple focused workshops, direct phone calls and regional visits throughout the project	All of the above with time for an individual visit/s and discussion/s with the key stakeholders identified at start of process.
Content	Do you support option X to solve the problem as we have determined it?	For the problem as we have determined it, which Option X, Y and Z would you support?	Our view of the problem is (this), what are the options for addressing this problem?	How can we improve our assessment of your problem and what a successful solution looks like?	In your own words, what is the problem and what would a successful solution look like?

Figure 3 Project stakeholder engagement model (engagement triangle)

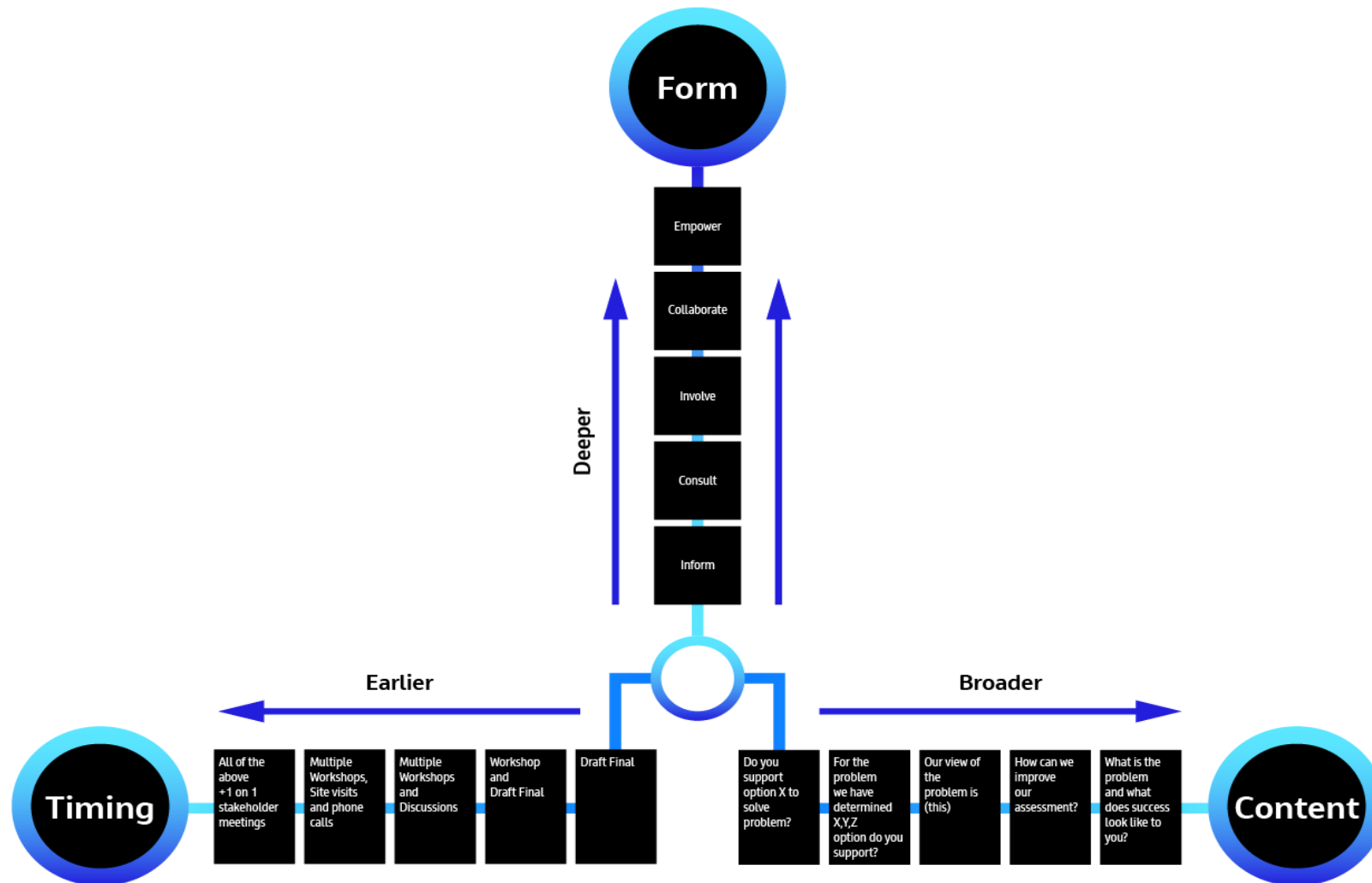


Figure 4 provides an overview of the engagement levels for each stakeholder group identified.

In determining the appropriate level of participation, consideration has been given to:

- **Purposes and objectives**—reasons for engaging the stakeholder and the results to be achieved will help determine which level of participation is appropriate.
- **Stakeholders**—different stakeholders have different needs, expectations and capacity. Consider these factors in determining the appropriate level of participation and resourcing required for engagement.
- **Resources**—resources available for engagement will have a significant impact on the level of engagement that can realistically be achieved.

Typically, 'empower' and 'collaborate' participation are generally not suited to community engagement during the development of a business case for infrastructure. However, 'collaborate' is frequently used with expert and knowledgeable stakeholders to identify potential options in response to a service need or develop a reference design.

Figure 4 Project stakeholder groups and level of engagement



7 Engagement plan

The plan that has been developed for this project allows the project team to engage directly and meaningfully with large and diverse groups of stakeholders. Engagement will occur at different levels and ways according to the needs of the stage of development and the type of stakeholder.

Regular and formal consultation will occur more frequently for the stakeholders that scored highly, whereas other stakeholders will be consulted on a more as need basis and less frequently. The plan includes protocols for internal and external engagement and other communication activities, such as dealing with project enquiries.

The project team will engage with the stakeholders through a range of methods. With key stakeholders, the preference is to meet face-to-face in one-on-one meetings or group gatherings (while abiding by COVID-19 restrictions and social distancing measures) to gain a deeper understanding of the details of the critical issues that may impact the success, or failure, of project.

Detailed analysis will be undertaken throughout the process to keep stakeholders informed on the project. This will also allow for immediate feedback and improvements to the analysis as it relates to specific stakeholders.

For the development of the preliminary business case for the project, the focus of stakeholder engagement includes:

- understanding of stakeholder perceptions of the service need, including updating from previous assessments, if required (i.e. what are the problems facing growers and look at ways to address the problems).
- market sounding considerations, including an assessment of demand for additional water from the project, to define the project
- consideration whether the project/s will provide equitable outcomes for stakeholders as part of the consideration of public interests, including identifying potential negative impacts of the project and their management and, where possible, adjusted to mitigate risks or realise opportunities
- identifying positive and negative social and other impacts as part of the social impact evaluation, including establishing a social impact baseline.

This process with stakeholders will allow us to:

- confirm the service need and identify demand for additional water from the project and how their requirements can be considered as part of a reference project/s in a detailed business case
- provide clear communication pathways throughout the project – gathering information and providing consistent, frequent communications
- ensure stakeholders are fully informed, understand the purpose of the preliminary business case and how they can provide meaningful input into the assessment process
- ensure outcomes of the preliminary business case have a high level of support and confidence from all stakeholders.

This plan is a living document and will be adjusted throughout the business case development according to the projects needs and stakeholder specifications.

7.1 KEY AREAS OF STAKEHOLDER ENGAGEMENT

Our stakeholder engagement will consider:

- Service need.
- Water demand assessment.
- Social impact evaluation.

7.1.1 Service need

We will confirm and update the service need and the approach to address the problem reflecting the preliminary business case findings. This is crucial, as that describes the drivers for the project and outcomes sought and somewhat describes the project's vision that must be considered when developing/undertaking:

- project design
- social impact evaluation
- economic analysis
- public interest considerations
- sustainability assessment
- environmental assessment.

Structured one-on-one interviews, group meetings and workshops with key stakeholders will include a specific component to obtain a greater level of understanding on the service need, especially to engage with those who have not actively participated during previous assessments.

The predominate activities to capture feedback on the service need will be through the Round 1 water demand assessment.

Also, insights will be captured from Traditional Owners, local council, existing water infrastructure operators and community groups through individual meetings and/or workshops as part of the social impact evaluation.

7.1.2 Water demand assessment

As part of the preliminary business case, a comprehensive water demand assessment (round 1 demand assessment) will be undertaken. This will involve comprehensive stakeholder engagement with potential water customers and will require the project team to have a good understanding of the soil type(s) within study area, plus other information that these stakeholders require to make an informed decision on their level of interest, such as reliability and cost of water.

The round 1 demand assessment captures demand based on initial discussions with current and prospective water users and is completed as part of the preliminary business case assessment. A subsequent round of demand assessment would typically be required as part of a detailed business case (subject to approval to proceed to a DBC and engagement of a suitable supplier of services). This subsequent stage would aim to test the 'true' level of interest or commitment to a new water supply.

Like all stakeholder engagements, there is a need to prepare appropriate information prior to the engagement. For the water demand engagement, it is critical that the information to be provided to potential water customers' needs to look professional and contain all the important information they require. The information documents will be developed early in the preliminary business case.

The information captured from this assessment forms part of the 'service need' component and is critical to the robustness of the PBC, as this provides the evidence of demand values used in the financial modelling.

The following is a summary of the engagement during the PBC with potential purchases of additional water from the project to assess their likely demand:

Round 1 – Expressions of Interest

- Development of an information document and non-binding expression of interest form for prospective water customers within the Clare Valley. This will include a range of capital and annual charge estimates, based on preliminary assessments.

A detailed engagement plan for the Round 1 demand assessment is included as Attachment 1.

This engagement process could be enhanced with further demand assessment letters of intent undertaken as part of a preliminary business case.

7.1.3 Social impact evaluation

Confirming the project's service need and investment logic map will capture current social issues and stakeholder vision for change. However, there is a requirement for additional engagement to focus on the social impacts and drill down to a much greater level of understanding.

A social impact evaluation captures the positive contributions the project makes to the local community and region and details any negative impacts, including mitigation actions required to minimise the negative impacts. Engagement with local groups, including potential customers, industry, state departments and council, will support this assessment.

Risks identified as a part of the social impact evaluation will be added to the Risk Register and managed accordingly.

Benefits identified will be added to the Stakeholder Benefits Register.

7.1.4 Summary of engagement activities

Table 6 provides an overview of the planned activities for the water demand assessment and other specific evaluations. More detailed engagement plans will be developed prior to that phase of the PBC assessment commencing (such as the detailed engagement plan for the Round 1 demand assessment – see Attachment 1). These detailed engagement plans will be provided to PIRSA for their review and comment, and for circulation to the Project Reference Group.

Table 6 Summary of engagement activities

Stakeholder entity	What	When	Why
Water demand assessment			
Potential customers	Round 1 demand assessment, including: Presentations/workshops One-on-one and small group meetings Customer follow-ups	Round 1 – February to April 2022	Designing a reference project which meets the needs of the customers that is technically and commercially feasible
Existing water providers (SA Water)	Participation in the Round 1 demand assessment through: Potential to leverage and integrate existing infrastructure and operations to deliver water to a broader range of customers in the Clare Valley Increasing awareness of the process to their customers Advocating for the requirements of their customers Providing comment on Round 1 demand assessment material through the Project Reference Group.	Direct engagement during February to April 2022 through the demand assessment process	Designing a reference project which meets the needs of the customers that is technically and commercially feasible
Lead industry bodies – CVWGA (Project Reference Group member)	Participation in the Round 1 demand assessment through: Increasing awareness of the process to their members Advocating for the requirements of their members Providing comment on Round 1 demand assessment material through the Project Reference Group.	Direct engagement during February to April 2022 through the demand assessment process	Designing a reference project which meets the needs of the customers that is technically and commercially feasible
Local councils and Regional Development Australia, Northern and Yorke Landscape Board, Clare and Gilbert Valley Council	Participation in the Round 1 assessment through considering other potential commercial and industrial uses for water to increase project scale	Direct engagement during February to April 2022 through the demand assessment process	Designing a reference project which meets the needs of the customers that is technically and commercially feasible

Stakeholder entity	What	When	Why
Social impact evaluation			
Potential customers	Participation in the Round 1 demand assessment and other industry forums outlining the potential benefits of additional water being made available (e.g. increased economic activity)	Direct engagement during February to April 2022 through the demand assessment process	Understanding the social impact to stakeholders through the development of the project
Lead industry bodies – CVWGA	Participation in the Round 1 demand assessment outlining the potential benefits of additional water being made available (e.g. increased economic activity)	Direct engagement during February to April 2022 through the demand assessment process	Understanding the social impact to stakeholders through the development of the project
Local councils and Regional Development Australia, Northern and Yorke Landscape Board, Clare and Gilbert Valley Council	Direct engagement (interview and / or workshops)	Direct February to June 2022 during the social impact evaluation	Understanding the social impact to stakeholders through the development of the project
Community groups	Direct engagement (interview and / or workshops)	February to June 2022 during the social impact evaluation	Understanding the social impact to stakeholders through the development of the project
Environmental impact evaluation			
Government departments including Department of Environment and Water, Environment Protection Agency, Northern and Yorke Landscape Board, etc.	Direct engagement (interview and / or workshops)	Direct engagement during February to June 2022 through the environment impact assessment process	Understanding the environmental impact to the environment through the development of the project including areas such as storage of water, interception of natural flows, groundwater extraction, etc.

7.2 ROLES AND RESPONSIBILITIES

In considering the communications and engagement roles and responsibilities:

- PIRSA will coordinate communications and engagement activities related to the involvement of government agencies including SA Water.
- KBR will provide information and a detailed engagement plan for the demand assessment to PIRSA for their approval. KBR will present information on the demand assessment to potential customers of the project, which may lead to further one-on-one or small group discussions.
- PIRSA will support any required liaison arrangements and support industry consultation throughout the project, as may be requested by KBR, the Project Reference Group and the Government.
- CVWGA will support PIRSA and KBR to identify and confirm stakeholders, review the stakeholder engagement plan, and to convey concise messaging to community.

All communications with the media require prior approval of the Minister for Primary Industries and Regional Development (or nominated representative) or Cabinet.

7.3 RISK MANAGEMENT STRATEGIES

It is important to understand and incorporate the view of all relevant stakeholders throughout the business case process. Ensuring adequate risk management strategies are included in engagement plan will mitigate the risk of not consulting and allow all stakeholders to feel they can give meaningful input to the assessment process.

The risks and mitigation controls identified in the stakeholder analysis have been added to the project risk register and managed collectively with all the other project risks. These risks are outlined in Table 7.

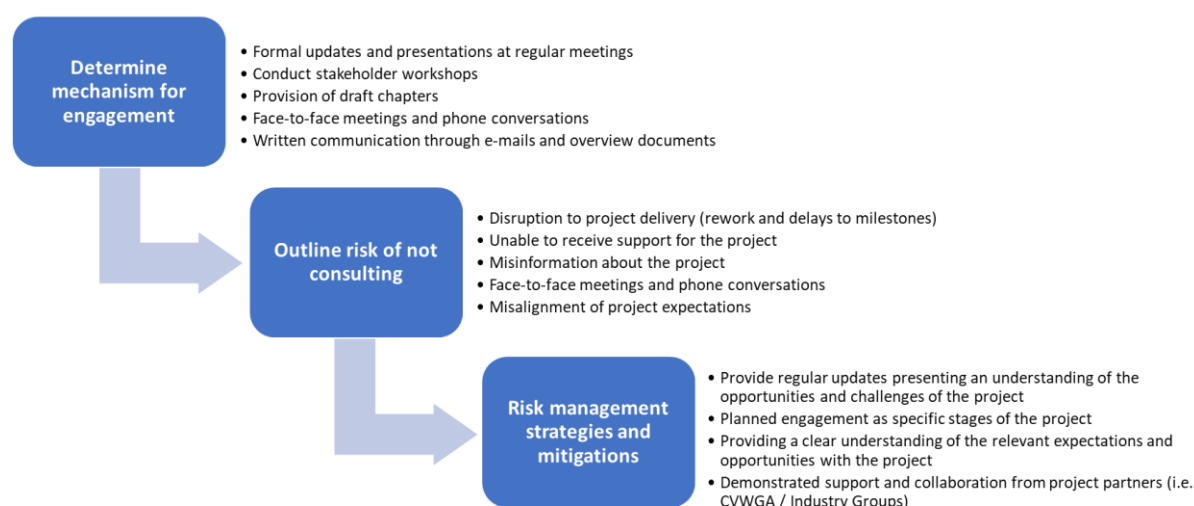
Table 7 Engagement risks and mitigation

Risk	Mitigation
Poor awareness or lack of interest undermines engagement and or feedback received.	Existing strong regional and industry awareness and advocacy about importance of new water infrastructure will help improve the efficiency and spread of key messages. Early positive engagement with staff and key stakeholders will help us identify risks and pathways to grow awareness and encourage engagement. Ongoing engagement through multiple channels including the PIRSA website and PIRSA's existing communication methods/networks, including through CVWGA, will help to keep stakeholders informed and manage expectations.
Similar projects in the region leads to confusion on what each project will deliver and result in poor understanding of the Project	Engaging directly with end customers of other schemes (e.g. SA Water investigations into its supply pipelines and reservoirs) to enable understanding of relative merits of the different projects Existing strong regional and industry awareness and advocacy about importance of new water infrastructure will help improve the efficiency and spread of key messages. Early positive engagement with key stakeholders will help us identify risks and pathways to grow awareness and encourage engagement. Ongoing engagement through multiple channels including the PIRSA website and PIRSA's existing communication methods/networks, including through CVWGA, will help to keep stakeholders informed and manage expectations.
Poor understanding of issues or complexities of project leads to non-compatible expectations, negative publicity or disregard for project outcomes.	Early engagement and communication with key stakeholders will help us identify risks and pathways to grow awareness and encourage engagement. Keeping messaging simple and reinforcing opportunities to engage will help prevent confusion or spread of misinformation. Establishing PIRSA as the single, trusted, and available source of information early will prevent misinformation or other negative sources of information undermining communications. Reinforcing key messages through multiple communication channels, including social media, and PIRSA existing network will help raise awareness. Media Monitoring by PIRSA will help PIRSA monitor public sentiment.
Delays to project delivery	Constant review and close management of the Project Plan and Engagement Strategy. Keeping key stakeholders and partners informed about progress at regular intervals will help manage expectations and prevent surprises. Being transparent and open in communication and timeline, including realistic timeframe for approvals will help manage expectations.

Risk	Mitigation
Limited budget restricts ability to communicate or encourage engagement/feedback	Existing strong regional and industry awareness and advocacy about importance of new water infrastructure to the region will help get the message out and communicate the key benefits. Identifying industry advocates and leaders can assist with industry trust and adoption of program. Learnings from other regional and rural campaigns will be employed and ensure cost-effective use of resources. Review of tools and tactics through evaluation during the project will help inform effectiveness of communications and allow for changes as the project progresses. Consider use of social media to contribute to the communication process.
Key stakeholders rescind support or voice disappointment, which leads to negative publicity.	Early engagement with and key stakeholders will help us identify risks and pathways to grow awareness and encourage engagement. Targeting groups who are experienced/familiar with water infrastructure projects, engaging with government can assist conversations around this issue, and identify ways to communicate benefits. Ongoing engagement through multiple channels – including the PIRSA website and PIRSA's existing communication methods/networks, including through CVWGA, will help to keep stakeholders informed and manage expectations. Media Monitoring by PIRSA will help PIRSA monitor public sentiment.

Table 8 outlines a summary of some key methods for managing stakeholder risks.

Table 8 Method for managing stakeholder risks



7.4 IMPACT OF COVID 19

The impacts of COVID-19 to engaging with stakeholders will be monitored through the preliminary business case process. Travel restrictions may prevent in-person and on-site meetings with stakeholders and some of the methods of consultation with the stakeholders may have to be amended or engagement delayed.

The changes to the plan resulting from potential impacts from COVID-19 may include:

- Planned and scheduled meetings for the demand assessment reschedules or undertaken via telephone or videoconference.
- Public information sessions reverted from one large gathering to several smaller gatherings requiring an RSVP to adhere to social distancing measures.
- All engagements with stakeholders during any travel restriction period to be undertaken by teleconference or videoconferencing, including client and steering committee meetings, consultation with government departments, discussions with potential customers and meetings with other stakeholders.

7.5

PRIVACY

KBR acknowledge the importance of protecting personal information collected as part of the stakeholder engagement process and will comply with Privacy Act 1998 (Cth) (Privacy Act).

7.6 DETAILED STAKEHOLDER ENGAGEMENT PLAN

Table 9 provides a detailed stakeholder engagement plan for the delivery of the preliminary business case for the Clare Valley project.

Table 9 Detailed stakeholder engagement plan

Rank	Stakeholder entity	Interest level	Influence level	Score	Proposed mechanism and actions	Engagement Plan (frequency and timing)	Risk of not consulting (or risk of consulting)	Risk management strategies
=1	Lead state agencies	H	H	12	Regular direct communication Invites to public meetings and other key discussions	Monthly or more frequent if required Ad hoc discussions on key matters	Disruption to project delivery Rework and delays to milestones Misinformation about the project Misalignment of project expectations	Ongoing constructive communication Share initial findings and seek feedback
=1	Steering Committee and Project Reference Groups	H	H	12	Formal updates and presentations at fortnightly and monthly meetings Provision of draft chapters Invited to stakeholder workshops	Formal fortnightly and monthly updates Ad hoc discussions on key matters Draft and Final chapters as per project plan	Disruption to project delivery Rework and delays to milestones Misinformation about the project Misalignment of project expectations	Ongoing constructive communication Share initial findings and seek feedback on draft PBC by chapter
=1	Potential customers	H	H	12	Regular communication through face-to-face meetings and phone conversations Invited to stakeholder workshops Supported with written communication through e-mails and overview documents	Direct communications throughout project On an as-needs basis for specific matters	Lack of project support Not delivering a project that meets customer requirements Misinformation about the project	Regular engagement on the opportunities identified through the project Continuous engagement to gather input and response to proposed initiatives Expression of Interest responses provided direct to KBR

Rank	Stakeholder entity	Interest level	Influence level	Score	Proposed mechanism and actions	Engagement Plan (frequency and timing)	Risk of not consulting (or risk of consulting)	Risk management strategies
=1	Existing water providers (SA Water)	H	H	12	Formal updates and regular presentations via the Project Reference Group Invited to all stakeholder workshops Supported with written communication through emails and overview documents	Direct communications throughout project On an as-needs basis for specific matters	Lack of project support Not delivering a project that meets customer requirements Misinformation about the project	Ongoing constructive communication Regular engagement on the opportunities identified through the project Continuous engagement to gather input and response to proposed initiatives
=1	Lead industry bodies – CVWGA	H	H	12	Invitation to participate in workshops Regular contact with updates of the project and potential impacts to industry and community	Regular contact or more frequent when providing an update on the progress of the project.	Disruption to project delivery Potential to be obstructive towards any future initiatives Misinformation about the project	Regular and honest engagement on the process and potential impacts Involvement in the process
=6	Landholders	H	M	9	Invitation to participate in workshops Regular contact with updates of the project and potential impacts to property	Regular contact or more frequent when providing an update on the progress of the project.	Disruption to project delivery Potential to be obstructive towards any future initiatives Misinformation about the project	Regular and honest engagement on the process and potential impacts Involvement in the process

Rank	Stakeholder entity	Interest level	Influence level	Score	Proposed mechanism and actions	Engagement Plan (frequency and timing)	Risk of not consulting (or risk of consulting)	Risk management strategies
=6	Traditional owners/ Aboriginal cultural heritage	H	M	9	Direct and meaningful engagement on matters of interest Specific communication and site visits for specific project events during DBC phase (e.g. when ground truthing and investigations undertaken) Collaboration on opportunities	Early engagement to develop plan and agreements As defined in plan or on an as-needs basis on specific matters	Disruption to project delivery Potential to be obstructive towards the project	Regular and meaningful engagement Engaging during potentially sensitive stage of the project (during and post-detailed business case phase)
=6	State Member for Wakefield	H	M	9	Formal updates and regular presentations Invited to stakeholder workshops Supported with written communication through e-mails and overview documents	Direct communications throughout project On an as-needs basis for specific matters	Lack of project support Not delivering a project that meets customer requirements Misinformation about the project	Ongoing constructive communication Regular engagement on the opportunities identified through the project Continuous engagement to gather input and response to proposed initiatives
=6	Local councils	M	H	8	Formal updates and regular presentations Invited to stakeholder workshops Supported with written communication through e-mails and overview documents	Direct communications throughout project On an as-needs basis for specific matters	Lack of project support Not delivering a project that meets customer requirements Misinformation about the project	Ongoing constructive communication Regular engagement on the opportunities identified through the project Continuous engagement to gather input and response to proposed initiatives

Rank	Stakeholder entity	Interest level	Influence level	Score	Proposed mechanism and actions	Engagement Plan (frequency and timing)	Risk of not consulting (or risk of consulting)	Risk management strategies
=9	Other State departments, authorities, and corporations	M	H	8	Regular updates on project status Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	Regular project updates On an as-needs basis for specific matters	Disruption to project delivery Rework and delays to milestones Misinformation about the project Misalignment of project expectations	Providing regular updates and presenting an understanding of the opportunities and challenges of the project
=9	Commonwealth departments and authorities	M	H	8	Regular updates on project status via South Australian departments Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	Regular project updates by PIRSA On an as-needs basis for specific matters	Disruption to project delivery Rework and delays to milestones Misinformation about the project Misalignment of project expectations	Providing regular updates and presenting an understanding of the opportunities and challenges of the project
=9	Commonwealth Departmental Ministers	M	H	8	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	Regular project updates by PIRSA On an as-needs basis for specific matters	Disruption to project delivery Misinformation about the project Misalignment of project expectations	Providing regular updates and presenting an understanding of the opportunities and challenges of the project
=9	Commonwealth elected representative for Grey	M	H	8	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	Regular project updates On an as-needs basis for specific matters	Disruption to project delivery Misinformation about the project Misalignment of project expectations	Providing regular updates and presenting an understanding of the opportunities and challenges of the project

Rank	Stakeholder entity	Interest level	Influence level	Score	Proposed mechanism and actions	Engagement Plan (frequency and timing)	Risk of not consulting (or risk of consulting)	Risk management strategies
=9	State Premier and Departmental Ministers	M	H	8	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	Regular project updates On an as-needs basis for specific matters	Disruption to project delivery Misinformation about the project Misalignment of project expectations	Providing regular updates and presenting an understanding of the opportunities and challenges of the project
=9	State elected representatives (other than member for Wakefield)	M	H	8	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	Regular project updates On an as-needs basis for specific matters	Disruption to project delivery Misinformation about the project Misalignment of project expectations	Providing regular updates and presenting an understanding of the opportunities and challenges of the project
=16	Regional Development Australia, Clare and Gilbert Valley Council	M	M	6	Invited to stakeholder workshops Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	On an as-needs basis on specific matters (e.g. public interest and social assessment)	Misinformation about the project Misalignment of project expectations	Engagement at specific stages of the project
=16	Community groups	M	M	6	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	On an as-needs basis on specific matters (e.g., public interest and social assessment)	Misinformation about the project Misalignment of project expectations	Engagement at specific stages of the project
=16	Potential contractors, operators, and project partners	M	M	6	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	On an as-needs basis on specific matters	Lack of interest or readiness for project Misinformation about the project	Engagement at specific stages of the project Providing a clear understanding of the relevant expectations and opportunities with the project

Rank	Stakeholder entity	Interest level	Influence level	Score	Proposed mechanism and actions	Engagement Plan (frequency and timing)	Risk of not consulting (or risk of consulting)	Risk management strategies
=16	Other industry peak bodies	M	M	6	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	On an as-needs basis on specific matters	Lack of interest or readiness for project Misinformation about the project	Engagement at specific stages of the project Providing a clear understanding of the relevant expectations and opportunities with the project
=16	Media (local, regional media)	M	M	6	Regular updates on project status Specific updates on project milestones and matters of interest	On an as-needs basis on specific matters	Misinformation about the project Misalignment of project expectations	Providing regular updates and presenting an understanding of the opportunities and challenges of the project
=21	Environmental groups	M	L	4	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	On an as-needs basis on specific matters	Misinformation about the project Misalignment of project expectations	Engagement at specific stages of the project
=21	Local business	M	L	4	Specific and direct engagement on matters of interest and/or areas requiring feedback and guidance	On an as-needs basis on specific matters	Disruption to project delivery Lack of interest or readiness for project Misinformation about the project	Engagement at specific stages of the project Providing a clear understanding of the relevant expectations and opportunities with the project

Attachment 1 – Round 1 Demand Assessment Engagement Plan

Clare Valley Preliminary Business Case

A scenic landscape of the Clare Valley, Australia, featuring rolling green hills, rows of vineyards, and a clear blue sky with some clouds. The foreground shows a lush green field with a small stream or ditch. The background includes distant hills and a line of trees.

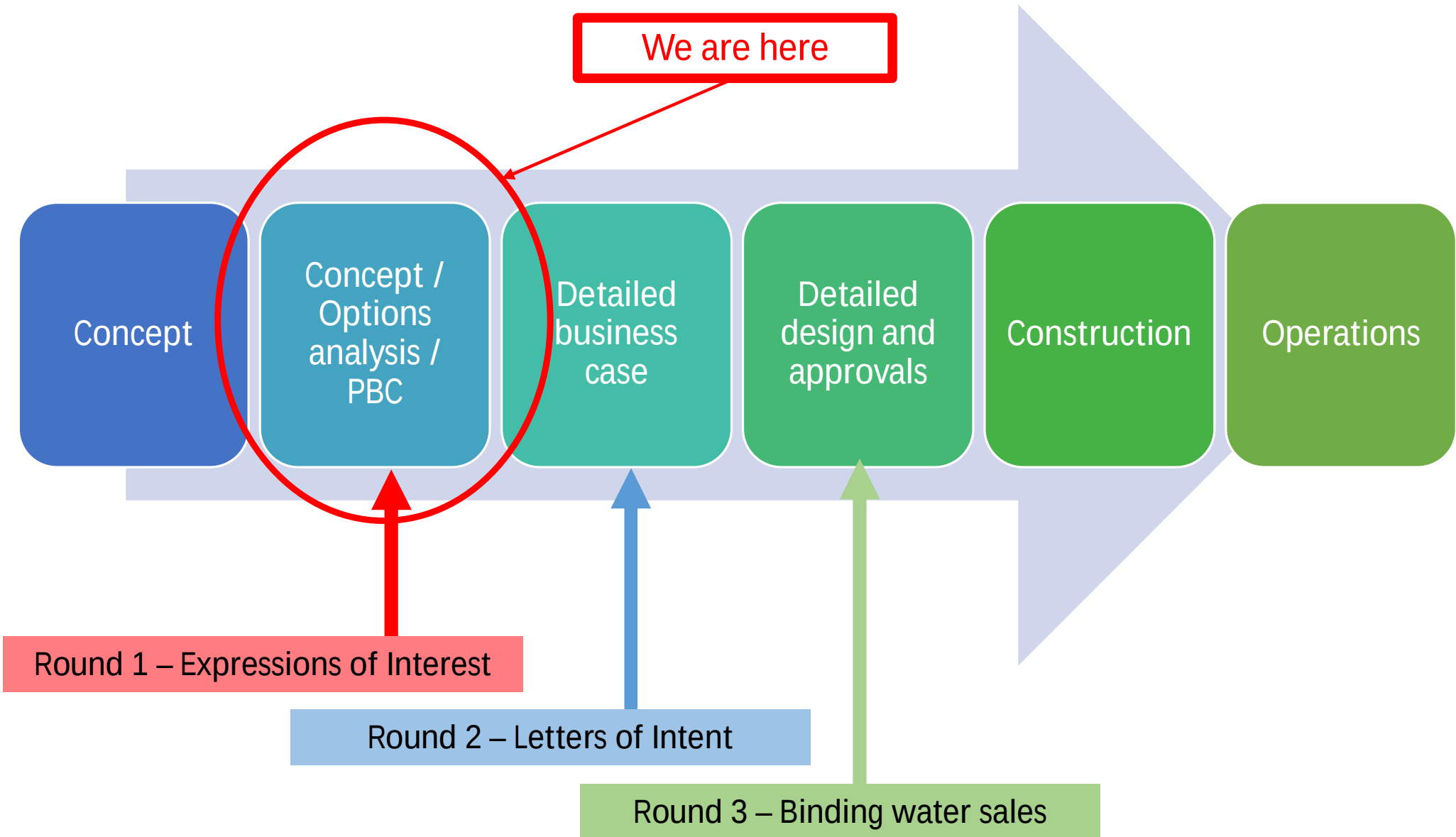
Demand assessment engagement plan

25 February 2022

Demand assessment engagement plan

- Detail around key aspects of the demand assessment for the Clare Valley preliminary business case (PBC)
- Objective of the demand assessment
 - Understand potential customers true level of interest and commitment through a commercially-focused process to develop a preferred option/s
- The outcome will be a reference project/s that maximises the benefits of the project through best meeting customers needs to underpin and grow their businesses
- These reference project/s may required further consideration as part of a detailed business case
- Potential customers include those who would like to access additional water in the Clare Valley—whether those are existing water users or new water users (incl. existing customers of SA Water) and wine grape and non-wine grape growers.

Our project delivery method is demand led



Three-stage demand process

Round 1 – Expressions of Interest

Non-binding

Range of customer capital contributions (various levels of grant funding)
Range of fixed and variable annual charges (no subsidy)

Consideration of water product – reliability, delivery period and quality

Location of demand to refine design and price estimates for Round 2 in detailed business case

Round 1 – Expressions of Interest

Key questions asked in Expression of Interest form and interviews:

- How much water would you purchase at different price ranges (ML per annum) and Water product characteristics?
 - Capital contribution and annual charges
 - Water quality
 - Delivery period
 - Reliability and security
- Where do you need the additional water delivered (Property location)?
- What are you going to be using the water for (types of crops etc.)?
- What additional on-farm investment is required to use the additional water?
- What activities (if any) would you be forgoing through applying the additional water?
- Would you be replacing existing sources of water? Or is this additional water?

Other questions:

- On-farm support (from an industry development perspective) – do potential water customers need to fully maximise economic opportunities?
- Options for additional questions to be added if requested

Engagement activities – February 2022

Week commencing	Demand assessment activities	Key parties	Other information
7 February	- Immersion 1 - Initial 'listen and learn' discussions with larger water users in the Clare Valley - Understanding what is the problem - Invitations to presentation circulated	- KBR - Potential customers - Clare Valley Wine and Grape Association (CVWGA) - Project Reference Group (PRG)	Initial discussions with key stakeholders – SA Water, DEW, PIRSA
14 February	- Follow up phone calls from Immersion 1 - Preparation for water information session - Initial investment logic mapping – understanding what the problems / opportunities are? What are potential solutions?	- KBR - Potential customers - CVWGA - PRG	
21 February	- Immersion 2 - Water information session - Addition 'listen and learn' discussions with small to medium water users in the Clare Valley	- KBR - Potential customers - CVWGA - PRG	Tuesday 22 February – Water Information Session, The Valleys Lifestyle Centre
28 February	- Follow up phone calls from Immersion 2 - Update investment logic mapping – understanding what the problems / opportunities are? What are potential solutions?	- KBR - Potential customers - CVWGA - PRG	

Engagement activities – March 2022

Week commencing	Demand assessment activities	Key parties	Other information
7 March	- Finalise investment logic mapping – understanding what the problems / opportunities are? What are potential solutions? - Develop of options long-list to address problems - Consider potential price ranges for additional water - Commence preparation of demand assessment presentation and Round 1 expression of interest form	- KBR - Potential customers - CVWGA - PRG	
14 March			
21 March			
28 March			

Engagement activities – April 2022

Week commencing	Demand assessment activities	Key parties	Other information
4 April	- Preparation of demand assessment presentation and Round 1 expression of interest form - Invitations to presentation circulated	- KBR - CVWGA - PSC	
11 April	Review of demand assessment presentation and Round 1 expression of interest form	- KBR - CVWGA - PSC	
18 April	Round 1 demand assessment kick-off and presentations	- KBR - Potential customers - CVWGA - PRG	- Water Meeting 1 – 12 April 2022, 10am to 12pm , The Valleys Lifestyle Centre (TBC) - Water Meeting 2 – 12 April 2022, 5pm to 7pm , The Valleys Lifestyle Centre (TBC)
25 April	- Circulate Round 1 expression of interest information - Follow up discussions with key potential customers following presentations	- KBR - Potential customers - CVWGA	

Engagement activities – May 2022

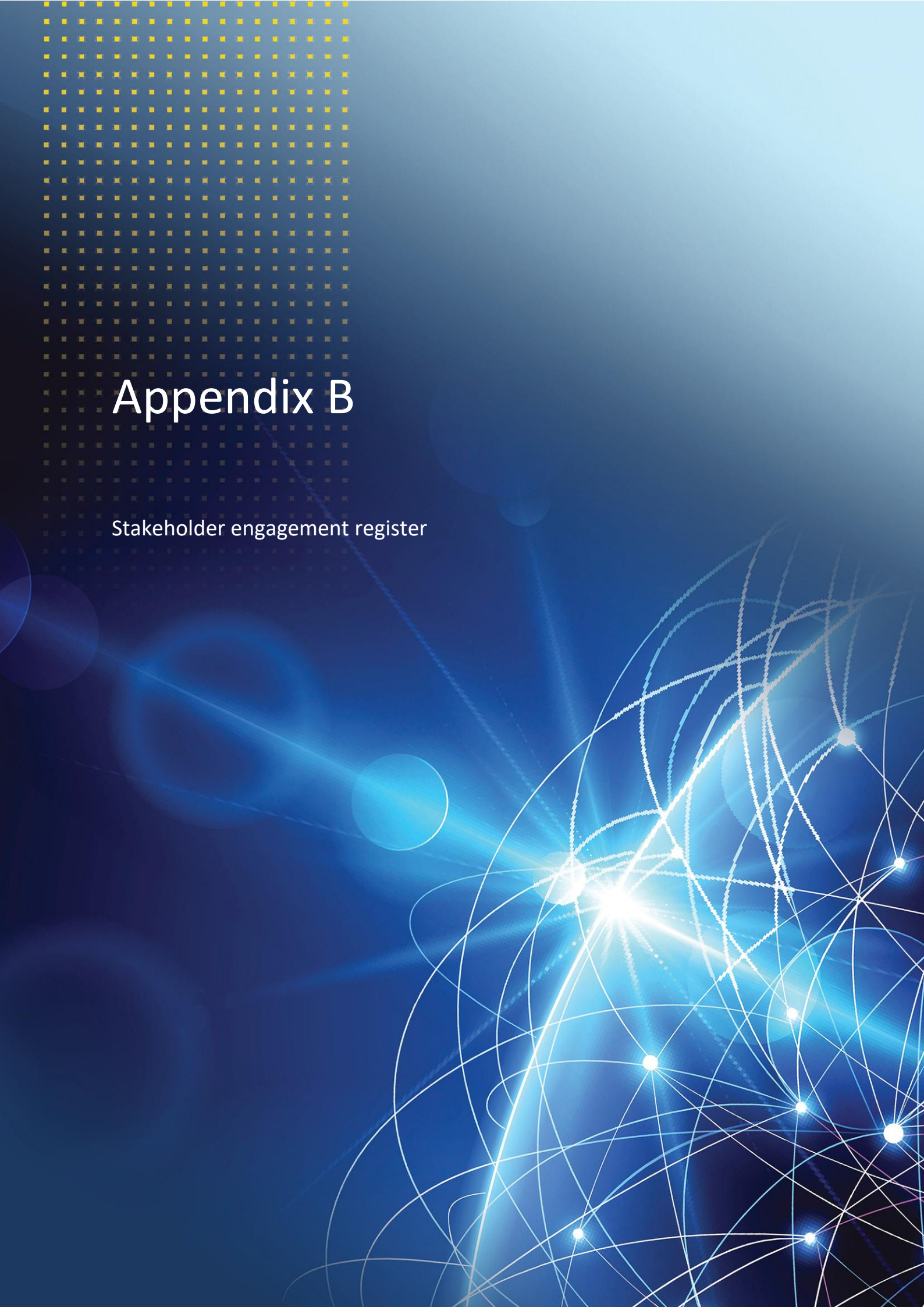
Week commencing	Demand assessment activities	Key parties	Other information
2 May	- Follow up any forms not received or further questions on demand - Prepare Round 1 demand assessment report	- KBR - CVWGA - PSC	
9 May	- Follow up any forms not received or further questions on demand - Prepare and finalise draft Round 1 demand assessment report	- KBR - CVWGA - PSC	
16 May	Review and finalisation of the Round 1 demand assessment report	- KBR - CVWGA - PSC	
23 May	Review and finalisation of the Round 1 demand assessment report	- KBR - CVWGA - PSC	
30 May	- Review and finalisation of the Round 1 demand assessment report - Update to Clare Valley potential customers on Round 1 results	- KBR - Potential customers - CVWGA - PSC	

Round 1 – Demand Assessment

Monday 11 April to Wednesday 13 April 2022
(to be confirmed – avoid clash with vintage)

Water Meeting 1
12 April 2022, 10am to 12pm
The Valleys Lifestyle Centre

Water Meeting 2
12 April 2022, 5pm to 7pm
The Valleys Lifestyle Centre



Appendix B

Stakeholder engagement register



Clare Valley Water Preliminary Business Case

Appendix B – Stakeholder engagement register

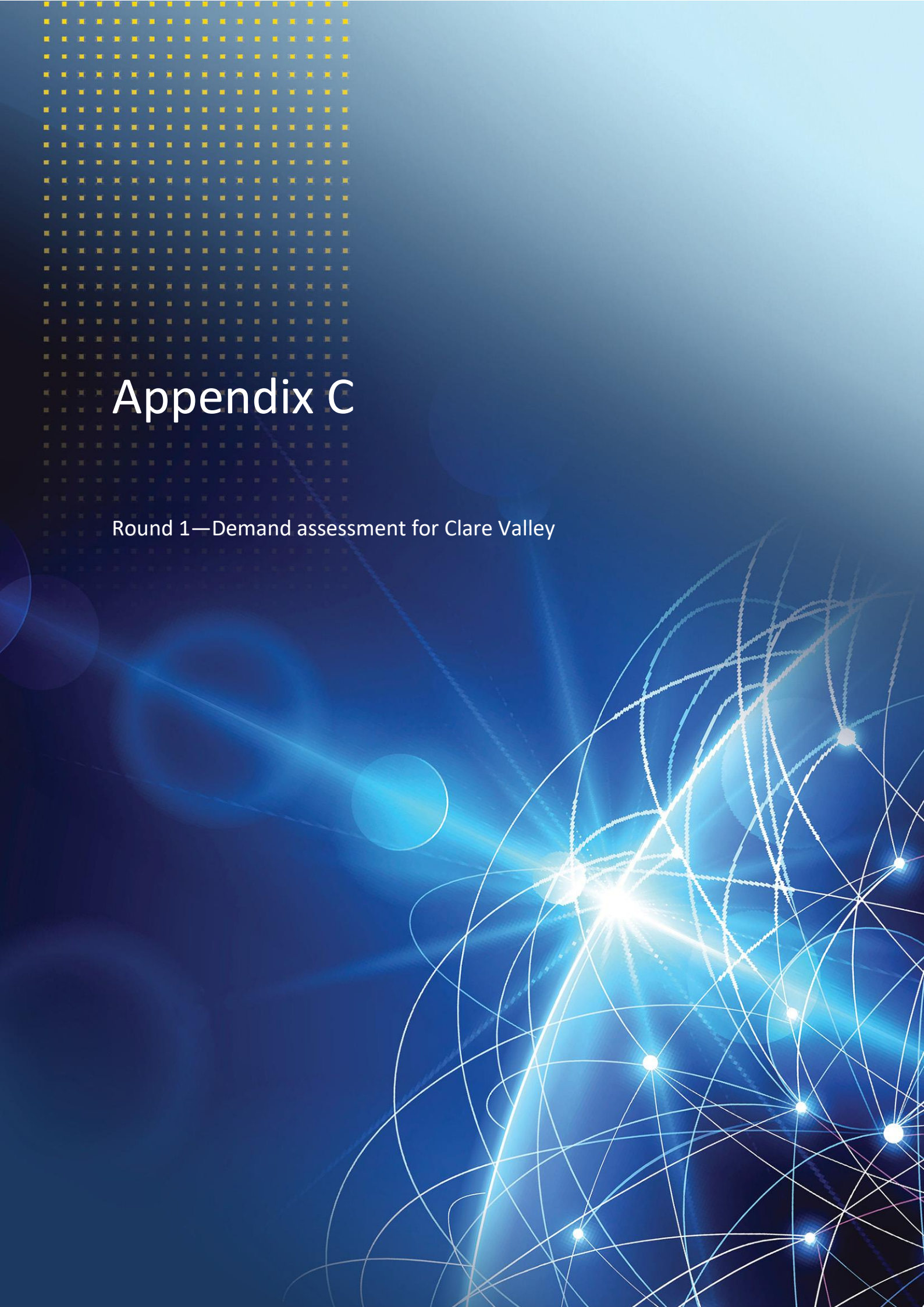
APPENDIX B – STAKEHOLDER ENGAGEMENT REGISTER

The stakeholder engagement register has been developed to provide a summary of key activities and findings arising from engagement with key stakeholders. The method of documentation for this project is in accordance with the stakeholder engagement plan.

The register contains record of all stakeholders, contacts, dates of engagement with comments or summarised key findings and will be updated through the delivery of the preliminary business case (PBC).

Table 1 Stakeholder engagement register

Stakeholder entity	Stakeholder Group	Participants	Activity and date	Engagement objective	Summary of key findings
Potential customers	Potential customers	Angus MacDonald - KBR Luke Curtain - KBR Andrew Newman - KBR Nick Smith - KBR Cameron Smith – KBR Potential customers and community members	Face-to-face discussions (Clare region) 7 - 9 February 2022 (Immersion 1) 21 - 23 February 2022 (Immersion 2)	Service need: Providing background on the project and the Round 1 demand assessment to potential customers and landholders in the region who may require additional water. Understand the opportunities that additional water could present and to identify existing problems in the region.	Some expressed a strong interest in growing their enterprise (predominately grape growing) and/or substituting existing sources of water which are either unreliable and/or reducing quality. Both matters require accessing additional water. There was a preference for a climate-independent solution - however, of more important was for this water to be affordable.
Potential customers	Potential customers	Angus MacDonald - KBR Luke Curtain – KBR Potential customers, landholders and community members	Water information presentation (Clare) 22 February 2022	Service need, public interest, and sustainability: Public meeting to provide an update on: - the status of the project - introduction of the preliminary business case project team - outline of next steps, including the demand assessment process with industry - areas of investigations and opportunities for engagement - expected preliminary business case and project timeframes.	The community was enthusiastic about a commercial-led approach to assessing the project. - Recognised the challenges around native water sources and the expense of importing water into the region. Complementary of SA Water and their operation of the CVWSS. - Some expressed desire for a climate-independent solution. Some were concern whether these options would be affordable and the expected reliability of the River Murray was suitable at the moment.
Potential customers	Potential customers	Angus MacDonald - KBR Luke Curtain – KBR Potential customers and community members	Five Round 1 demand presentations (Clare Valley region) 12 April, 13 April, 3 May and 4 May 2022 Phone and follow up conversations occurred throughout April and May 2022.	Provide a project update and start the Round 1 Demand Assessment process. New information presented incl.: - Final Round 1 demand assessment process and form - Key information requested, why it is important and how it will be used - Price ranges for expressing demand, both up-front capital and annual charges - Next steps.	Strong interest in participation of Round 1. Process and additional information were well received and was important to provide context for the Round 1 process. Important matters was scale and the sufficient demand provides the best chance for a pipe extension.



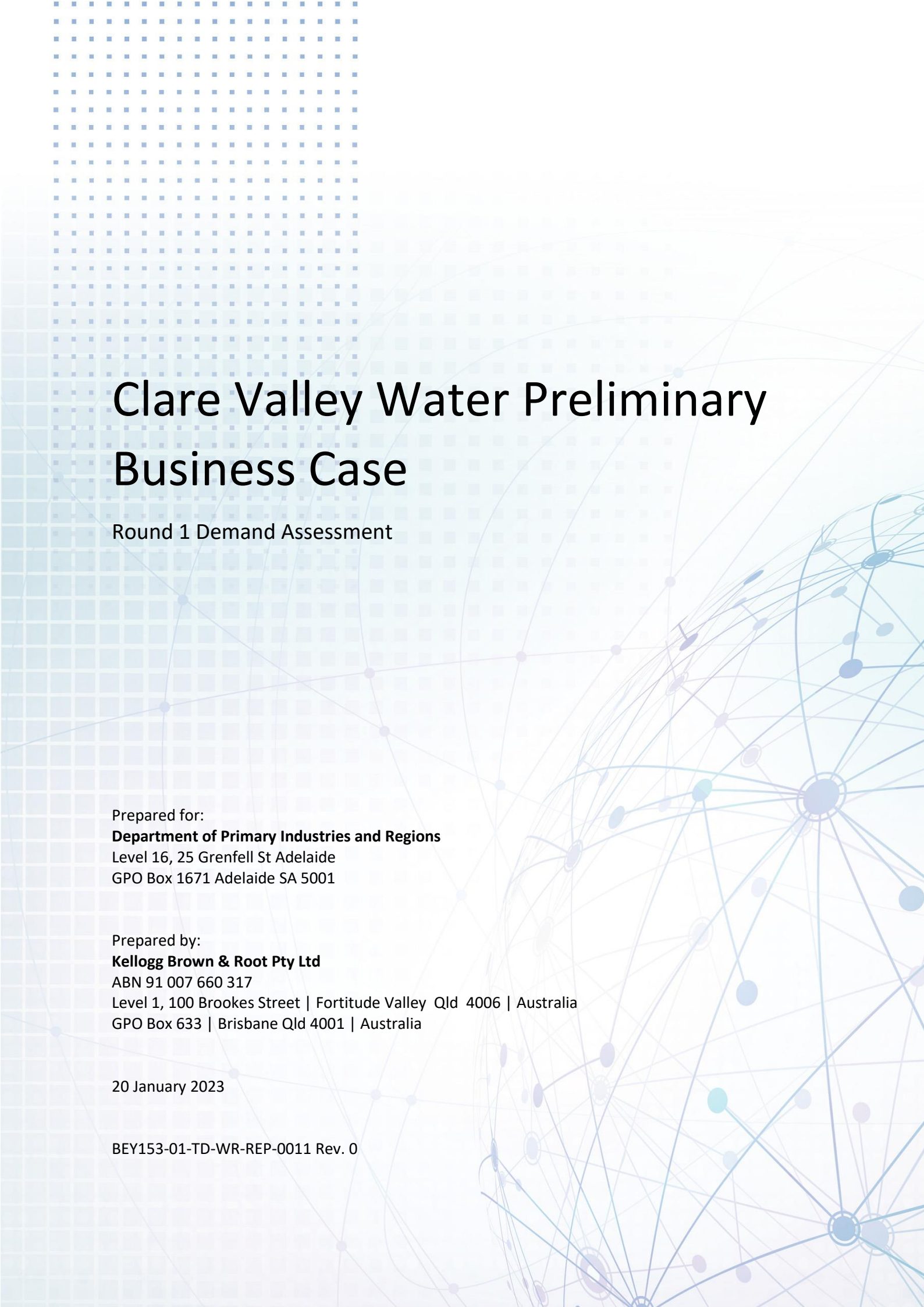
Appendix C

Round 1—Demand assessment for Clare Valley



Clare Valley Water Preliminary Business Case

Round 1 Demand Assessment



Clare Valley Water Preliminary Business Case

Round 1 Demand Assessment

Prepared for:
Department of Primary Industries and Regions
Level 16, 25 Grenfell St Adelaide
GPO Box 1671 Adelaide SA 5001

Prepared by:
Kellogg Brown & Root Pty Ltd
ABN 91 007 660 317
Level 1, 100 Brookes Street | Fortitude Valley Qld 4006 | Australia
GPO Box 633 | Brisbane Qld 4001 | Australia

20 January 2023

BEY153-01-TD-WR-REP-0011 Rev. 0

Limitations Statement

The sole purpose of this report and the associated services performed by Kellogg Brown & Root Pty Ltd (KBR) is to provide advice in accordance with the scope of services set out in the contract between KBR and **Department of Primary Industries and Regions** ('the Client'). That scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

KBR derived the data in this report primarily from information provided by industry during the Round 2 demand assessment process. The passage of time, manifestation of latent conditions or impacts of future events may require further exploration at the site and subsequent data analysis, and re-evaluation of the findings, observations and conclusions expressed in this report.

In preparing this report, KBR has relied upon and presumed accurate certain information (or absence thereof) provided by government officials and authorities, the Client and others identified herein. Except as otherwise stated in the report, KBR has not attempted to verify the accuracy or completeness of any such information.

No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions expressed in this report.

This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in connection with the provisions of the agreement between KBR and the Client. KBR accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

Revision History

Revision	Date	Comment	Originated by	Checked by	Technical Approval	Project Approval
0	20 January 2023	Issued for Use – Final PBC	Angus MacDonald	Luke Curtain	Matt Bradbury	Phil Staniford
			 Digitally signed by Angus MacDonald Date: 2023.01.20 11:22:11 +1000		 Matt Bradbury 2023.01.24 08:24:22 +1000	

Contents

Section	Page
CONTENTS	0
1 EXECUTIVE SUMMARY	1
2 PROJECT OVERVIEW	5
2.1 Purpose	5
2.2 Project scope	5
2.3 Nationally endorsed demand assessment process	5
3 ROUND 1 DEMAND ASSESSMENT OVERVIEW	6
3.1 Important information in Round 1 Expression of Interest form	6
3.2 Round 1 questionnaire	8
4 ENGAGEMENT METHODOLOGY	10
4.1 PRE-Round 1 Demand Assessment - Immersion	10
4.2 Round 1 Demand Assessment – Part 1 & 2	10
4.3 Post Round 1 Demand Assessment – Follow-up	10
4.4 Summary	10
5 ROUND 1 RESULTS – DATA AND ANALYSIS	12
5.1 Overview	12
5.2 Round 1 participation	12
5.3 Question 2 – Current enterprises	12
5.4 Question 3 & 4 – Do you have a winery and if so What size is your winery?	14
5.5 Question 5 – Volume and sources of current irrigation or other water use	15
5.6 Question 6 to 8 – Substitution demand	16
5.7 Question 9 to 11 – Growth demand	17
5.8 Total demand	18
5.9 Optimising customer capital revenue	22
5.10 Willingness to pay of wine and grape section only	24
5.11 Question 12 – Delivery location for network design.	25
5.12 Question 13 – Inputs to economic assessment	26
5.13 Question 14 – Preferred water quality option	28
5.14 Questions 15 to 20 – Water delivery and storage questions	29
5.15 Questions 21 to 22 – Other questions	31

1 Executive summary

The purpose of this report is to outline the process and findings of the Round 1 demand assessment completed for the Clare Valley Water (CVW) Preliminary Business Case (PBC).

1.1 METHOD

KBR generally undertakes the following three phases of demand assessment using a nationally endorsed approach:

- Round 1 – Expressions of Interest (non-binding) – the subject of this report
- Round 2 – Letters of Intent (non-binding) – usually completed as part of a future DBC
- Round 3 – Water Sales – Legally binding water sales with customer capital contributions.

This approach demonstrates ‘skin in the game’ from customers and allows government to make a capital investment with a high degree of confidence that the project will succeed, and the forecast economic benefits arising from that investment will be realised for the benefit of the community.

As part of the PBC a long list of potential supply options has been developed. There is no preferred option at this stage. The process will identify the best supply option/s that meet demand.

The preliminary business case is deliberately demand led. No engineering has been done. Decisions on supply options come after Round 1 demand.

1.2 ENGAGEMENT

Round 1 demand assessment included two immersion phases that focussed on understanding the service need and the existing approach to price, water quality and enterprise mix. The phases were:

- Immersion 1: 7 to 10 February 2022 – Focus on larger water users and/or those connected to the Clare Valley Water Supply Scheme
- Immersion 2: 21 to 24 February 2022 – Focus on smaller water users and/or those not connected to the Clare Valley Water Supply Scheme.

Findings from 40 immersion interviews were incorporated in the demand assessment that followed.

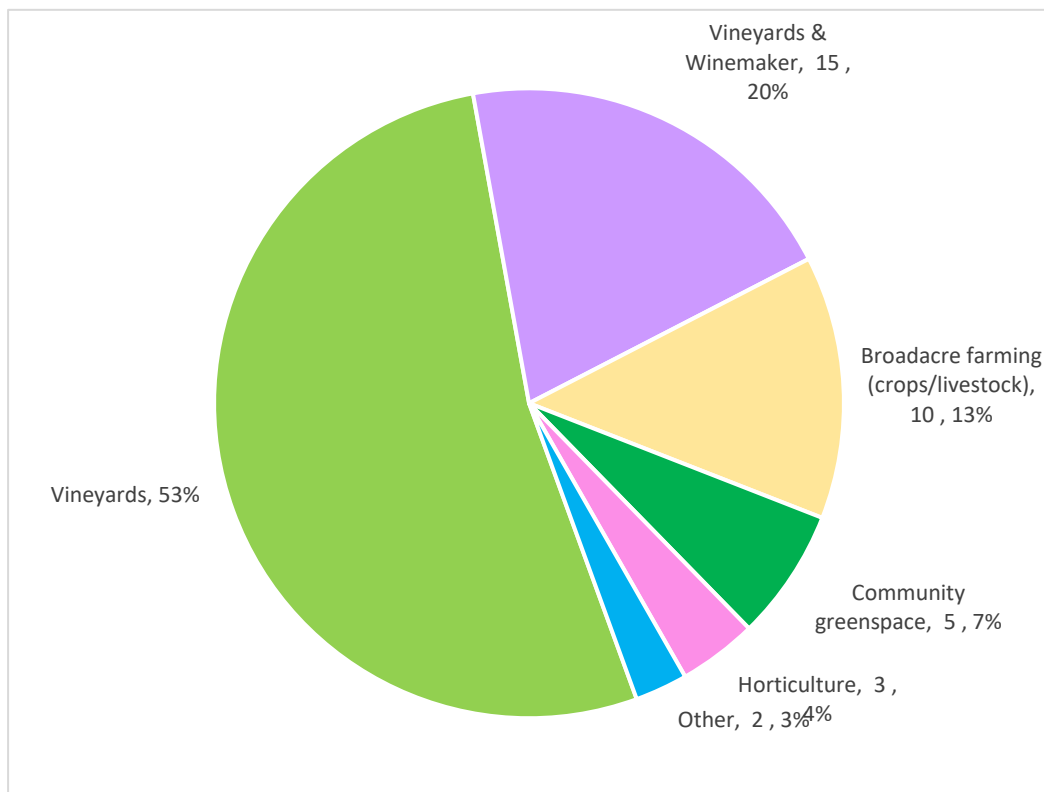
Round 1 demand assessment included a two rounds of industry meetings that focussed on explaining the phased demand assessment process, the demand led PBC, and prices and types of demand sought (substitution and growth demand). The stages were:

- Round 1 Industry Meeting 1: 11-14 April 2022 – Two public meetings in Clare
- Round 1 Industry Meeting 2: 3 to 4 May 2022 – Three public meetings in Clare Valley and surrounds (Manoora, Spalding and Balaklava).

As part of promoting each meeting, the Clare Valley Wine and Grape Association used its mailing list and other farming networks and advertising in local newspapers.

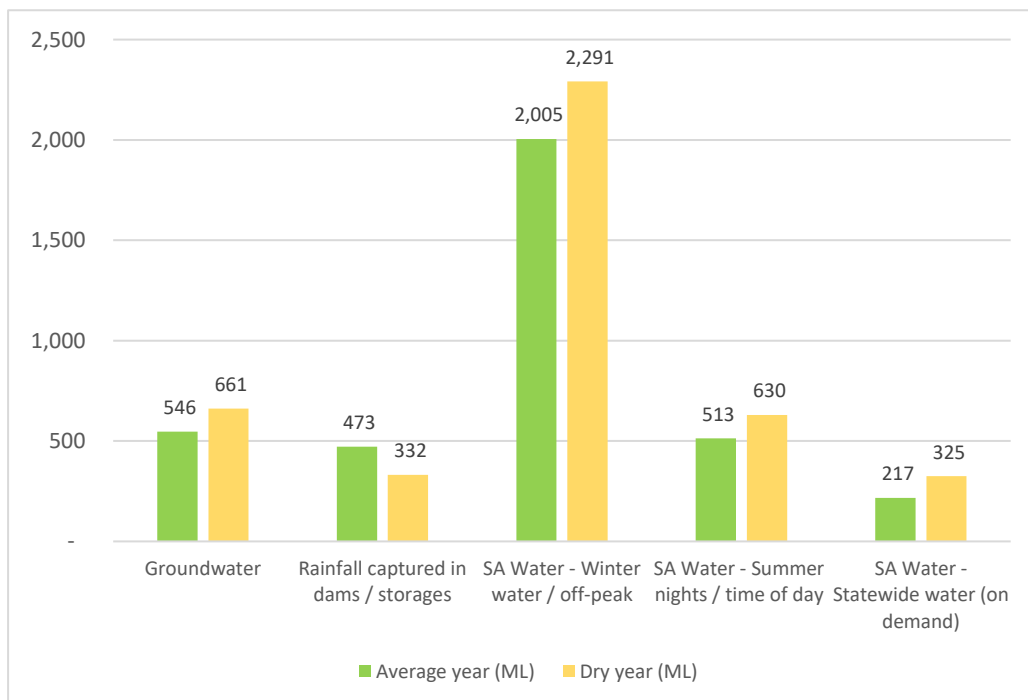
1.3 RESULTS

More than seventy (74) expressions of interest were received from potential customers for new water representing 140 properties. The following figure depicts respondent enterprises, which included grape growers, wine makers and other sectors in the Clare Valley.

Figure 1 Number and portion of enterprises by category

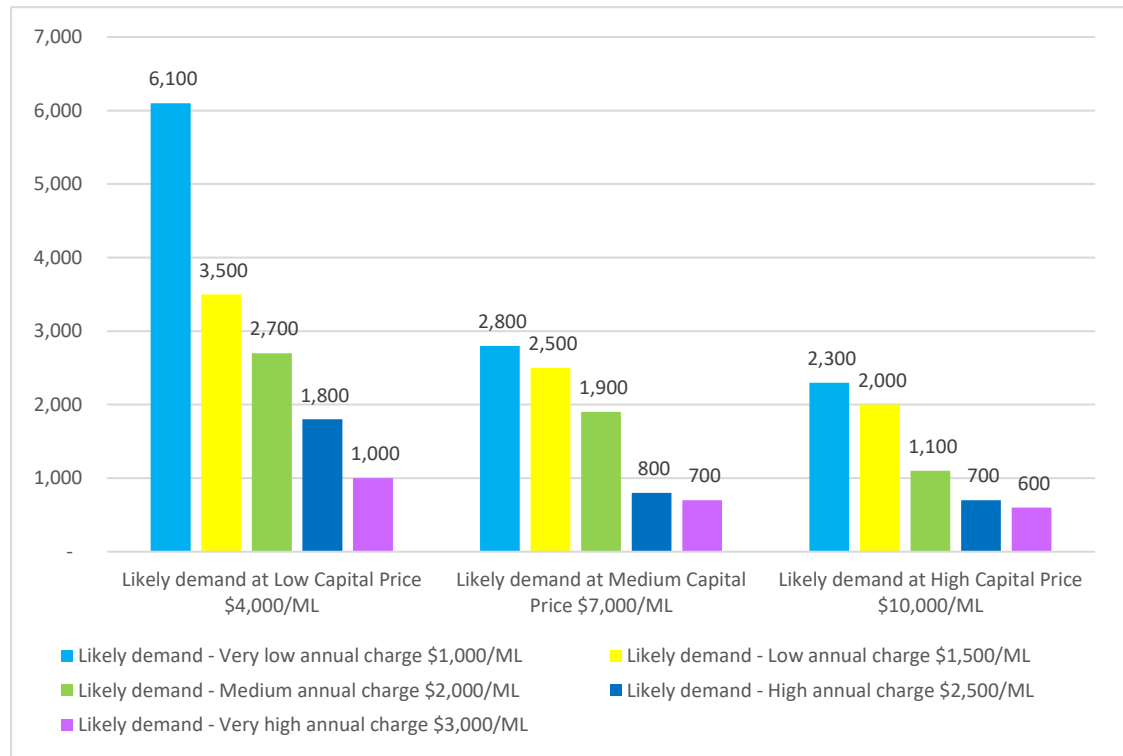
Of the 5,000 ha of vineyards in Clare Valley, responses were received from 54 wine and grape businesses owning or controlling 3,350 ha or two thirds (67%) of Clare Valley vines. There were 15 wineries among respondents.

Potential customers were asked to estimate volumes of current water use under average and dry conditions by source. The relative volumes are depicted in the following figure.

Figure 2 Average versus dry year respondent existing water use by source (ML)

The following figure provides a summary of total likely demand for new water at different prices.

Figure 3 Likely demand for new water at different prices – Capital price focus (ML)



The same likely total demand is presented below focussing on annual charges (and capital prices).

Figure 4 Likely demand for new water at different prices – Annual charge focus (ML)

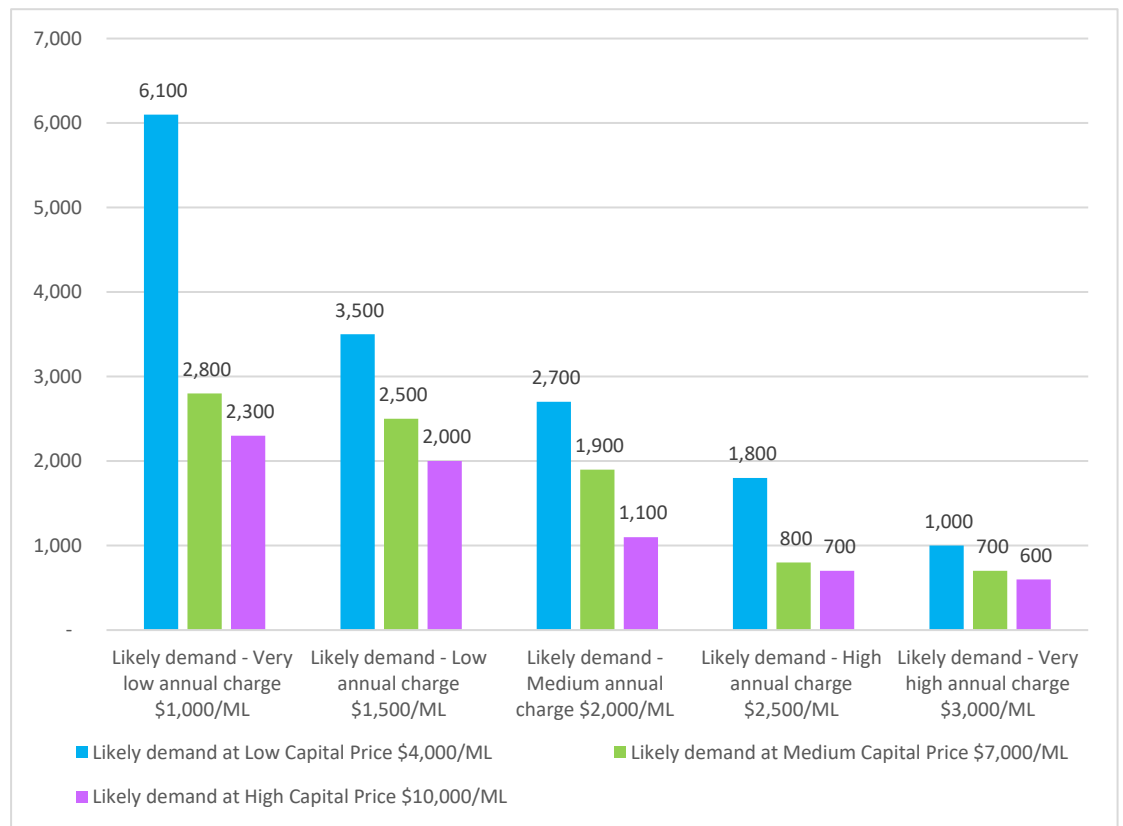
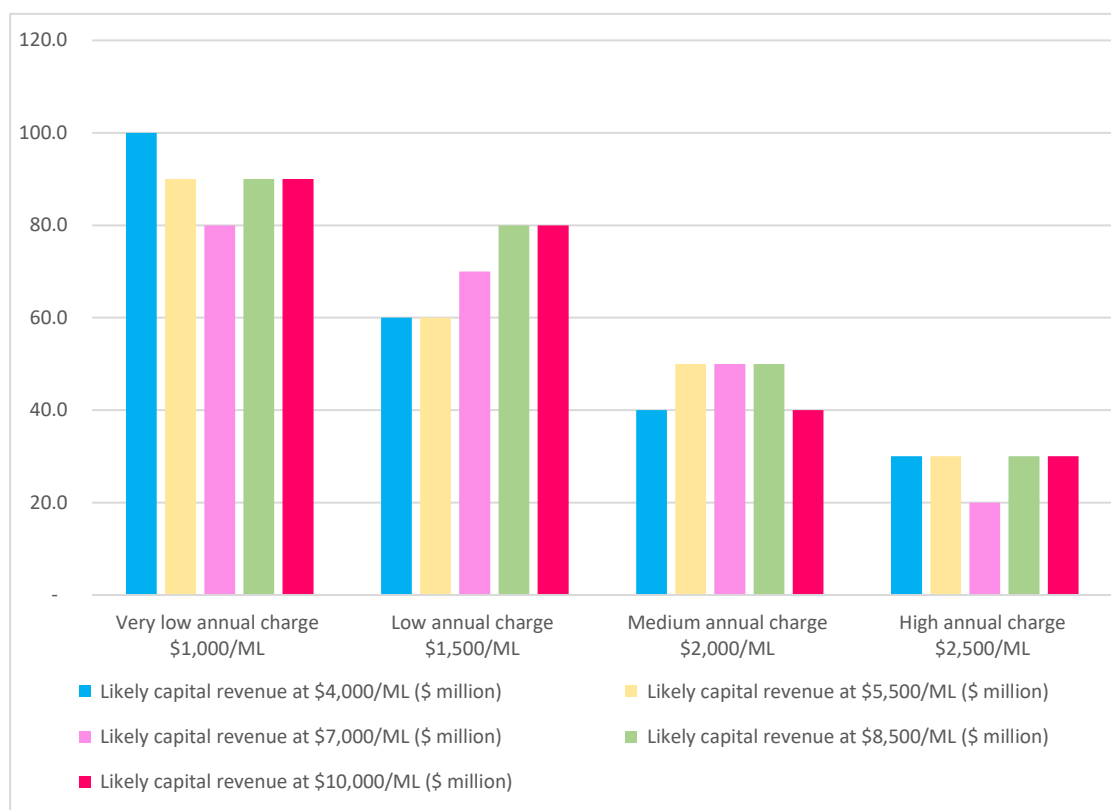


Figure 5 shows customer capital revenue raised from capital prices/infrastructure charges. The chart focuses on capital revenue at different annual charges, which are the primary driver.

Figure 5 Customer capital revenue at different prices - Annual Charge Focus (\$ million)



At \$1,000/ML annual charge, customer capital revenue is highest ranging from \$20–24 million, however, a solution at this annual charge is considered unlikely.

At \$1,500/ML annual charge, customer capital revenue is highest ranging from \$14–20 million. The highest revenue is at a \$10,000/ML capital price, and the second highest revenue is at \$8,500/ML. The lowest capital revenue is at \$4,000/ML capital price.

At \$2,000/ML annual charge, customer capital revenue is highest ranging from \$11–13 million. Highest revenue is at a \$7,000/ML capital price, and the second highest revenues are at \$5,500/ML and \$8,500/ML. Lowest capital revenue is at \$4,000/ML and \$10,000/ML.

At \$2,500/ML annual charge, customer capital revenue ranges from \$4–6 million. The capital charge makes little difference, but revenue is highest at \$10,000/ML. At \$3,000/ML there was a similar finding, but as the statewide price of water is less than \$3,000/ML this price point is not important.

KBR analysis has shown that the above findings, which draw on data from Round 1 participants *across all sectors*, are the same (apply equally) to wine and grape respondents only.

That is, to maximise customer capital contributions, annual charges need to be as low as possible. As \$1,000/ML annual charge is likely unachievable, the next best annual charge for maximising private investment is \$1,500/ML. As the annual charge lowers, the demand rises, and customer capital revenue from capital prices, increases.

The goal of the PBC will be to identify water supply options with the lowest possible sustainable annual charges, but within realistic capital cost budgets, given the capital that can be raised from customers based on Round 1, and government funding scenarios based on national precedents (e.g. 50% Federal Government and between 5% to 30% of state government of capital expenditure).

2 Project overview

2.1 PURPOSE

The purpose of this report is to outline the process, findings and subsequent recommendations associated with the Round 1 demand assessment completed for the Clare Valley Water (CVW) Preliminary Business Case (PBC). The aim being to inform the next steps of the PBC, including short-listing of water supply options and high-level engineering and costing work on short-listed options.

2.2 PROJECT SCOPE

Customer participation has been sought to determine the appetite for new water from any source. KBR informed customers that no preferred supply options have been identified at this stage.

The results of this demand assessment will underpin the selection and design of the recommended water supply option/s as an outcome of this preliminary business case.

2.3 NATIONALLY ENDORSED DEMAND ASSESSMENT PROCESS

KBR generally undertakes the following three phases of demand assessment using a process that emanated from Tasmanian Irrigation and is now a nationally endorsed approach:

- Round 1 – Expressions of Interest (non-binding) – the subject of this report.
- Round 2 – Letters of Intent (non-binding) – complete as part of DBC.
- Round 3 – Water Sales – Legally binding water sales contracts with staged customer capital contributions, for example, made upon signing a contract, when government funding becomes unconditional, prior to completion of construction and in some cases for the initial years of scheme operation in the form of an annual customer infrastructure levy.

Round 1 and Round 2 are not legally binding, whereas Round 3 is legally binding to underpin funding.

This approach demonstrates ‘skin in the game’ from customers and allows government to make a capital investment with a high degree of confidence that the project will succeed, and the forecast economic benefits arising from that investment will be realised for the benefit of the community.

This is distinct from the alternative ‘build it and they will come’ approach, which recent national irrigation history has discredited (e.g. Paradise Dam in Queensland).

KBR’s approach ensures that, due to the requirement for upfront, pre-construction financial and legal commitments by investors/customers, the forecast demand is secured prior to construction.

Moreover, customers are incentivised to deploy additional capital and other resources to earn a return on their capital investment in the water product as soon as it becomes available.

3 Round 1 demand assessment overview

3.1 IMPORTANT INFORMATION IN ROUND 1 EXPRESSION OF INTEREST FORM

This section presents the data provided to customers on their Round 1 Expression of Interest forms.

3.1.1 Guidance provided to customers

- Please also consider the Round 1 presentation (Info Pack) (attached).
- Please complete this form if your business is in, or near, the Clare Valley and may be seeking more water, especially for irrigation, livestock or other uses.
- Your information will be kept confidential.
- Responses will be aggregated as part of a summary report.

3.1.2 Engineering options

A long list of potential supply options has been developed. There is no preferred option at this stage. The process will identify the best supply option/s that meet demand.

The preliminary business case is deliberately demand led. No engineering has been done. Decisions on supply options come after Round 1 demand.

3.1.3 Water quality

Water supplied to the Clare Valley, if a suitable option can be found, will be of a suitable quality for irrigated agriculture. For example, a high quality (300-400ppm) desalinated water product sourced from a wastewater treatment plant, or raw River Murray water, or potable River Murray water as is currently supplied by SA Water.

3.1.4 Climate change

The forecast impacts of climate change by 2050 in the Clare Valley include:

- Likely decrease in average rainfall during winter and spring months.
- Average temperatures likely to increase by 1.3 degrees Celsius.
- Increase in soil aridity / dryness driving higher irrigation requirements (e.g. to offset reduced in-season rainfall).

Source: University of Tasmania/ Wine Australia - Climate Atlas for Clare Valley.

3.1.5 Demand for water in two parts – Substitution and Growth

In two separate sections, the form seeks an estimate of:

- Demand for substitution water (i.e. swapping with existing sources).
- Demand for new / additional / growth water (i.e. for business expansion).

The two combined reflect total demand. It was noted that climate change can be factored into both types of demand.

3.1.6 Think long term demand in a changing world

In developing demand estimates, respondents were asked to:

- Go beyond immediate water needs to long-term planning, as a new water project may be a 100-year asset.
- Consider how their businesses may grow with access to a greater volume of more secure water.
- Consider the impacts of climate change, which will include dryer soils and increased irrigation requirements.

3.1.7 Customer capital price

Respondents were informed that:

Capital prices (infrastructure charges) and annual charges are GST exempt.

All prices are subject to change.

A customer capital contribution demonstrates 'skin in the game' and can attract government capital funding.

No engineering has been completed/conducted so actual capital prices will be set later. Round 1 tests three capital price options (see Table 1).

Table 1 Round 1 capital charges (subject to change)

Customer capital price scenario	Initial deposit – Year 1 (\$/ML)	Annual capital infrastructure charge – Year 2 + (\$/ML)	No. of annual payments	Total Customer Capital Price (\$/ML)
Low	1,000	1,000	4	4,000
Medium	1,000	1,000	7	7,000
High *	1,000	1,000	10	10,000

* For comparison, the customer capital price for the Barossa New Water detailed business case is \$10,000/ML.

3.1.8 Customer annual charges

Via annual charges, customers will pay 100% of scheme operating costs. The supply option is unknown and annual charges have not been costed.

The indicative Round 1 annual charges range from \$1,000 to \$3,000/ML.

3.1.9 Demand scenarios

For each type of demand (substitution and growth), please advise minimum, likely and maximum demand volumes at each price point.

Table 2 Guidelines to inform your demand for additional water

Minimum demand (e.g. 0.5-1ML/ha)	Likely demand (e.g. 1-2ML/ha)	Maximum demand (e.g. 2-3ML/ha)
Account for climate change forecasts, including increased irrigation needs due to soil aridity Your business-as-usual increased need for new water Think 10 years or longer.	Account for climate change, including increased irrigation needs due to rising soil aridity Balance minimum and maximum demand Assume moderate business growth over 10 to 20 years Think 20 years or longer.	Assume pessimistic forecast climate change Account for significantly increased irrigation requirements Big business growth Think 30 years or longer.

Likely demand from Round 1 will drive engineering and costs in the preliminary business case.

3.2 ROUND 1 QUESTIONNAIRE

Table 3 lists the questions provided to potential customers as part of the expression of interest.

Table 3 Round 1 form questions

	Question
General	
1	Please provide your customer information in the table below
Section 2: Your business /enterprises	
2	Please summarise your main enterprises (excluding wineries) in the table below – enterprise and hectares.
3	Do you have a winery?
4	What size is your winery? (Wine Australia categories were provided)
Section 3: Your current water sources and water use	
5	Please describe the volume and sources of your current irrigation or other water use.
Section 4: Substitution demand (in the context of annual charges from \$1,000 to \$3,000/ML)	
6	What is your minimum, likely and maximum substitution demand at various annual charges and \$4,000/ML capital contribution paid over four years.
7	What is your minimum, likely and maximum substitution demand at various annual charges and \$7,000/ML capital contribution paid over seven years.
8	What is your minimum, likely and maximum substitution demand at various annual charges and \$10,000/ML capital contribution paid over ten years.
Section 5: Growth demand (in the context of annual charges from \$1,000 to \$3,000/ML)	
9	What is your minimum, likely and maximum growth demand at various annual charges and \$4,000/ML capital contribution paid over four years.
10	What is your minimum, likely and maximum growth demand at various annual charges and \$7,000/ML capital contribution paid over seven years.
11	What is your minimum, likely and maximum growth demand at various annual charges and \$10,000/ML capital contribution paid over ten years.
Section 6: Location of your total future demand (substitution plus growth) water	
12	Assuming your highest total likely demand at \$4,000/ML capital price and \$1,000/ML annual charge, provide the delivery location and total likely volume (substitution + growth demand) for network design.
Section 7: Uses for new water – economic benefits	
13	Please provide the following information about the top few enterprises on which the new water would be used. The table provided to respondents sought data on: Enterprise/new use, Portion of new water, Irrigation rate (ML/ha), Yield (t/ha), Gross revenue (\$/ha), Fixed & Variable costs (\$/ha), and Profit (\$/ha)).
Section 8: Alternative water source preferences	
14	Rank your preference of water sources (1 the highest preference / can be equal) from the following options: River Murray potable water (current CVWSS product) River Murray raw (not suitable for drinking / untreated) Recycled / desalinated wastewater (300-400ppm but not potable)

Question	
Section 9: Timing of water use & water storages	
15	What portion (X%) of irrigation water do you apply/use each month in a dry year / below average rainfall?
16	How many water storages do you have on your properties/farms?
17	What volume of water storage do you have? (ML)
18	How easy would it be to construct a dam on your farm? (Graded options were provided)
19	How easy would it be to install water tanks on your farm? (Graded options were provided)
20	What is your level of support for sharing a new local 'community' water storage with several other growers? (Graded options were provided)
Section 10: Did you attend a round 1 meeting and confidentiality	
21	Did you attend a Round 1 water meeting on 12 or 13 April 2022? (Yes / No)
22	Do you approve this confidential data being shared with SA Water to help design a solution? (Yes / No)

4 Engagement methodology

4.1 PRE-ROUND 1 DEMAND ASSESSMENT - IMMERSION

Round 1 demand assessment included two 'building block' or immersion phases that focussed on understanding the service need and the existing approach to capital charges and annual charges, water quality and enterprise mix. The phases were:

- Immersion 1: 7 to 10 February 2022 – Focus on larger water users and/or those connected to the Clare Valley Water Supply Scheme
- Immersion 2: 21 to 24 February 2022 – Focus on smaller water users and/or those not connected to the Clare Valley Water Supply Scheme.

The result of this phase was the service need, investment logic and options long list report. The findings were incorporated in the Round 1 – Expression of Interest form.

As part of promoting each meeting, the Clare Valley Wine and Grape Association used its mailing list and other farming networks and advertising in local newspapers to promote the event.

At each meeting attendees provided names and emails to build the customer data base.

4.2 ROUND 1 DEMAND ASSESSMENT – PART 1 & 2

Round 1 demand assessment included several demand assessment meetings that focussed on explaining the three-phase demand assessment process, the demand led preliminary business case, water prices and types of demand (substitution and growth) – see section (above). The phases were:

- Round 1 Industry Meeting 1: 11-14 April 2022 – Two public meetings in Clare (one during office hours and one at night to accommodate primary producers)
- Round 1 Industry Meeting 2: 3 to 4 May 2022 – Three public meetings in Clare Valley and surrounds (Manoora, Spalding and Balaclava).

As part of promoting each meeting, the Clare Valley Wine and Grape Association used its mailing list and other farming networks and advertising in local newspapers.

At each meeting attendees provided names and emails to build the customer data base.

4.3 POST ROUND 1 DEMAND ASSESSMENT – FOLLOW-UP

On 27 May 2022, KBR provided a draft Round 1 Demand Assessment report to PIRSA.

In the days following the draft, up to 3 June 2022, KBR worked with the Clare Valley Wine and Grape Association (CVWGA) to identify members of the association and other participants in the Round 1 engagements outlined above, who had not responded.

This was done by name only. No commercial information was shared with CVWGA. Identified people and companies were contacted by email and follow-up phone calls were made by CVWGA and KBR to potential customers with significant areas of vineyards.

The result was a further 20 new Round 1 forms being returned to KBR by 6 June 2022.

4.4 SUMMARY

The community was widely engaged during the process, and most relevant stakeholders were very likely contacted via numerous channels.

Community contact includes:

- CVWGA sent emails to its contact data base of over 100 emails for each phase
- CVWGA provided KBR with contacts of small, medium and large water users, on and off the CVWSS and representatives of different types of grape, livestock, broadacre and horticultural production systems
- KBR conducted 40 face-to-face one-on-one interviews with prospective customers
- CVWGA and KBR followed-up with further emails and calls to about 50 identified potential respondents in late May and early June, resulting in over 20 new forms being received after preparation of the draft report. The final demand report includes those new responses.

It is likely that most people with an interest in new water have been contacted during this process, including in the grape/wine industry, farming/livestock and other enterprises.

5 Round 1 results – data and analysis

5.1 OVERVIEW

This section summarises the results of the Round 1 demand assessment process. Analysis and recommendations are provided based on the response findings.

5.2 ROUND 1 PARTICIPATION

Table 4 summarises customer participation in the Round 1 demand assessment.

Table 4 Round 1 participants

Item	Result
No. of expression of interest forms received	74
No. of properties reflected in survey responses	140
Average no. of farms per respondent	1.9
Average area per farm (ha)	204

5.3 QUESTION 2 – CURRENT ENTERPRISES

Types and area of respondent existing enterprises

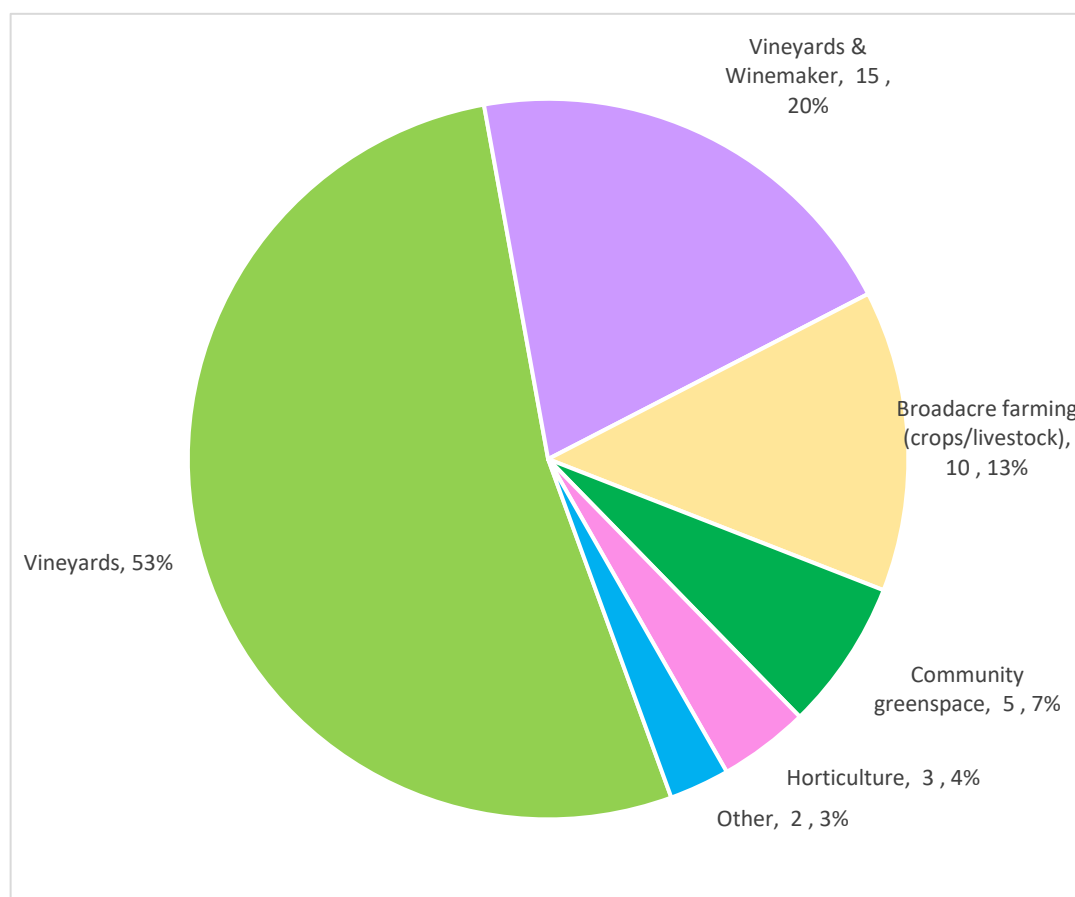
Respondents were asked to outline their enterprises. Responses have been categorised in Table 5.

Table 5 Respondent current enterprise categories

All enterprise categories	No. of primary enterprises per category	Area of enterprise in hectares (ha) - Rounded
Vineyards	39	1,450
Vineyards & Winemaker	15	1,900
Broadacre farming (crops/livestock)	10	23,560
Community greenspace	5	30
Horticulture	3	50
Other	2	1,530
Total	74	28,520

Figure 1 depicts the primary enterprise identified by respondents and indicates an inclusive process, which invited responses from wine grape growers, wine makers and other sectors in the Clare Valley. Responses included:

- 39 primarily wine grape growing businesses (some of which have additional enterprises)
- 15 winemakers who generally also grow grapes for input to winemaking (and other enterprises)
- 10 broadacre farms with primarily livestock and / or extensive cropping operations
- 8 responses collectively from the community greenspace (sporting fields, clubs and parkland) and horticulture (e.g. olive trees) sectors
- 2 other enterprises included high-value inputs to agriculture and tourism.

Figure 6 Number and portion of enterprises by category

Representation of wine and grape sector area under vines

According to Vinehealth Australia, the total vineyard area in Clare Valley on 30 April 2021 was about 5,000 hectares (Source: <https://www.wgcsa.com.au/uploads/1/1/5/5/115509859/clare-valley-report-2021.pdf>). Information on Clare Valley vineyard areas is in Table 6.

Table 6 Area of respondent wine and grape enterprises in Clare Valley

Wine and Grape Enterprise Categories	Area of enterprise in hectares (ha)	Portion of Clare Valley vineyards by area
Vineyard only respondents	1,450	29%
Winemaker & vineyard respondents (excl. vineyards only above)	1,900	38%
Total respondent area	3,350	67%
Vineyard areas missing from Round 1	1,650	33%
Total	5,000	100%

Of the 5,000 ha of vineyards in Clare Valley, Round 1 demand responses were received from 54 wine and grapes businesses owning or controlling 3,350 ha or two thirds (67%) of Clare Valley vines.

Water use by current enterprises

The following table shows information provided by respondents about their current water use. The data focusses on irrigation application rates (but not all respondents are irrigators).

Table 7 Water use of current enterprises

Total of all enterprises	Area of enterprise in hectares (ha)	Average irrigation application rate (ML/ha) *	Average total water use across this enterprise area (ML)
Vineyards	1,448	1.5	2,239
Vineyards & Winemaker	1,897	0.9	1,691
Broadacre farming (crops/livestock)	23,558	0.0	89
Community greenspace	31	3.0	95
Horticulture	55	0.4	22
Other	1,531	0.4	544
Total	28,520	0.2	4,679

The low water use per hectare of 'other enterprises' reflects the likelihood that the broadacre cropping farms are not irrigated, and that provision of stock water to livestock and grazing over large areas, together generate low water use rates in ML per hectare.

The following table focuses on current irrigation practices of wine and grape growers.

Table 8 Water use of wine and grape enterprises

Total of all enterprises	Area of enterprise in hectares (ha)	Average irrigation application rate (ML/ha) *	Average total water use across this enterprise area (ML)
Vineyards	1,450	1.5	2,240
Vineyards & Winemakers	1,900	0.9	1,690
Total	3,350	1.2	3,930

Wine grape growers that do not make wine, appear to average 1.5 ML per ha. Whereas winemakers who also grow grapes (and buy grapes from others) appear to average about 0.9 ML per ha of irrigation. This suggests an average application rate by the wine and grape sector of 1.2 ML per ha.

5.4

QUESTION 3 & 4 – DO YOU HAVE A WINERY AND IF SO WHAT SIZE IS YOUR WINERY?

There were 15 wineries among respondents with the sizes indicated in Table 8.

Table 9 Number and size of Clare Valley wineries

Category	Grapes processed per annum (tons)	No of wineries per category
Micro	0-100t	2
Small	100t-750t	6
Medium	750t-5,000t	5
Large	5,000-20,000t	2
Major	+20,000t	0
Total		15

5.5 QUESTION 5 – VOLUME AND SOURCES OF CURRENT IRRIGATION OR OTHER WATER USE

Customers were asked to estimate their current volumes of water use under average and dry conditions by source. Table 10 provides a summary of responses.

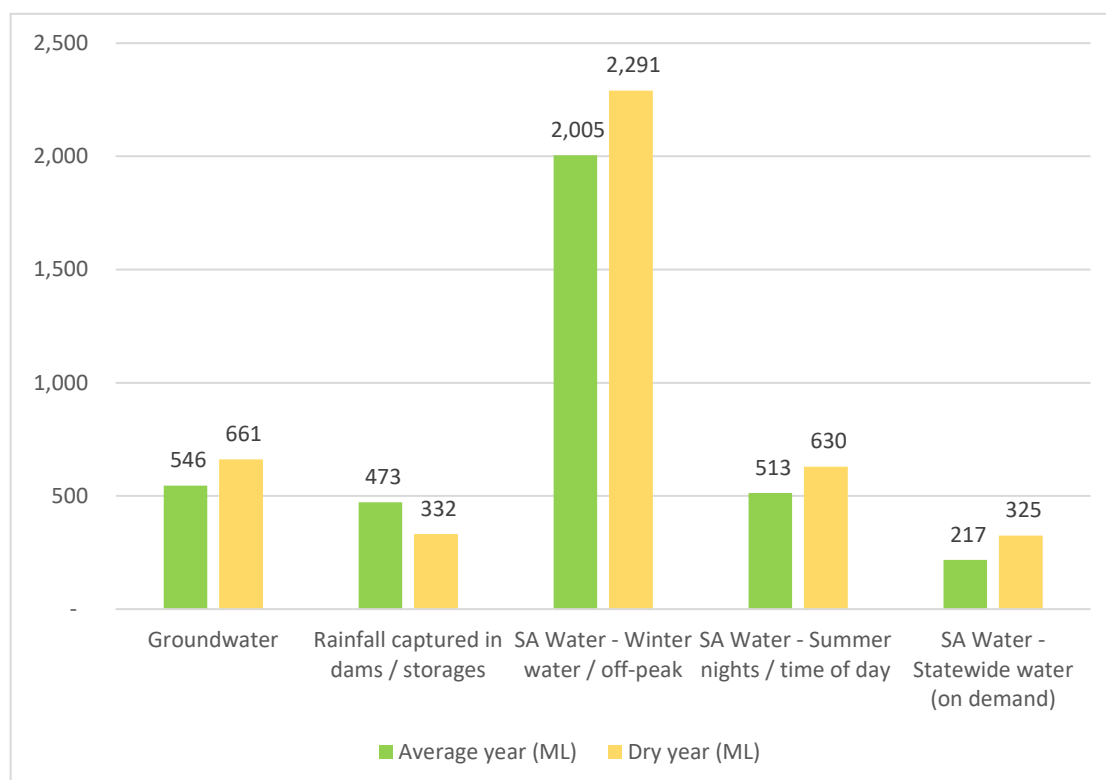
Table 10 Volume of current irrigation or other water use by source in an average and a dry year (ML pa)

Source	Average year use (ML) - Rounded	Dry year use (ML) - Rounded	Change (%)
Groundwater	550	660	20%
Rainfall captured in dams/storages	470	330	-30%
SA Water - Winter water/off-peak	2,010	2,290	14%
SA Water - Summer nights / time of day	510	630	24%
SA Water - Statewide water (on demand)	220	320	45%
Other sources	-	70	0%
Total	3,760	4,300	14%

When compared to an average year, during a drought or dry year, the respondent data suggests:

- Groundwater extractions increase 20%
- Use of rainfall captured in onfarm dams decreases by 30%, due to less rainfall
- SA Water - Winter water / Off-peak water use increases 14%
- SA Water - Summer nights / Time of Day water use increases 24%
- SA Water - Statewide water use increases 45% despite its high price
- Water use from other sources increases by 70ML per annum.

The relative volumes in ML of average year and dry year water use by source are depicted in the following figure.

Figure 7 Average versus dry year - Respondent current water use by source (ML)

In dryer years, the use of groundwater, SA Water products and other sources increase. The use of water from rainfall captured in dams reduces, due to less rain.

5.6 QUESTION 6 TO 8 – SUBSTITUTION DEMAND

This section presents minimum, likely and maximum substitution demand at various prices. Three capital prices each test demand at five annual charges. Price ranges were derived during immersion and other consultations with 40 prospective customers and was refined in public meetings.

For example, KBR included the \$1,000/ML annual charge based on a request from growers and the CVWGA. The reason for including a very low annual charge of this nature alongside the low \$4,000/ML capital price was to generate a scenario that is more affordable than the least cost CVWSS products (Winter off-peak). Growers and CVGWA hoped that this price point would generate a high volume of demand to support a large-scale water supply option, such as piped desalinated wastewater delivered to the Clare Valley from Adelaide. The results are presented below and illustrates strong price elasticity.

Table 11 summarises responses to Q6: Substitution demand at various annual charges and \$4,000/ML capital contribution paid over four years.

Table 11 Substitution demand at a \$4,000/ML capital contribution and various annual charges

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	2,246	1,372	1,027	497	258
LIKELY (ML)	3,052	1,836	1,387	788	338
MAX (ML)	3,711	2,191	1,654	923	408

Table 12 summarises responses to Q7: Substitution demand at various annual charges and \$7,000/ML capital contribution paid over seven years.

Table 12 Substitution demand at a \$7,000/ML capital contribution and various annual charges

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	1,107	965	733	209	177
LIKELY (ML)	1,575	1,363	1,031	294	238
MAX (ML)	1,842	1,572	1,203	378	314

The next table summarises responses to Q8: Substitution demand at various annual charges and \$10,000/ML capital contribution paid over ten years.

Table 13 Substitution demand at a \$10,000/ML capital contribution and various annual charges

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	933	730	489	194	129
LIKELY (ML)	1,368	1,046	592	254	162
MAX (ML)	1,572	1,210	685	326	197

In all scenarios, as capital and annual charges rise, demand falls:

- Highest likely substitution demand (\$4,000/ML capital and \$1,000/ML annual charge) is 3.1 GL
- Mid-point likely substitution demand (\$7,000/ML capital and \$2,000/ML annual charge) is 1.0 GL
- Lowest likely substitution demand (\$10,000/ML capital and \$3,000/ML annual charge) is 0.2 GL.

5.7

QUESTION 9 TO 11 – GROWTH DEMAND

This section presents minimum, likely and maximum growth demand at various prices. Three capital prices each test demand at five annual charges. This range was derived during immersion and other consultations with 40 prospective customers and was refined in public meetings.

Table 14 is for Q9: Growth demand at \$4,000/ML capital contribution paid over four years.

Table 14 Growth demand at a \$4,000/ML capital contribution and various annual charges

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	1,642	831	521	336	194
LIKELY (ML)	3,056	1,621	1,272	992	622
MAX (ML)	4,565	2,559	2,047	1,318	888

Table 15 is for Q10: Growth demand at \$7,000/ML capital contribution over seven years.

Table 15 Growth demand at a \$7,000/ML capital contribution and various annual charges

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	522	415	249	115	71
LIKELY (ML)	1,233	1,165	889	508	441
MAX (ML)	1,806	1,727	1,390	626	500

Table 16 is for Q11: Growth demand at \$10,000/ML capital contribution over ten years.

Table 16 Growth demand at a \$10,000/ML capital contribution and various annual charges

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	313	286	115	56	50
LIKELY (ML)	955	910	492	436	419
MAX (ML)	1,477	1,399	599	487	465

In all scenarios, as capital and annual charges rise, demand falls:

- Highest likely growth demand (\$4,000/ML capital and \$1,000/ML annual charge) is 3.1 GL
- Mid-point likely growth demand (\$7,000/ML capital and \$2,000/ML annual charge) is 0.9 GL
- Lowest likely growth demand (\$10,000/ML capital and \$3,000/ML annual charge) is 0.5 GL

A comparison of the selected prices is presented below. Total demand is in the next section.

Table 17 Sample of low, mid-point and highest substitution and growth demand at price extremes

Likely demand	Substitution (GL)	Growth (GL)
Highest demand (\$4,000/ML capital, \$1,000/ML/annum)	3.1	3.1
Mid-demand (\$7,000/ML capital, \$2,000/ML/annum)	1.0	0.9
Lowest demand (\$10,000/ML capital, \$3,000/ML/annum)	0.2	0.5

5.8

TOTAL DEMAND

This section presents minimum, likely and maximum **total** demand at various prices. Three capital prices each test demand at five annual charges. This range was derived during immersion and other consultations with 40 prospective customers and was refined in public meetings (as above).

Table 18 is total demand at \$4,000/ML capital contribution paid over four years.

Table 18 Demand at a \$4,000/ML capital contribution and various annual charges – Rounded (ML)

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	3,890	2,200	1,550	830	450
LIKELY (ML)	6,110	3,460	2,660	1,780	960
MAX (ML)	8,280	4,750	3,700	2,240	1,300

The next table is total demand at \$7,000/ML capital contribution over seven years.

Table 19 Demand at a \$7,000/ML capital contribution and various annual charges – Rounded (ML)

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	1,630	1,380	980	320	250
LIKELY (ML)	2,810	2,530	1,920	800	680
MAX (ML)	3,650	3,300	2,590	1,000	810

Table 20 is total demand at \$10,000/ML capital contribution over ten years.

Table 20 Demand at a \$10,000/ML capital contribution and various annual charges – Rounded (ML)

Demand	Very low annual charge \$1,000/ML	Low annual charge \$1,500/ML	Medium annual charge \$2,000/ML	High annual charge \$2,500/ML	Very high annual charge \$3,000/ML
MIN (ML)	1,250	1,020	600	250	180
LIKELY (ML)	2,320	1,960	1,080	690	580
MAX (ML)	3,050	2,610	1,280	810	660

Total demand is presented in Figures 8, 9 and 10 below at the three capital prices.

Figure 8 Demand at a \$4,000/ML capital contribution and various annual charges – Rounded (ML)

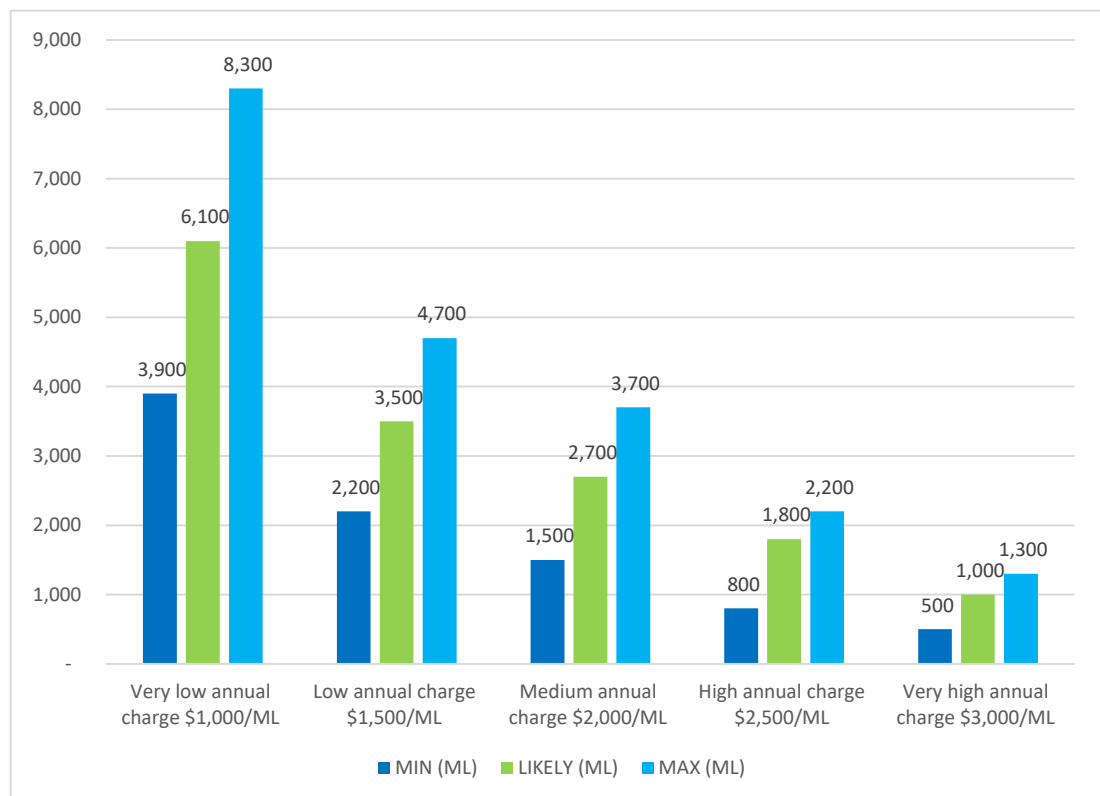


Figure 8 shows that prospective customers have demonstrated that at the very lowest combined prices (\$4,000/ML capex and \$1,000/ ML opex), demand ranges from 3.9 GL (minimum demand) to 8.3 GL (maximum / 'dare to dream' demand). **The likely demand at the very low price is 6.1 GL.** As the annual charge rises to \$1,500/ML likely demand falls to 3.5GL and then at \$2,000/ML the likely demand is 2.7 GL. Customers are highly sensitive to annual charges, comprised predominantly of fixed charges that are paid regardless of metered water use.

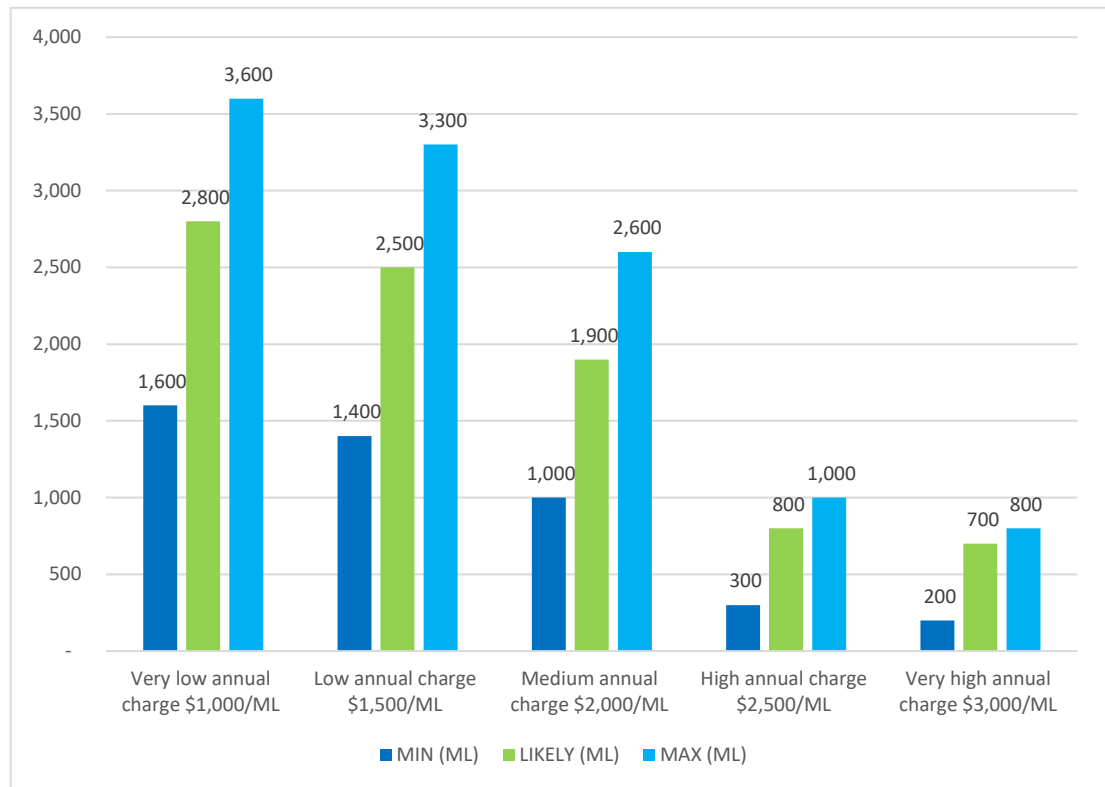
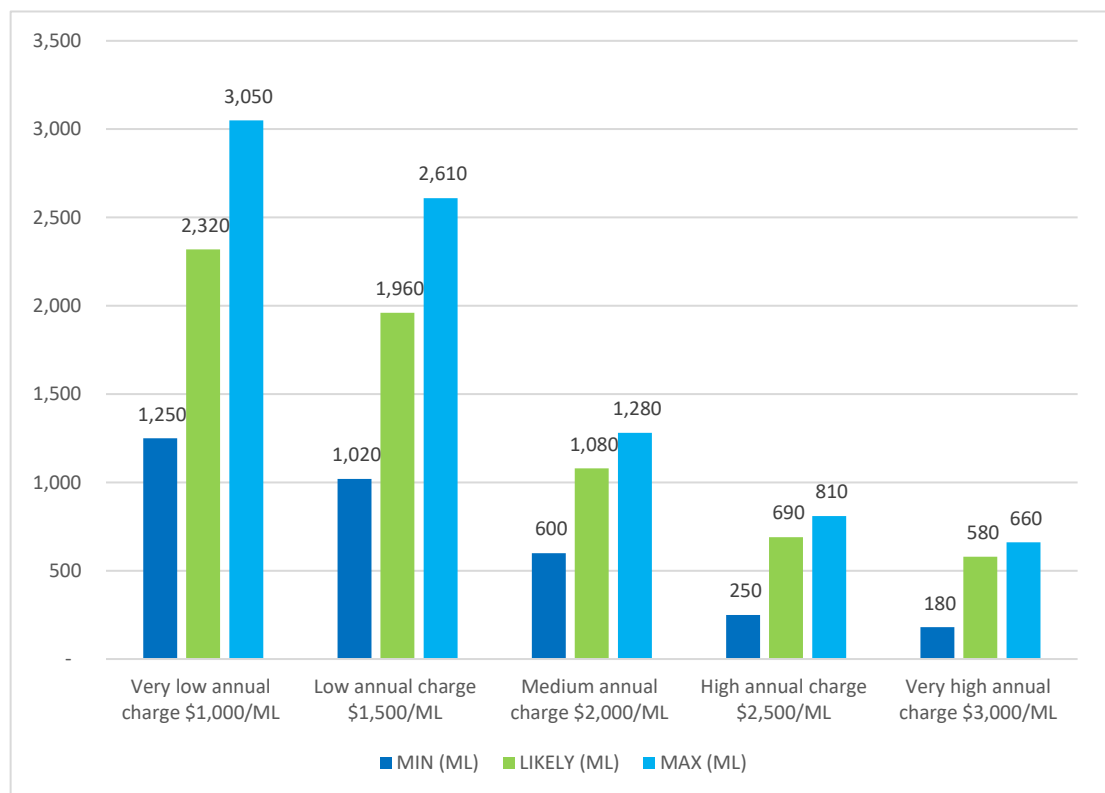
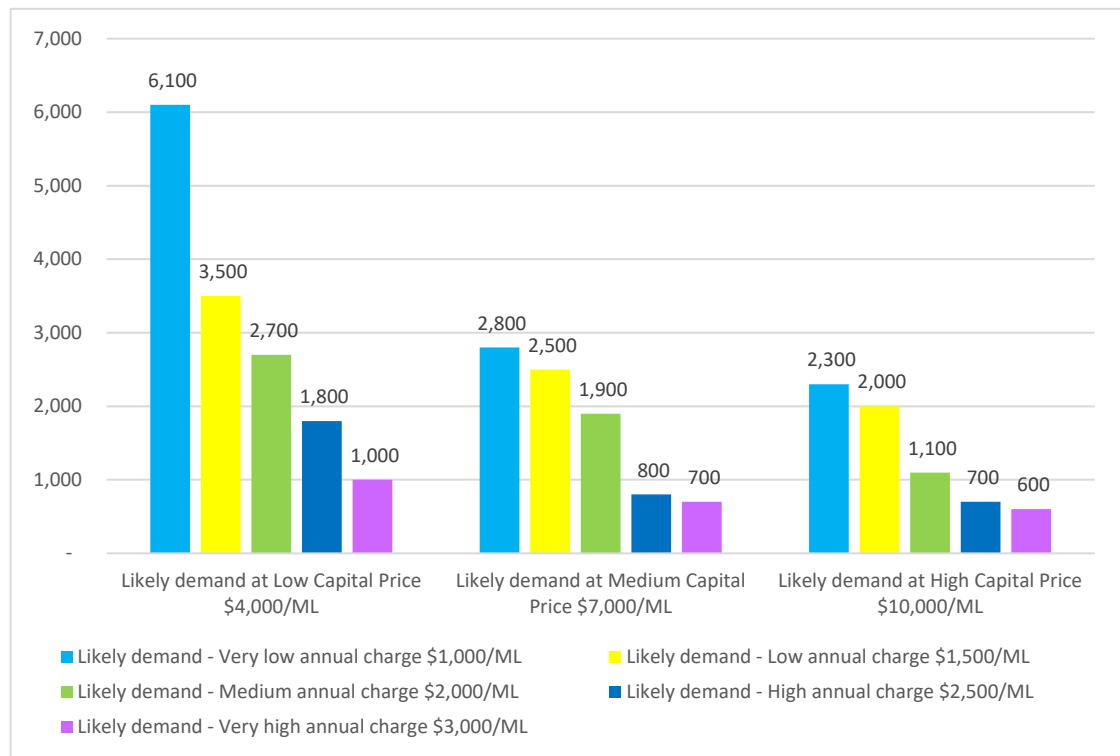
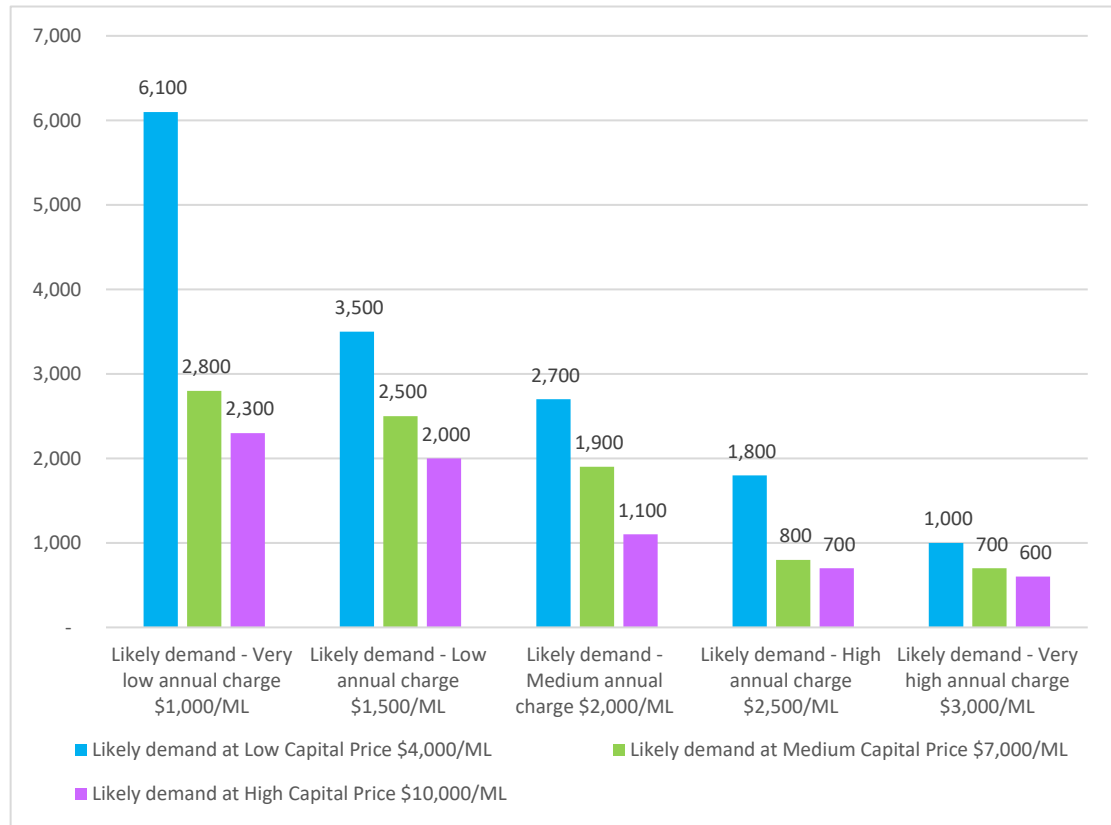
Figure 9 Demand at a \$7,000/ML capital contribution and various annual charges – Rounded (ML)**Figure 10 Demand at a \$10,000/ML capital contribution and various annual charges – Rounded (ML)**

Figure 11 provides a summary of total likely demand.

Figure 11 Likely demand at different capital prices and annual charges – Capital charge focus (ML)

The same likely demand data is presented below at each of the five annual charges (and capital prices). KBR observes that it is annual charge that drives demand above all.

Figure 12 Likely demand at different capital prices and annual charges – Annual charge focus (ML)

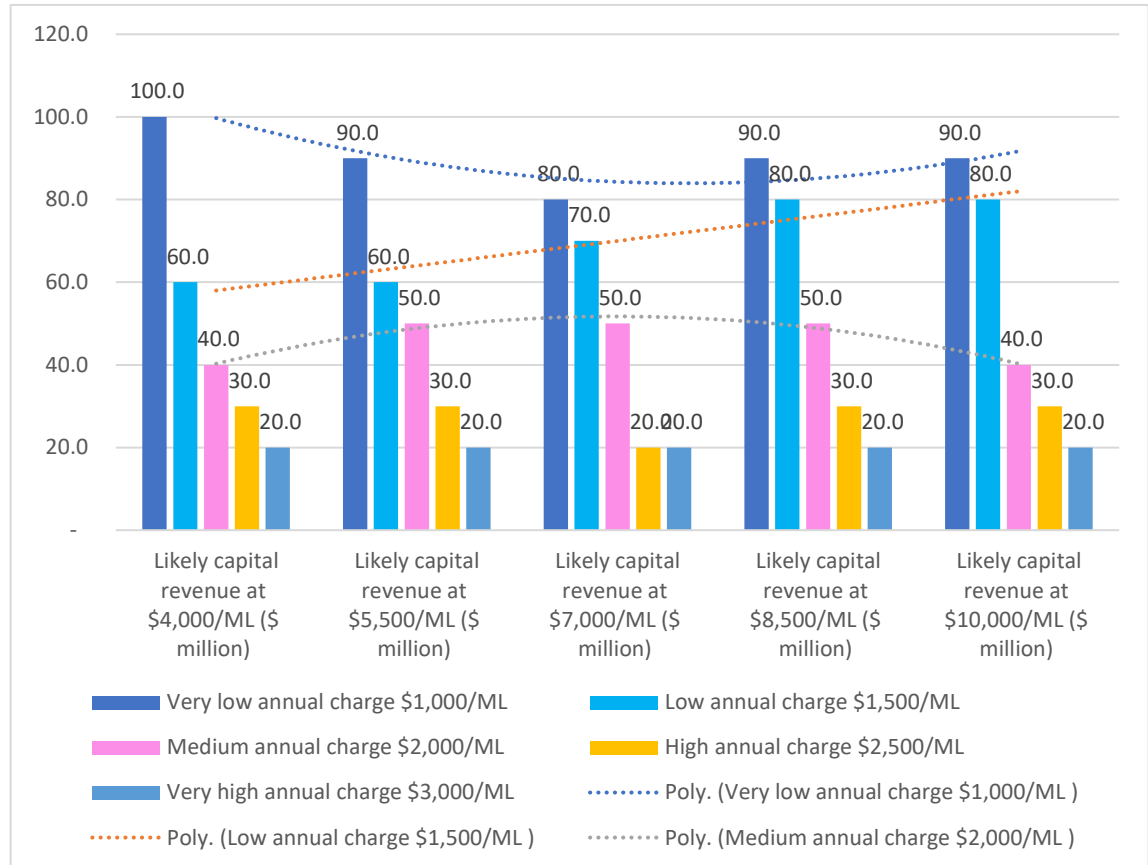
KBR note that it may be challenging to find a solution with an annual charge of \$1,000/ML.

5.9 OPTIMISING CUSTOMER CAPITAL REVENUE

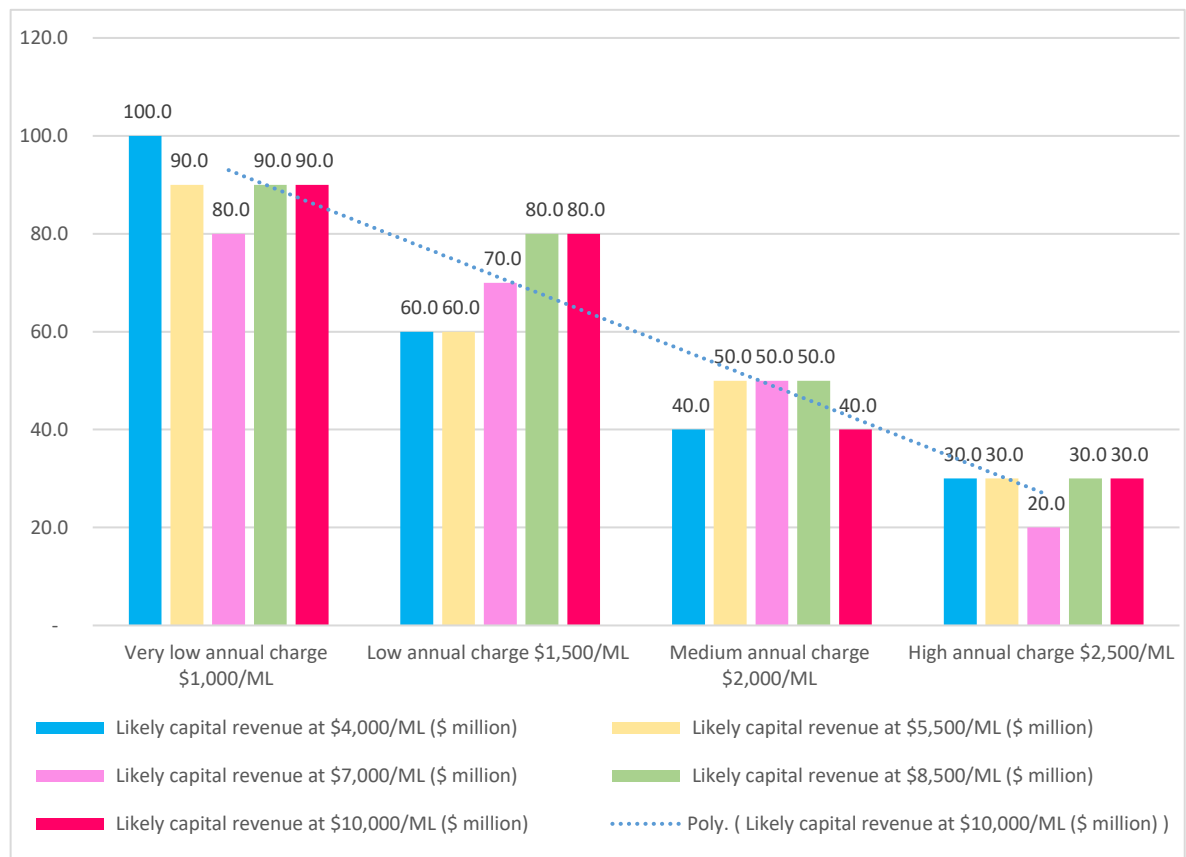
This section presents minimum, likely and maximum total customer capital revenue at various prices.

Usually this analysis identifies a clear 'sweet spot' where customer capital revenue is maximised which is typically viewed as the capital price point that also maximises the schemes prospects of achieving funding and implementation success. However, the results below in Figures 5 and 6 are complex – warranting at least the two following approaches to this revenue analysis.

Figure 13 Customer capital revenue at different prices - Capex Price Focus (\$ million)



Presenting capital revenue by capital prices from \$4,000-10,000/ML (including two interpolated prices) as above is a bit vexing, warranting the following analysis, which focuses on annual charges.

Figure 14 Customer capital revenue at different prices - Annual Charge Focus (\$ million)

Annual charges appear to drive customer capital revenue as follows:

- At \$1,000/ML annual charge, customer capital revenue is highest ranging from \$20–24 million. The highest revenue is at a \$4,000/ML capital price, but the second highest revenue is at \$10,000/ML. With a very low annual charge the capital price is a secondary consideration.
- At \$1,500/ML annual charge, customer capital revenue is highest ranging from \$14–20 million. The highest revenue is at a \$10,000/ML capital price, and the second highest revenue is at \$8,500/ML. The lowest capital revenue is at \$4,000/ML capital price.
- At \$2,000/ML annual charge, customer capital revenue is highest ranging from \$11–13 million. Highest revenue is at a \$7,000/ML capital price, and the second highest revenues are at \$5,500/ML and \$8,500/ML. Lowest capital revenue is at \$4,000/ML and \$10,000/ML.
- At \$2,500/ML annual charge, customer capital revenue ranges from \$4–6 million. The capital charge makes little difference, but revenue is highest at \$10,000/ML.

5.9.1 Optimising capital revenue – Conclusions and recommendations

In summary, to increase customer capital revenue, annual charges need to be as low as possible.

- Optimal capital revenue occurs at \$1,000/ML annual charge. KBR note that it may be challenging to find a solution with an annual charge of \$1,000/ML.
- If this is not achievable, the next best annual charge for maximising capital revenue is \$1,500/ML and so on. As annual charge lowers, demand rises, and customer capital revenue increases.

The goal of KBR's engineering will be to identify supply options with the lowest possible sustainable annual charges, but with capital costs that can be funded based on realistic capital funding scenarios. Any capital funding to be provided in future by governments is unknown at this early stage. This has been addressed separately in the key findings report and will be covered in the PBC.

5.10 WILLINGNESS TO PAY OF WINE AND GRAPE SECTION ONLY

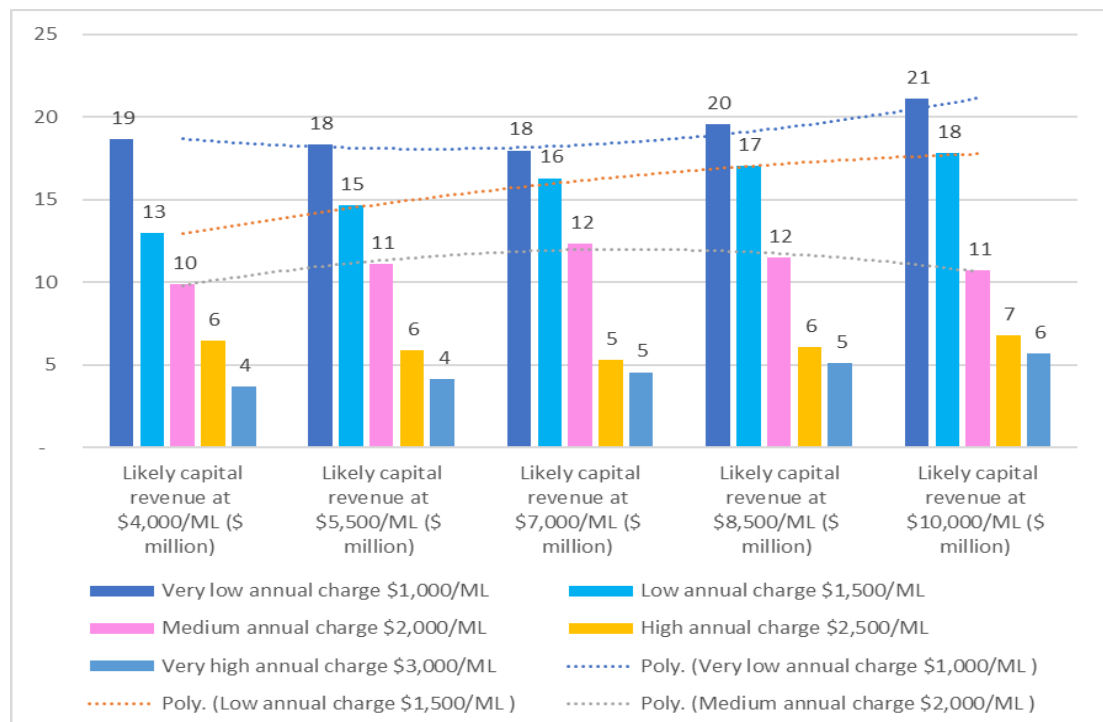
Government requested that KBR consider the willingness to pay of wine and grape sector only. Accordingly, a version of the model was developed that excluded all 20 non-wine-and/or-grape enterprises. The following demand resulted from the 54 wine and grape participants in the survey.

Figure 15 Likely demand from wine and grape sector at different prices – Annual charge focus (ML)



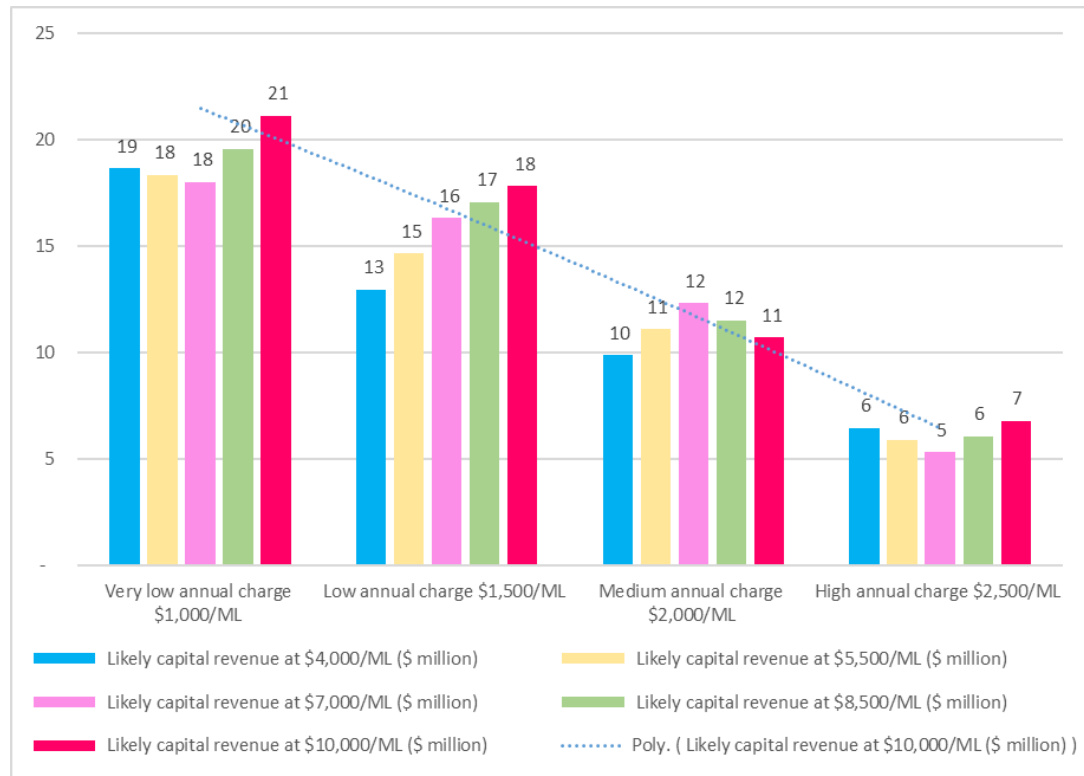
Demand is lower due to the omission of non-wine or non-grape customers. Given that a \$1,000/ML annual charge solution is unlikely, demand from the wine and grape sector only can be viewed as up to 3.2 GL. However, demand is from 74 customers in all sectors. Figure 16 refers to willingness to pay.

Figure 16 Customer capital revenue at different prices - Capex Price Focus (\$ million)



The pattern in Figure 16 is no different to the pattern for all customers. The following may offer further insights into the willingness to pay of the grape and wine sector.

Figure 17 Customer capital revenue at different prices - Annual Charge Focus (\$ million)



The pattern in Figure 17 directly above is no different to the pattern for all customers. The demand data does not offer insights into the willingness to pay of the grape and wine sector.

KBR's view is that based on net margin analysis (i.e. profit per ML), wine and grape growing has higher capacity to pay that broadacre and most horticultural crops. However, intensive livestock (e.g. feedlots, piggeries, chicken meat and egg production and dairies) can exceed wine and grape production in terms of capacity to pay for water. This is because the water use of intensive livestock is even lower than for wine and grapes and the profit per ML is very high.

Clare Valley Round 1 demand is dominated by wine and grape and intensive livestock sectors. Therefore, the overall results in the 'all sectors' analysis above are generally indistinguishable from an analysis of wine and grape responses only. Moreover, the demand from additional broadacre and horticultural cropping is in the minority and the horticultural component (e.g. fruit, vegetables and olives) is also high value agriculture. In conclusion, any willingness to pay insights from the 'all customers' revenue analysis, will also apply to the wine and grape sector.

5.11 QUESTION 12 – DELIVERY LOCATION FOR NETWORK DESIGN.

Customers provided lot and plan number, and street address for each location to which they would like new water delivered. This has been recorded in a detailed webmap as the basis for engineering.

5.12 QUESTION 13 – INPUTS TO ECONOMIC ASSESSMENT

Respondents were asked to provide information about the top few enterprises in which the new water would be used. The question sought data on: Enterprise/new use, Portion of new water allocated to that use, irrigation application rates (ML/ha), farmgate yield (t/ha), gross revenue (\$/ha), fixed and variable costs (\$/ha) and profit (\$/ha).

The results of this analysis have been provided separately in the economic assessment.

5.12.1 Substitution versus growth demand

The economics considers the portion of demand that reflects new demand or growth versus customers' intended substitution of more expensive, less reliable and/or less good quality existing water for the new source. In general, new or growth demand delivers a higher economic benefit than the replacement of old sources for new better or less expensive sources.

The following figure provides insight into share of demand types at a \$4,000/ML capital price.

Figure 18 Share of total likely substitution versus growth demand at \$4,000/ML capital price (%)

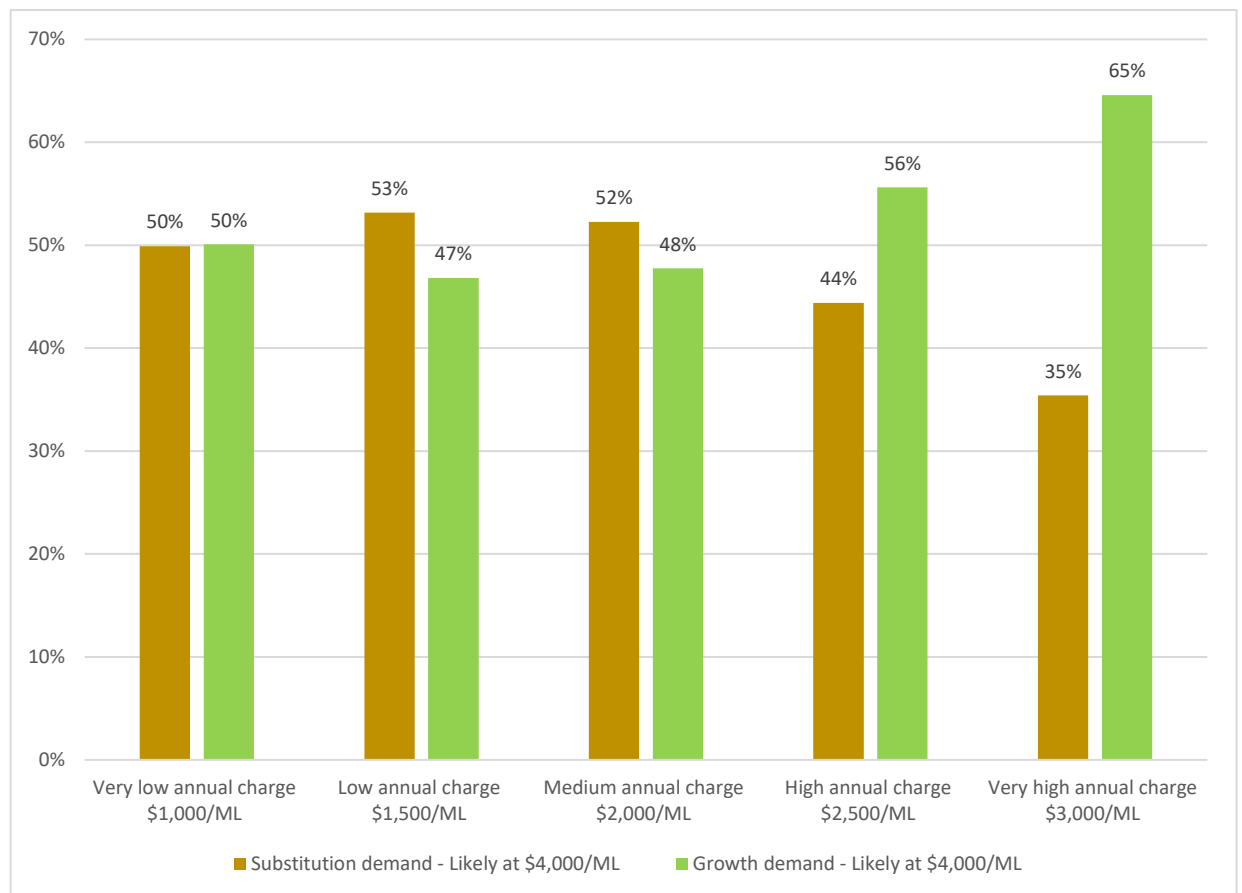


Figure 18 shows that substitution and growth demand are evenly matched at lower annual charges, but that as annual charges rise (and overall demand falls), growth demand makes up an increasing proportion of that demand. This makes sense as growth demand attracts a higher return.

Figure 19 provides insight into to portions of demand types at a \$7,000/ML capital price.

Figure 19 Share of total likely substitution versus growth demand at \$7,000/ML capital price (%)

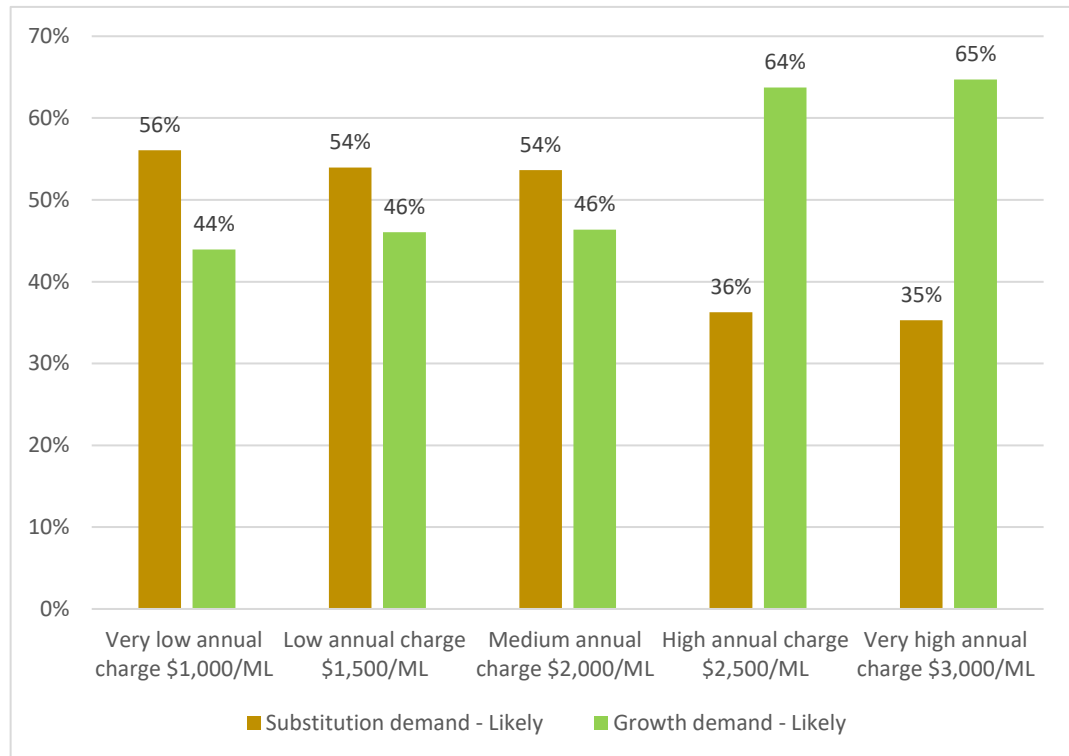
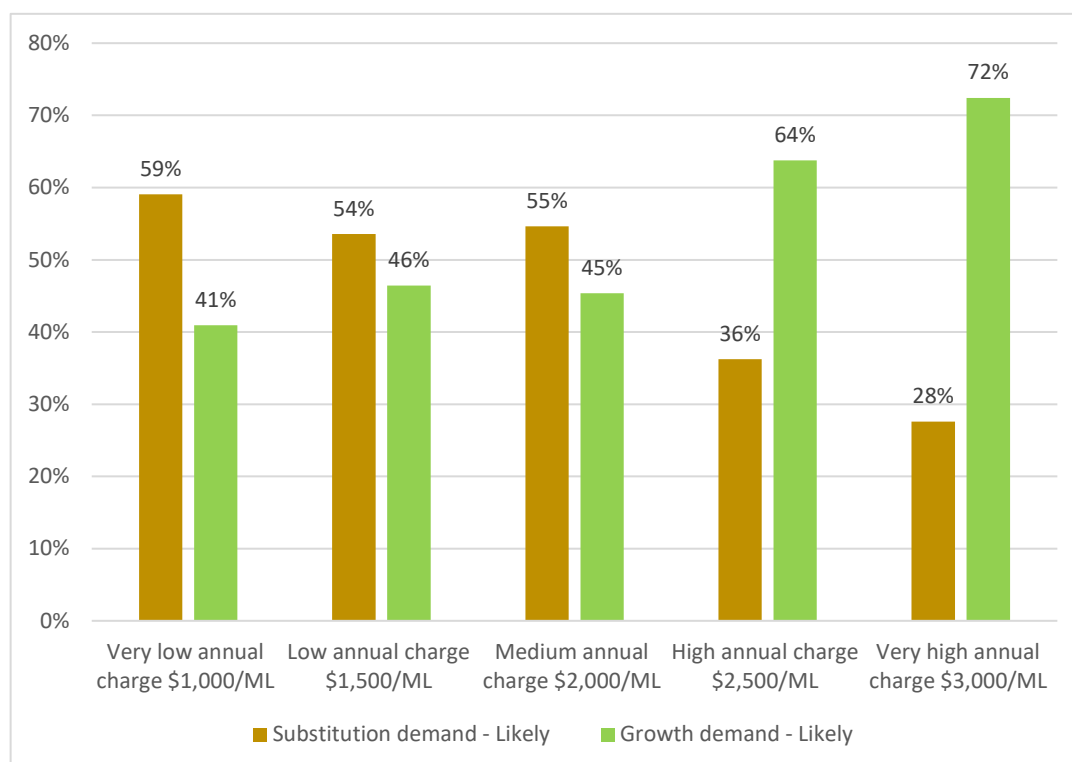


Figure 19 shows that at \$7,000/ML substitution demand slightly exceed growth demand at lower annual charges. However, as annual charges rise (and overall demand falls), growth demand makes up an increasing proportion of that demand, like but more so than at \$4,000/ML capital price.

The same pattern – but somewhat accentuated – is revealed below at a capital price of \$10,000/ML.

Figure 20 Share of total likely substitution versus growth demand at \$10,000/ML capital price (%)**5.13****QUESTION 14 – PREFERRED WATER QUALITY OPTION**

Customers were asked to identify their preferred water quality type as an input to selection of an engineering / supply option as part of this preliminary business case. The question invited respondents to rank their preference for the following options:

- River Murray potable water (current CVWSS product).
- River Murray raw (not suitable for drinking / untreated).
- Recycled / desalinated wastewater (300-400 ppm but not potable).

The responses, and resulting overall ranking of the options, are presented below.

Table 21 Preferred Water Quality Option

Ranking based on average ranking	Average rank	No. of times option ranked No. 1	No. of times option ranked No. 2	No. of times option ranked No. 3	Rank
Recycled / desalinated wastewater (300-400ppm)	1.7	32	16	12	1
River Murray potable water (CVWSS product)	1.9	27	13	21	2
River Murray raw (not potable / untreated)	2.2	9	32	18	3

KBR suggests that Options 1 and 2 are close to an equal first place. Moreover, it appears that a raw water product is not sought after as the number one preference, with only nine respondents ranking it first. Nevertheless, raw water is ranked second 32 times.

The ranking or preferences for options is far less important than annual charges. That is, whichever of these options has the lowest annual charge will be most popular with customers.

5.14 QUESTIONS 15 TO 20 – WATER DELIVERY AND STORAGE QUESTIONS

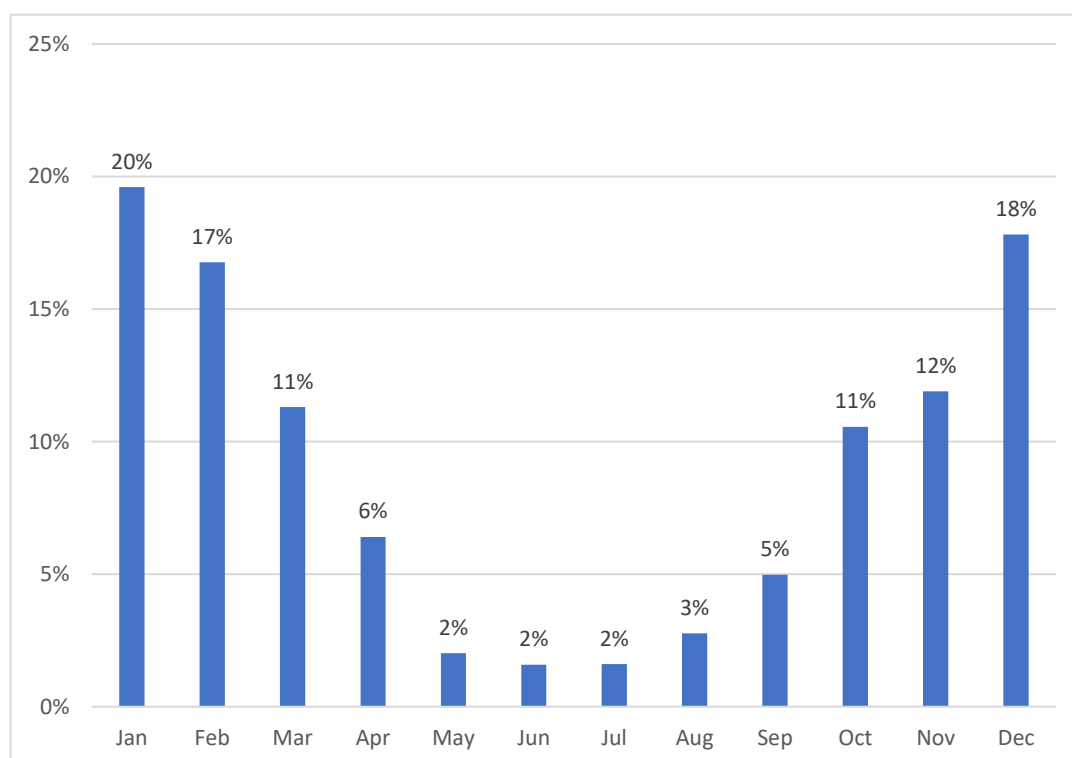
This section presents answers to the following questions

Water delivery and storage questions

15	What portion of irrigation water do you apply/use each month in a dry year (below average rainfall)?
16	How many water storage do you have on your properties?
17	What volume of water storage do you have? (ML)
18	How easy would it be to construct a dam on your farm? (Graded options were provided)
19	How easy would it be to install water tanks on your farm? (Graded options were provided)
20	What is your level of support for sharing a new local 'community' water storage with several other growers? (Graded options were provided)

Figure 21 sets out responses to the question about portion of monthly water use.

Figure 21 Average use of individual water per month in a dry year ^



Note: ^ Does not sum to 100% as each individual users has expressed their percentage. Not all months include all users.

The 20% peak suggest at most a five month or 150-day delivery scheme with adequate storage for water to meet summer peak irrigation demands.

The following table presents data on respondent's existing water storages.

Table 22 Current water storages owned by respondents

Question	Total
Q16a: How many DAMS do you have on your properties?	130
Q16b: How many TANKS do you have on your properties?	160
Q17: What volume of water storage do you have? (ML)	3,300

Question	Total
Average volume stored in a dam – Rounded (ML)	30

The storage that exists among respondents is material in volume, when compared to the range of demand. However, much of this storage would already be in use, so a question was asked about ease of implementation for new storages (separated between tanks and dams). This was to verify views of some respondents that they have vineyards covering almost their entire property and cannot accommodate more storage. Whilst others say the opposite, that is, there is plenty of space.

Ease of implementation drives costs, and the following table presents data about possible future water storages.

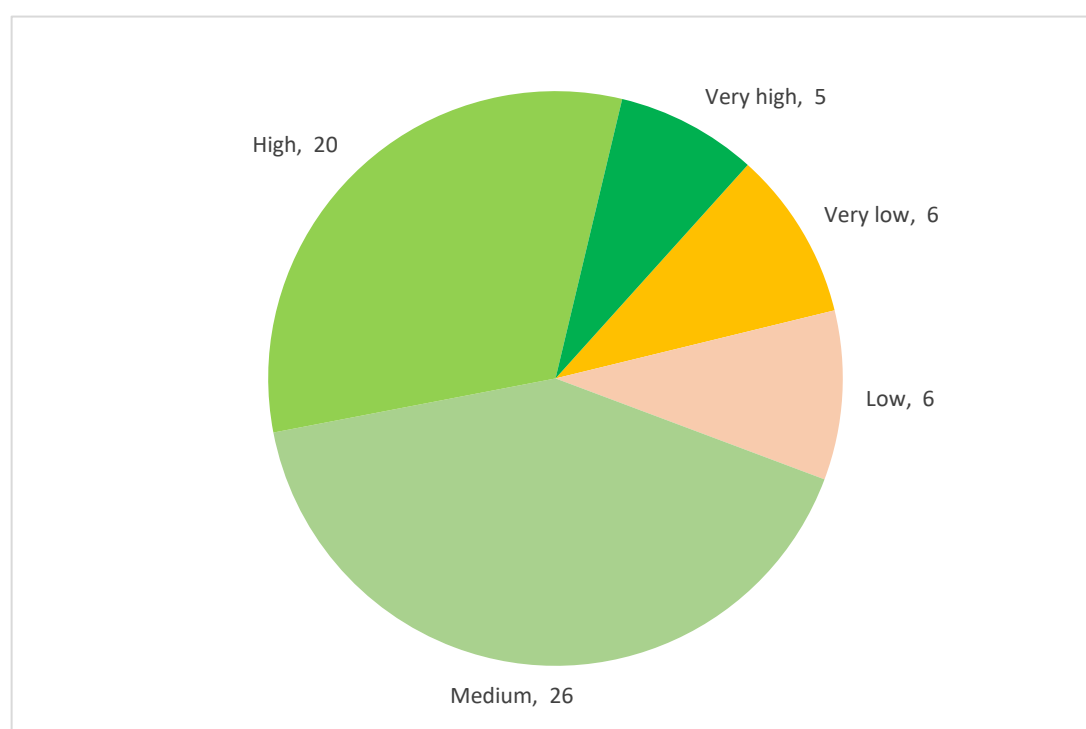
Table 23 Future water storages and attitudes to implementation

Ease of implementation	No. of respondents to Q18: How easy is it to construct a DAM onfarm?	No. of respondents to Q19: How easy is it to install WATER TANKS onfarm?	Portion of respondents: Ease of dam construction	Portion of respondents: Ease of tank installation
Easy	14	37	22%	58%
Moderate	22	20	34%	31%
Difficult	19	6	30%	9%
Impossible	9	1	14%	2%
Total	64	64	100%	100%

About 56% of respondents considered it easy to construct a dam onfarm. About 89% of respondents considered it achievable to install water tanks onfarm. Not everyone responded.

Respondents were asked what their level of support is for sharing a new (large) local 'community' water storage with several other growers. The responses are below.

Figure 22 Level of support for sharing a new local 'community' water storage?



The idea of shared community water storages is supported by 80% of respondents. Only 20% offered low or very low support.

5.15 QUESTIONS 21 TO 22 – OTHER QUESTIONS

This final section presents answers to the following questions.

Other questions	
21	Did you attend a Round 1 water meeting on 12 or 13 April 2022? (Yes / No)
22	Do you approve this confidential data being shared with SA Water to help design a solution? (Yes / No)

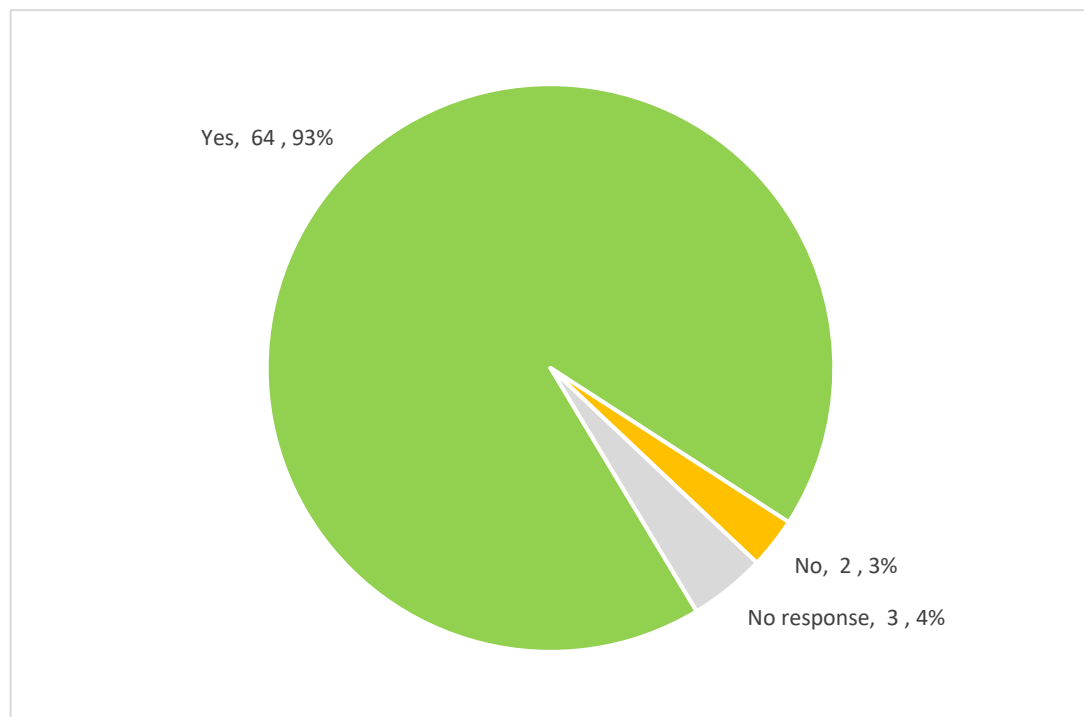
The following table presents how many respondents attended one of the five Round 1 meetings held for industry participants.

Table 24 Did you attend a Round 1 water meeting on 12 or 13 April 2022?

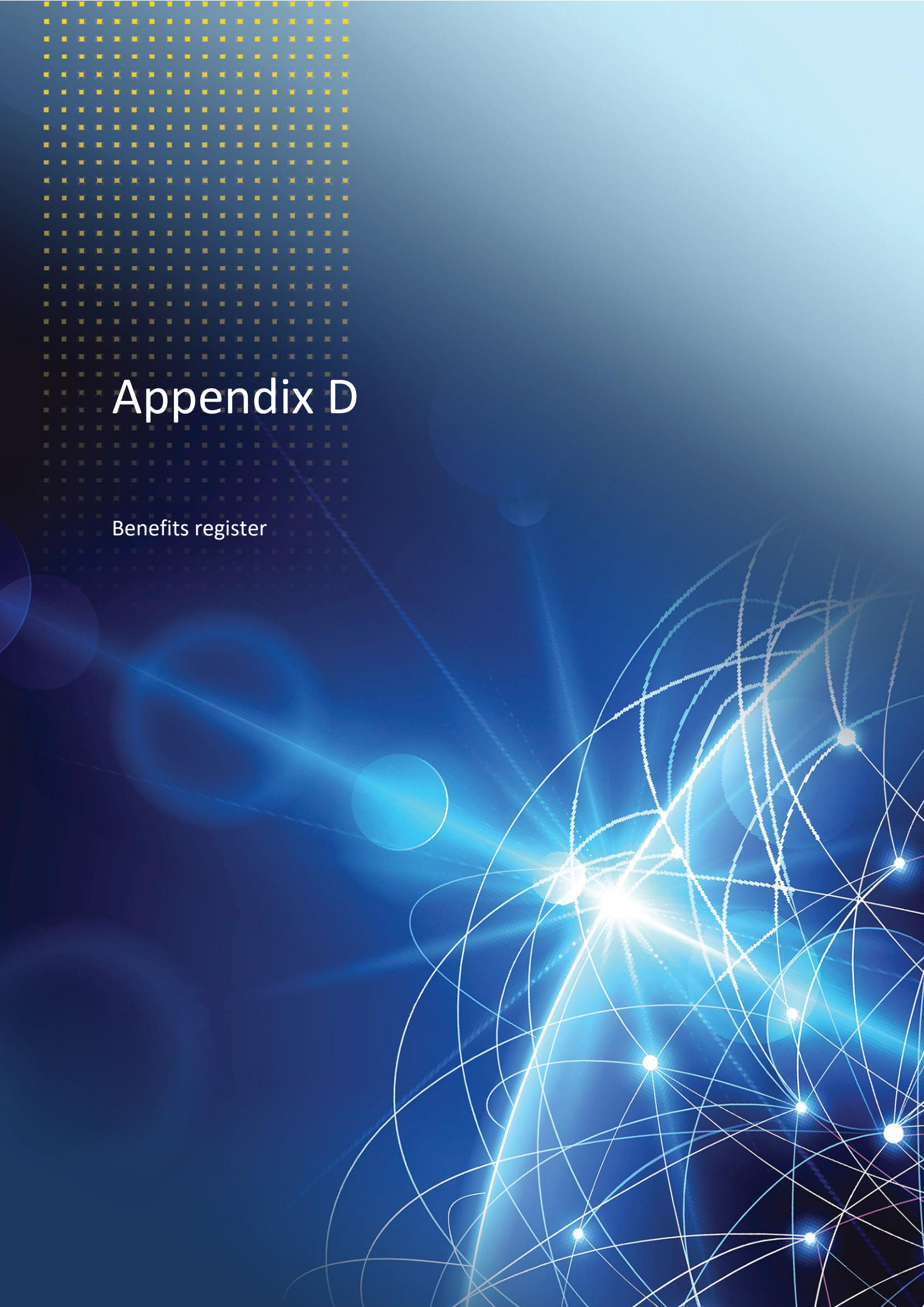
Response	No. of respondents	Portion of respondents
Yes	43	63%
No	25	37%
Total	68	100%

The following figure presents the result of the question: Do you approve this confidential data being shared with SA Water to help design a solution?

Figure 23 Do you approve this confidential data being shared with SA Water to help design a solution?



The respondent cohort is overwhelmingly (93%) in favour of sharing Round 1 data with SA Water.



Appendix D

Benefits register



Clare Valley Water Preliminary Case

Appendix D – Benefits Register

1 Benefits Register

1.1 KEY POINTS

The Benefits Register records the benefits identified during the preliminary business case (PBC) for Clare Valley Water project (the project). The benefits reflect how the project responds to the service need. The purpose of the Benefits Register at the PBC stage is to ensure the project is designed to achieve the benefits sought, and stakeholder needs are considered when identifying options.

The project shows strong benefits relating to social, environmental, cultural and employment outcomes.

1.2 METHODOLOGY

The development of benefits and the Benefits Register has proceeded throughout the development of the PBC. Details on benefit management are outlined in the environmental, social and economic chapters

1.3 INFORMATION RECORDED IN BENEFITS REGISTER

A quantitative benefit is superior to a qualitative benefit as the achievement of a quantitative benefit can be objectively measured; the benefit can be considered for the benefit–cost ratio (BCR) if it can be expressed in dollars.

Information is recorded in the Benefits Register under the following headings:

- Benefit—the benefit the project is anticipated to realise.
- Description—a description of how the benefit will address the service need.
- Service need— statement of problem/opportunity or proposed initiative the benefits relate to.
- Related stakeholders—the stakeholders who are related to the benefit, either as beneficiaries or through implementation. Identifying the stakeholders is important so they can be considered in the project development to achieve each benefit. For example, the operator of the potential scheme will be responsible for the delivery of potential benefits into the future.
- Potential beneficiary— the party expected to receive the benefit. For example, water entitlement purchasers are the potential beneficiaries of the water they purchase.
- Relative importance—importance of the benefit, considering the relative importance of different elements of the service need.

We have considered the relative importance from the perspective of the local community. Some benefits have a higher importance for the community than would be the case for a single group. For example, we expect the community will place a high importance on:

- Sustainable economic opportunities.
- Provision of community services and recreational opportunities.
- Local jobs.

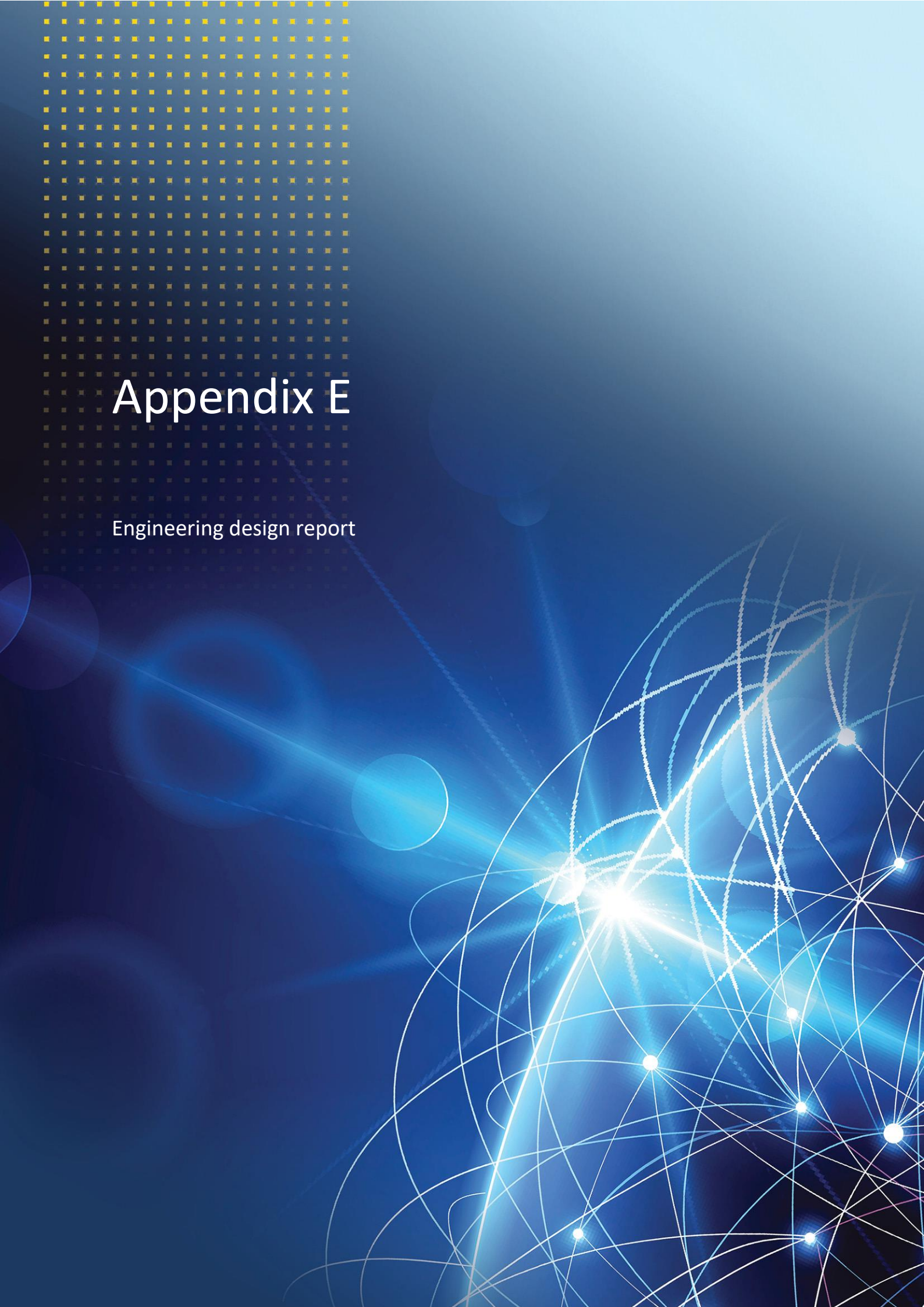
These benefits may have a low or medium importance for specific groups, for example water entitlement purchasers, who are potential funders of the project. However, other potential funders, such as the South Australian and Australian governments, would place a higher importance on the achievement of these benefits.

- Measure of realisation—the measure used to assess the realisation of the benefit and how well it responds to the service need.
- Baseline value (if known)—the measure of the benefit category in the base case; recording the baseline value allows measurement of the relative impact of the option. For many of the baseline statistics, the smallest ABS region is the Lower North SA3 region or the Clare and Gilbert Valleys local government area.
- Incremental target value (if known)—the incremental impact of the benefit on the baseline sought through the implementation of the project.
- Metric – the unit of measurement used for quantitative benefits.
- Chapter reference – a reference to the PBC chapter or appendix which provides additional information on the benefit.

Table 1 Benefits Register for Clare Valley Water project

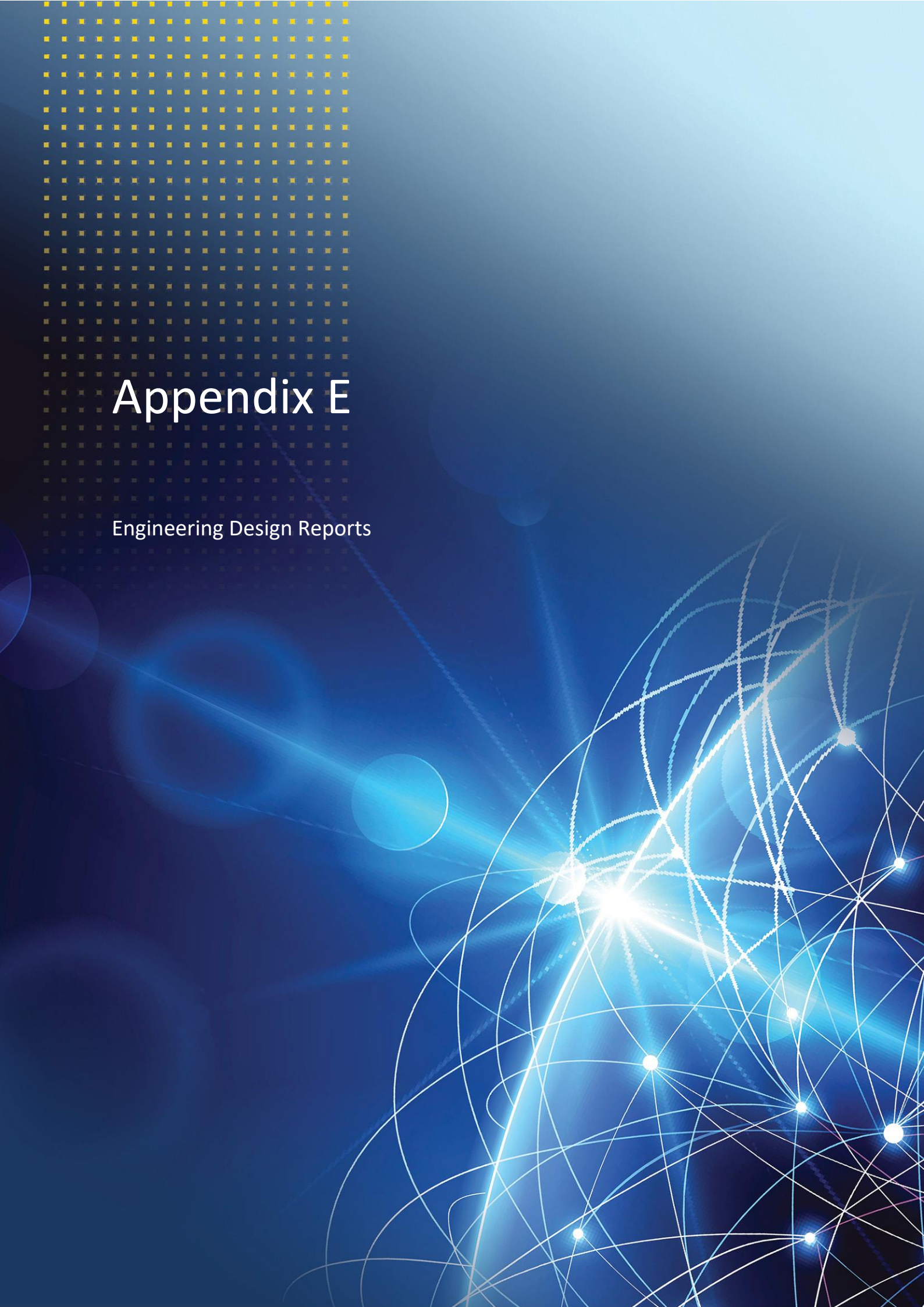
Benefit	Description	Service Need (problem or opportunity)	Related stakeholder/s	Potential beneficiary	Relative importance	Measure of realisation	Baseline value (if known)	Incremental target value (if known)	Metric	Chapter reference
Greater water security for the region	Reliable water that will ensure the region have a secure supply	Decreasing availability and quality of native water sources	Local businesses Local residents Local employees PIRSA	Local businesses Local residents Local employees PIRSA	Medium	Avoiding a decline in agricultural production and the impact of drought	TBC	TBC	million	Economics, finance and affordability chapters
Creation of new long-term jobs in the region	Increased long term employment opportunities	Potential for greater local commercial activity and investment	Landowners Local employees (existing and potential) Local businesses CVWGA PIRSA	Local businesses Local employees	High	Supported indirect agricultural employment	TBC	TBC	FTE	Economics, finance and affordability chapters
Increase in agricultural employment (incl. high value skilled employment)	Increased long term employment opportunities	Potential for greater local commercial activity and investment	Landowners Local employees (existing and potential) Local businesses CVWGA PIRSA	Landowners Local employees (existing and potential) Local businesses	High	Supported direct agricultural jobs	TBC	TBC	FTE	Economics, finance and affordability chapters

Benefit	Description	Service Need (problem or opportunity)	Related stakeholder/s	Potential beneficiary	Relative importance	Measure of realisation	Baseline value (if known)	Incremental target value (if known)	Metric	Chapter reference
Increase in employment during construction of project	Increased employment whilst project is being built	Potential for greater local commercial activity and investment	Local businesses Local employees (existing and potential) PIRSA	Local businesses Local employees (existing and potential)	Medium	Total construction employment	TBC	TBC	FTE	Economics, finance and affordability chapters
Agricultural production	Increased agricultural production, value and economic activity	Increase agricultural production	Landowners Local employees (existing and potential) Local businesses CVWGA PIRSA	Landowners Local employees (existing and potential) Local businesses	High	Direct industry value add of agricultural production through net margins of each enterprise using additional water	TBC	TBC	Agricultural production	Economics, finance and affordability chapters
New businesses will emerge and grow	New industries will emerge and flourish, including agriculture using additional water	Realising business opportunities and employment	Local businesses Local residents Local employees PIRSA	Local businesses Local employees	Medium	Increased agricultural revenue as a result of project	TBC	TBC	Million p.a	Economics, finance and affordability chapters
Improved environmental outcomes through substituting native water sources	Irrigators substitute native water sources with water from the project	Decreasing availability and quality of native water sources	Landowners Community DEW PIRSA	Landowners Community DEW	Medium	Improved health of native water sources in the region	TBC	TBC	TBC	TBC



Appendix E

Engineering design report



Appendix E

Engineering Design Reports

Clare Valley Water

Preliminary Business Case

Options Analysis: Technical Report

Prepared for: Department of Primary Industries and Regions

Date: 29 July 2022

Rev: 0



inside
infrastructure

Executive Summary

Background

The Clare Valley is considered a premium South Australian viticulture region that has produced long-term average annual yields of circa 20,000 tonnes of grapes.

The regions limited availability of natural surface water and groundwater resources to sustain wine grape plantings, with supply further supplemented by potable water supplied by South Australian Water Corporation (SA Water) via the Morgan-Whyalla pipeline. The Clare Valley Water Supply System (CVWSS) is utilised to transfer the bulk water from the Morgan-Whyalla pipeline for irrigation purposes.

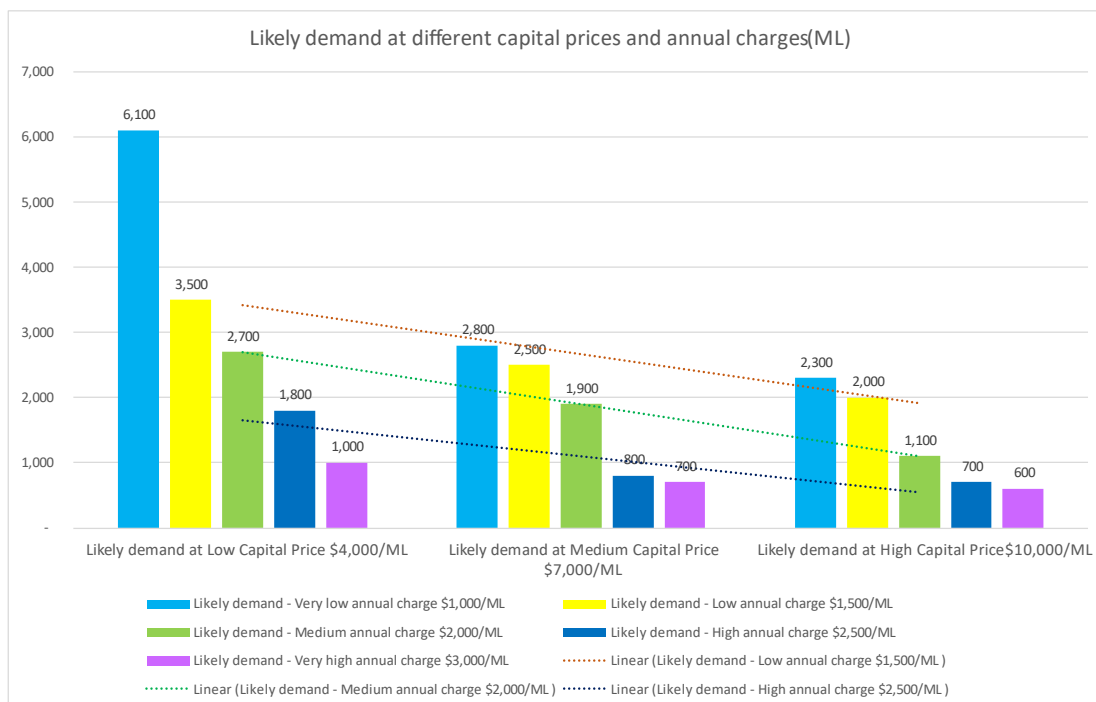
Declining long-term trends in annual rainfall has caused increased stress on local water resources and elevated stress on the CVWSS.

This Technical Options Assessment is part of the Clare Valley Water Preliminary Business Case (PBC) that Kellogg Brown & Root (KBR) is delivering for the Department of Primary Industries and Regions (PIRSA) in providing infrastructure options for the Clare region. The outcomes of this phase will inform the next phase - the Detailed Business Case (DBC).

The assessment of demand potential and customer willingness to pay has been undertaken in the region by KBR with this report documenting options feasibility and ability to meet the outcomes of this engagement process.

Engagement Outcomes

The KBR in-region engagement process identified through customer responses a range of water demands for different Capital Charge (upfront \$/ML) and Annual Charge (annual \$/ML) scenarios. The willingness to pay outcomes from this work are shown below, with the detailed analysis provided as part of the PBC.



From this willingness to pay assessment, there were ten scenarios that were progressed to assess the potential for different water source options to meet. The scenarios, with potential capital budget caps based on:

- 50:50 Grower : Government funding arrangements; and
- 25:75 Grower : Government funding arrangements.

This is represented below:

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/year)	Budget 50:50 (\$M)	Budget 25:75 (\$M)
L.1	1,000	4,000	6,100	48.8	97.6
L.2	1,000	7,000	2,800	39.2	78.4
L.3	1,000	10,000	2,300	46.0	92.0
M.1	1,500	4,000	3,500	28.0	56.0
M.2	1,500	7,000	2,500	35.0	70.0
M.3	1,500	10,000	1,900	38.0	76.0
H.1	2,000	4,000	2,700	21.6	43.2
H.2	2,000	7,000	1,900	26.6	53.2
H.3	2,000	10,000	1,100	22.0	44.0
H.4	2,500	4,000	1,800	14.4	28.8

There were higher price/charge options considered in the KBR engagement process, however all of these yielded demand below 1,000 ML/year.

Water Sources

Following the work undertaken in December 2021 to assess water source availability¹, five source options were considered to meet the scenarios from the KBR engagement process:

- Recycled water from the Adelaide Metropolitan wastewater treatment facilities
- Raw water from a standalone pipeline to the River Murray
- A direct connection to the Morgan Whyalla trunk system
- Connection to and extension of the existing Clare Valley Water Supply Scheme (CVWSS)
- The Bundaleer Reservoir, accessing a combination of catchment and Morgan-Whyalla source water.

¹ Clare Valley Water Strategic Supply Availability Review, Inside Infrastructure for PIRSA, December 2021

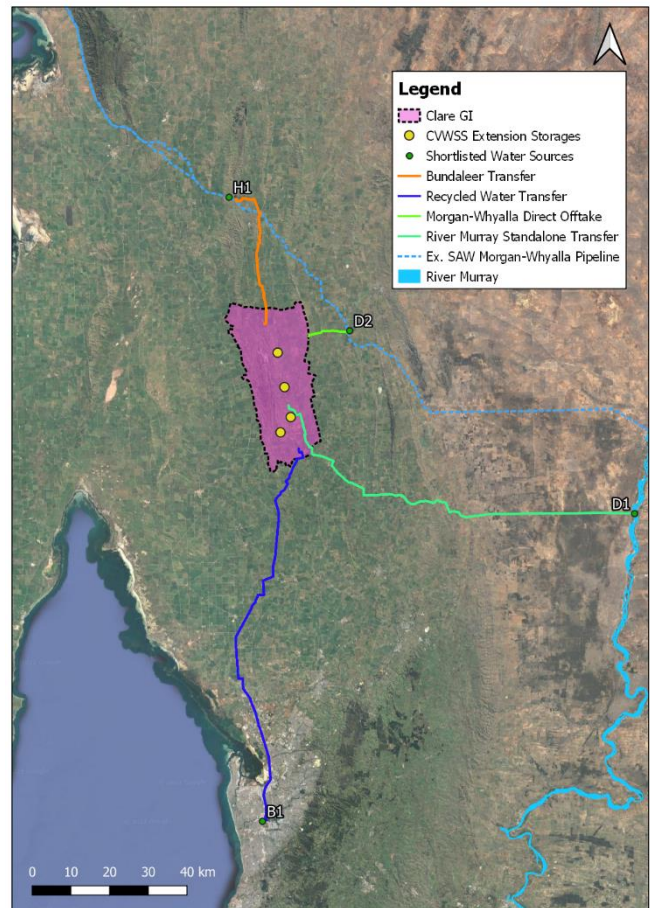
The direct connection to the Morgan Whyalla trunk system was ruled out from further assessment as the levels of demand resultant from the engagement process appeared to favour a series of connections to the existing CVWSS system instead. As both the direct Morgan Whyalla connection and CVWSS connection are targeting off-peak water through storage, it was considered that the CVWSS would have sufficient capacity (across the year) to meet demand and would not need a potentially costly new trunk main. This was further supported by the demand location information that did not favour an option connecting to the Morgan Whyalla in the Northeast of the region.

Assessment of Source Option Suitability

Initial engineering was undertaken on the four-remaining source/supply options to deliver water at scale to the Clare Valley to enable an assessment as to the probable (green), possible (amber) or unlikely (red) ability for a water supply scheme to be delivered for each of the ten willingness to pay scenarios. The options field was considered for both Capital Charge and Annual Charge components.

The cost basis for both components was indicative to support the suitability screening process and applied consistently across the field of 40 option scenarios (4 water option schemes x 10 budget options).

The outcomes of this assessment are in the table below (refer Appendix C.1 for full assessment):



Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	Recycled CAPEX (\$M)	Recycled OPEX (\$/ML)	Murray CAPEX (\$M)	Murray OPEX (\$/ML)	CVWSS CAPEX (\$M)	CVWSS OPEX (\$/ML)	Bundaleer CAPEX (\$M)	Bundaleer OPEX (\$/ML)
L.1	1,000	4,000	6,100	48.8	97.6	301	2,547	145	1,425	NA	NA	103	1,989
L.2	1,000	7,000	2,800	39.2	78.4	162	2,786	106	1,786	56	1,928	45	1,647
L.3	1,000	10,000	2,300	46.0	92.0	143	2,898	100	1,935	51	1,956	42	1,727
M.1	1,500	4,000	3,500	28.0	56.0	207	2,795	112	1,643	61	1,900	61	1,660
M.2	1,500	7,000	2,500	35.0	70.0	147	2,817	100	1,850	53	1,943	44	1,695
M.3	1,500	10,000	1,900	38.0	76.0	126	3,014	90	2,044	47	1,988	41	1,826
H.1	2,000	4,000	2,700	21.6	43.2	150	2,742	101	1,786	54	1,931	44	1,662
H.2	2,000	7,000	1,900	26.6	53.2	126	3,014	90	2,044	47	1,988	41	1,826
H.3	2,000	10,000	1,100	22.0	44.0	94	3,537	72	2,557	10	1,988	36	2,198
H.4	2,500	4,000	1,800	14.4	28.8	123	3,074	89	2,102	47	2,000	41	1,858

From this assessment process, two options were taken forward for further development to inform the PBC:

- A 3,000 ML/year supply from the CVWSS to community/private storage and irrigation system supply (drawing on scenarios H.1 and H.3)
- A 3,000 ML/year supply from the Bundaleer Reservoir through a new whole-region irrigation system (drawing on scenarios M.1, M.2 and H.2)

This assessment process was informed by demand location and likely scale information in GIS format from the engagement process delivered by KBR and the wider PBC team.

Selected Options Development

The selected options were modelled using WaterGEMS to assess (for PBC costing purposes). Key design decisions and assumptions to inform development, and improve economic outcomes included:

CVWSS Extension

- Option to work within the existing supply capacity of the CVWSS.
- Sufficient community storages located in close proximity to the existing CVWSS trunk systems to enable storage filling when there is capacity available (potential for filling to be regulated to enable a consistent overall CVWSS flow).
- The community storages act as a 'break' between the potable system (inlet to the storages) and the irrigation supply system(s) for customers in the Clare Valley. There is no further interconnection between the SA Water potable system and the irrigation system.

The above assumptions are to deliver a scheme that does not trigger a requirement for trunk main augmentation of the CVWSS as outlined in the SA Water memo², facilitated by significant community storage to manage inflow to within existing scheme capacity.

² Clare Valley Future Irrigation: Growth Scenarios. SA Water 11/04/2022

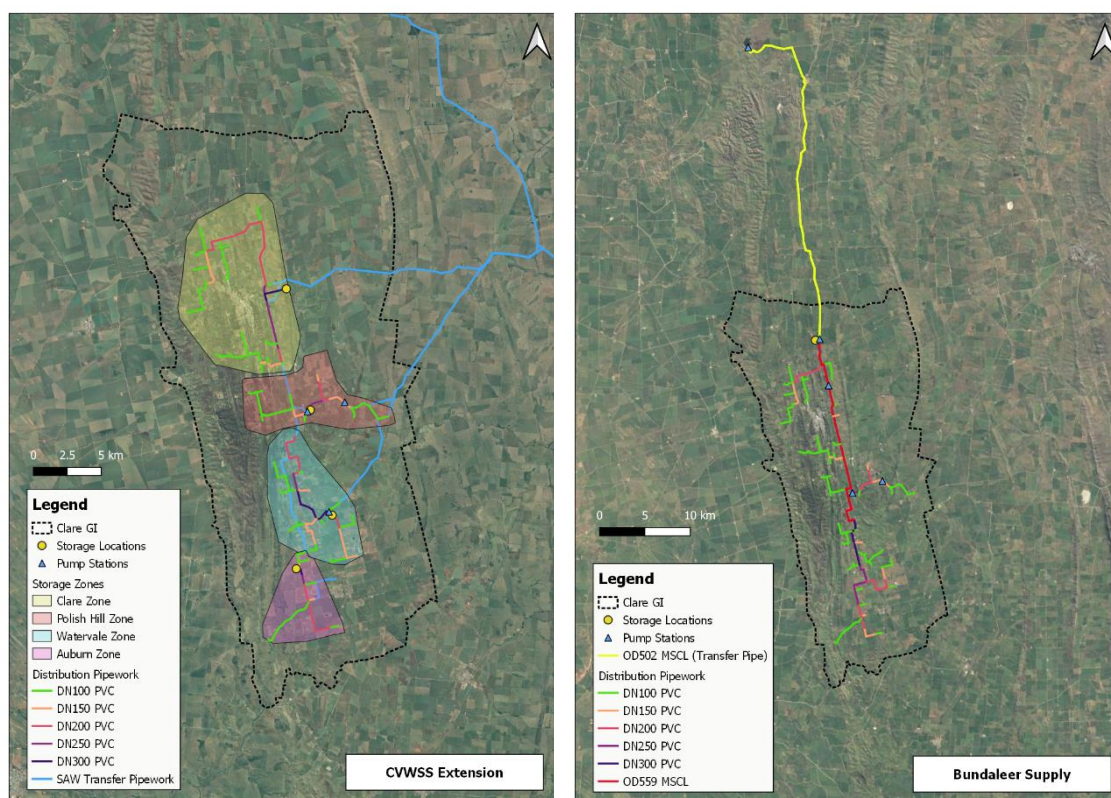
Bundaleer

- The level of water requirement from Bundaleer Reservoir would be within the operating levels currently adopted by SA Water for reservoir management.
- An allowance for a connection from the Morgan-Whyalla to the Bundaleer Reservoir is incorporated. The Morgan-Whyalla would also have direct connection capability to the Irrigation system.
- All other infrastructure works to be delivered to a suitable irrigation standard for on-supply to customers.

A summary of the infrastructure assets of each option is provided in the table below:

Asset Summary	CVWSS Extension	Bundaleer
PIPEWORK		
Distribution System	Pipe Length (m)	Pipe Length (m)
DN100 PVCO PN16	51,749	51,448
DN150 PVCO PN16	16,347	12,774
DN200 PVCO PN16	23,339	14,976
DN250 PVCO PN16	7,803	7,559
DN300 PVCO PN16	7,589	5,429
OD559 MSCL	-	22,872
Distribution Total	106,827	115,058
Transfer System		
OD502 MSCL	-	39,756
Transfer Total	-	39,756
Total Pipework	106,827	154,814
WATER STORAGEES		
	Capacity (ML)	Capacity (ML)
Storage 1	600	100
Storage 2	350	-
Storage 3	800	-
Storage 4	450	-
Total Storage Capacity	2,200	100
PUMP STATIONS		
	Pump Size (kW)	Pump Size (kW)
Transfer PS	-	930
Booster PS1	65	400
Booster PS2	7	400
Booster PS3	5	30
Booster PS4	-	5

The network layouts for both options are represented below:



Cost Summary

The assessed infrastructure cost for capital and annual to support the PBC process are:

- CVWSS Extension: \$72.4 million delivering water at a \$2,120/ML
- Bundaleer: \$102.1 million delivering water at a \$1,935/ML

A high-level summary of the components of the capital and annual costs are shown below:

Cost Area (Capital Cost)	CVWSS Extension (\$M)	Bundaleer (\$M)	Differential (\$M)
Pipeline system (including transfer/trunk)	15.9	49.2	33.3
Pumping	1.3	12.6	11.3
Storage	27.7	3.8	(23.9)
Direct Cost	44.9	65.6	20.7
Testing & Commissioning	0.4	0.7	0.3
Contractor preliminaries	1.3	2.0	0.7
Contractor margin/OH	3.2	4.6	1.4
Total Contract Cost	49.8	72.9	23.1
Training Levy	0.1	0.2	0.1
Land	2.8	0.2	(2.6)
Owners PM	3.8	5.5	1.7
Design	3.5	5.1	1.6
Contingency	12.4	18.2	5.8
Total Project Cost	72.4	102.1	29.7

Cost Area (Annual Cost)	CVWSS Extension	Bundaleer	Differential
Water Supply (\$M)	4.90	3.21	(1.70)
Maintenance (\$M)	0.24	0.27	0.03
Labour (\$M)	0.30	0.30	-
Pumping (\$M)	0.04	1.07	1.03
Annualised Asset Replacement (\$M)	0.87	0.95	0.08
Total Annual Cost (\$M)	6.35	5.80	(0.55)
Annual Charge (\$/ML rounded)	2,120	1,935	(185)

The outcomes from this assessment are that the CVWSS Extension option is most likely to be capable of meeting customer expectations and is recommended to be progressed for further consideration by the region and State government.

Areas that are recommended to be included in future studies to improve the understanding of the costs of a CVWSS Extension and potential benefits of this option are:

- Available capacity assessment of the CVWSS system in monthly timesteps, including further understanding of the 20 ML/day transfer capacity requirement/use within the CVWSS to supply the Swan Reach Paskeville system.
- Further cost analysis of the community storages assuming delivery as a program instead of individual project. This represents the greatest opportunity for downward pressure on the capital cost estimates and flow on to the operating cost estimates.
- Further engagement with the potential irrigation customer base in the region to increase understanding of peaking factors and peak/off-peak use to optimise storage sizes and structure a system that accesses an off-peak water product.

Abbreviations

BIL	-	Barossa Infrastructure Limited
BNW	-	Barossa New Water
CVWSS	-	Clare Valley Water Supply Scheme
DBC		Detailed Business Case
GI	-	Geographical Indicator
GL	-	Gigalitres
ha		Hectares
KBR		Kellogg Brown & Root
kWh		Kilowatt Hours
ML	-	Megalitres
MW		Megawatts
MWh		Megawatt Hours
NAIS	-	Northern Adelaide Irrigation Scheme
OH		Overheads
PBC	-	Preliminary Business Case
PIRSA	-	Department of Primary Industries and Regions
PM		Project Management
QS		Quantity Surveyor
SA Water	-	SA Water Corporation

Contents

Abbreviations	ix
1. Background and Scope of Review	2
1.1. Project Description and Purpose	2
1.2. Scope	2
1.2.1. Included in Review Scope	2
1.2.2. Excluded from Review Scope	2
2. Scenario Screening	4
2.1. Regional Engagement Outcomes	4
2.1.1. Willingness to Pay	4
2.1.2. Broader Learnings	5
2.2. Options for Screening	5
2.3. Design Assumptions for Scenario Screening	8
2.3.1. Capital Assumptions	8
2.3.2. Annual Charge Assumptions	8
2.3.3. Design Assumptions Summary	9
2.4. Screening Outcomes	10
3. Options Analysis	11
3.1. Options for Analysis	11
3.1.1. Design Assumptions	11
3.1.2. Volume and Distribution of Demand	11
3.2. Option 1: CVWSS Extension	12
3.2.1. Irrigation System	13
3.2.2. DBC Recommendations	15
3.3. Option 2: Bundaleer	15
3.3.1. Trunk System and Storage	15
3.3.2. Irrigation System	16
3.3.3. DBC Recommendations	17
4. Cost Comparison	18
4.1. Cost Basis	18
4.1.1. Capital Cost Estimates	18
4.1.2. Operating Cost Estimates	18
4.2. Option 1: CVWSS Extension	19
4.2.1. Capital Cost	19
4.2.2. Operating Cost	19
4.2.3. 3,000 ML Storage Scenario	20
4.3. Option 2: Bundaleer	20

4.3.1. Capital Cost	20
4.3.2. Operating Cost	21
4.4. Cost Comparison	21
4.5. Preferred Option	22
5. Recommendations	23
5.1. Water Source	23
5.2. Water Storage	23
5.3. Water Distribution	23

Tables

Table 1.1: Declining Trend in Annual Rainfall	2
Table 2.1: Options Field Budget Scenarios	8
Table 2.2: Capital and Annual Charge Scenario Basis	9
Table 2.3: Shortlist Screening Summary	10
Table 3.1: CVWSS Extension Option Pipe Lengths	15
Table 3.2: Bundaleer Option Pipe Lengths	16
Table 4.1: Capital Cost Comparison Basis	18
Table 4.2: Operating Cost Comparison Basis	18
Table 4.3: CVWSS Extension Option Capital Cost Summary	19
Table 4.4: CVWSS Extension Option Operating Cost Summary	19
Table 4.5: Bundaleer Option Capital Cost Summary	20
Table 4.6: Bundaleer Option Operating Cost Summary	21
Table 4.7: Option Capital Cost Comparison	21
Table 4.8: Option Operating Cost Comparison	22

Figures

Figure 2.1: Customer Willingness to Pay	4
Figure 2.2: Long-listed Options Geographical Location from Clare GI	6
Figure 2.3: Project Area of Short-listed Options	7
Figure 3.1: Customer Demand and Supply Zones	12
Figure 3.2: 500 ML Auburn Terra Rossa Storage	13
Figure 3.3: Auburn Terra Rossa Embankment	13
Figure 3.4: Berrimans Dam	13
Figure 3.5: CVWSS Extension System	14
Figure 3.6: Bundaleer Reservoir	15
Figure 3.7: Junction of Spring Farm Rd and Farrell Flat Rd	16
Figure 3.8: Bundaleer Option System	17

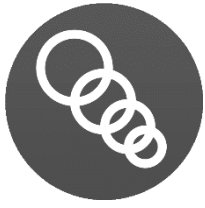
Appendices

Appendix A Options Screening

Appendix B Hydraulic Modelling

Appendix C Cost Estimates

Appendix D Basis of Design Report



1. Background and Scope of Review

1.1. Project Description and Purpose

The Clare Valley is considered a premium South Australian viticulture region that has produced long-term average annual yields between 20,000-25,000 tonnes of grapes.

The regions limited availability of natural surface water and groundwater resources sustain wine grape plantings, with supply further supplemented by potable water supplied by South Australian Water Corporation (SA Water) via the Morgan-Whyalla pipeline. The Clare Valley Water Supply System (CVWSS) is utilised to transfer the bulk water from the Morgan-Whyalla pipeline for irrigation purposes.

Declining long-term trends in annual rainfall has caused increased stress on local water resources and elevated stress on the CVWSS (Table 1.1).

Table 1.1: Declining Trend in Annual Rainfall³

Time Period	Annual Rainfall (mm)
1961-1990	568
1991-2020	529
2020-2021*	443

*July 2020-June 2021

1.2. Scope

The purpose of the Options Analysis is to assess infrastructure supply options for the Clare Valley, based on prior investigations.

The primary output will be a Technical Report (this report) as part of the Preliminary Business Case (current phase) that establishes which option sets can respond to the willingness to pay and demand information from the region - as well as

offer future growth potential. This will inform the work in the Detailed Business Case (next phase).

1.2.1. Included in Review Scope

The review scope includes:

- Determination of which water supply options can meet the demand levels resulting from the (first round) region engagement process
- Assessment (high level) of water supply scenarios against the region engagement (first round) outcomes (demand, capital charge and annual charge)
- Selection of preferred option(s) for further development and distribution system modelling
- Preparation of capital and annual cost estimates suitable to support the PBC development.

1.2.2. Excluded from Review Scope

The following items are excluded from the scope of the Technical Assessment:

- Demand analysis, assessment or engagement (delivered for PBC by KBR)
- Hydrological assessment of catchments or hydrogeological assessment of aquifers (for DBC consideration if applicable)
- Field assessment of pipeline routes, land access or geotechnical conditions (for DBC consideration)
- Contractor-pricing of supply options (for DBC consideration)

³ Regional Snapshot 2020-21, Clare Valley, Wine Australia 2021

- Engagement on source water pricing beyond that already undertaken in prior Clare (for DBC consideration).



2. Scenario Screening

The assessment considered a suite of water supply scenarios to respond customer engagement on capital and annual contributions and resultant scheme size.

2.1. Regional Engagement Outcomes

KBR delivered extensive engagement in the Clare region that considered willingness to pay and a number of other factors that would inform a potential supply scheme.

2.1.1. Willingness to Pay

The willingness to pay assessment delivered different likely demand for water based on a range of capital contribution levels (\$4,000/ML to \$10,000/ML) and annual water charges (\$1,000/ML to \$3,000/ML).

The outcomes of this process are represented in Figure 2.1 and range from water demand levels of >6,000 ML/year for a low capital contribution and low annual charge through to <1,000 ML/year at the high-cost scenarios.

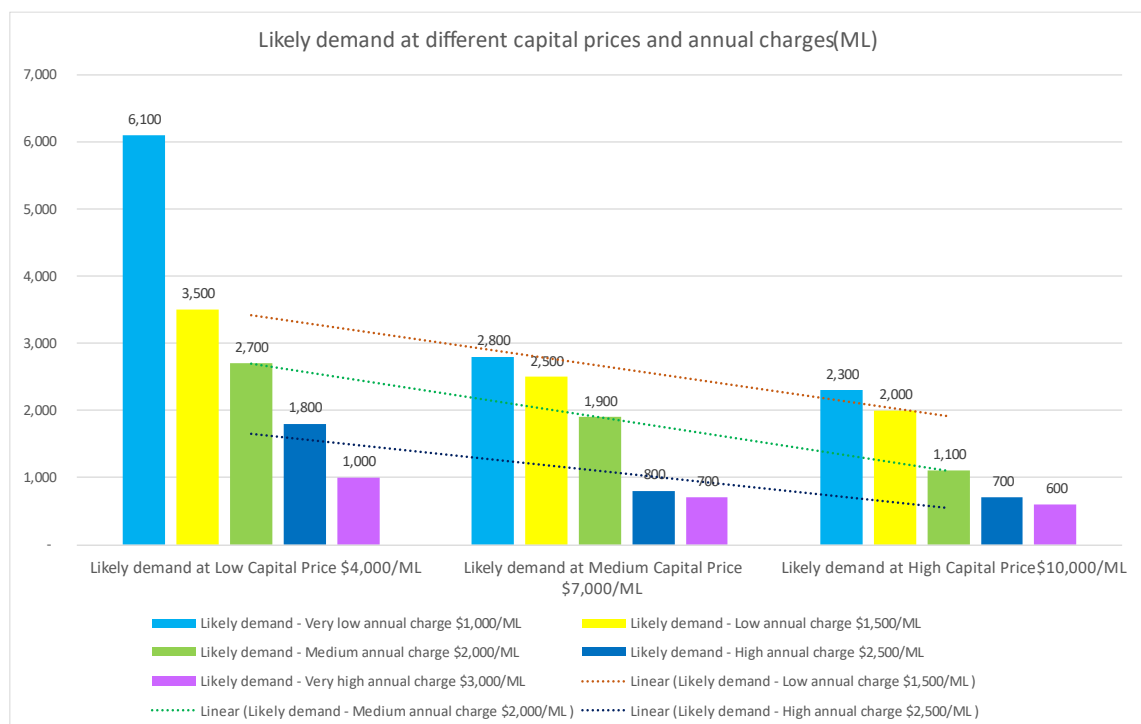


Figure 2.1: Customer Willingness to Pay

The process demonstrated that the region has a higher sensitivity to the annual charge than capital contribution.

The engagement process also gave a level of confidence for a 3,000 ML/year water supply

scheme if a Capital Charge in the \$4,000 - \$7,000/ML range and an Annual Charge in the \$1,500 - \$2,000/ML could be realised.

All options demonstrating a potential demand greater than 1,000 ML/year were included in the scenario screening process.

2.1.2. Broader Learnings

Some of the broader learnings from the engagement process that inform the options analysis process include:

- The peak month (January) has 19% of the annual water usage applied to irrigation, with 72% used for irrigation over the December to April (inclusive) higher tariff period
- A relatively high percentage (58%) of customers believe that their properties are suitable (easy or moderate constructability) for water storage to be constructed (scale not specified)
- A preference for a recycled water source, followed by potable then raw River Murray was represented, although all three options were considered suitable

- The majority (70-75%) of the water used for irrigation by CVWSS customers surveyed is already accessed during the off-peak tariff (April/May to November) period.

2.2. Options for Screening

The options analysis assessed how well different water supply options were able to meet Capital Charge and Annual Charge willingness to pay learnings from the (first round) in region engagement process.

Four supply options selected were based on the outcomes of the previous PBC work on Water Source Availability⁴, which assessed a long list of 38 water source options across aquifer, surface, river, recycled and desalinated water source options.

The geographical locations of earlier water source long list assessment are shown in Figure 2.2 along with water sources carried forward to the short list.

⁴ Clare Valley Water Strategic Supply Availability Review, Inside Infrastructure (for PIRSA), December 2021

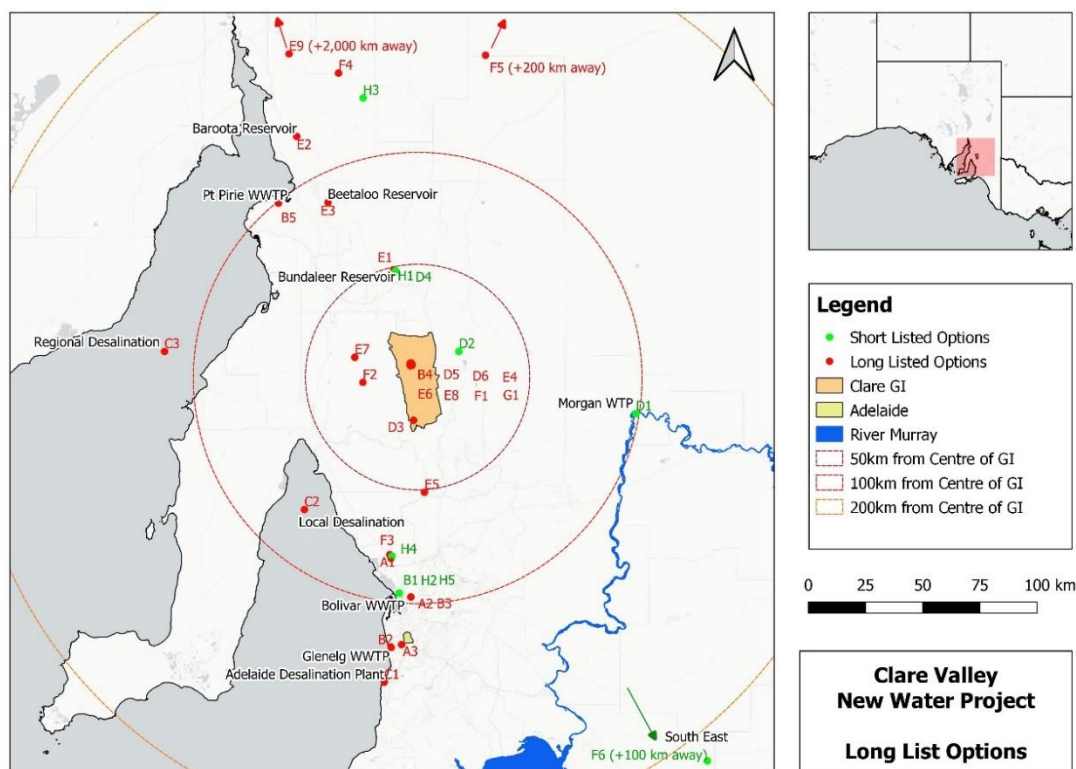


Figure 2.2: Long-listed Options Geographical Location from Clare GI

The water supply options carried forward to the short list consisted of:

- Recycled water from the Adelaide metropolitan wastewater and recycled water treatment facilities (B1)
- Raw water from the River Murray (D1)
- Potable water from the CVWSS (D2)
- A mixed water supply from Bundaleer Reservoir from catchment (raw) and Morgan Whyalla (potable) sources (H1).

The water sources and potential connection to the Clare GI (as part of the PBC) are shown in Figure 2.3.

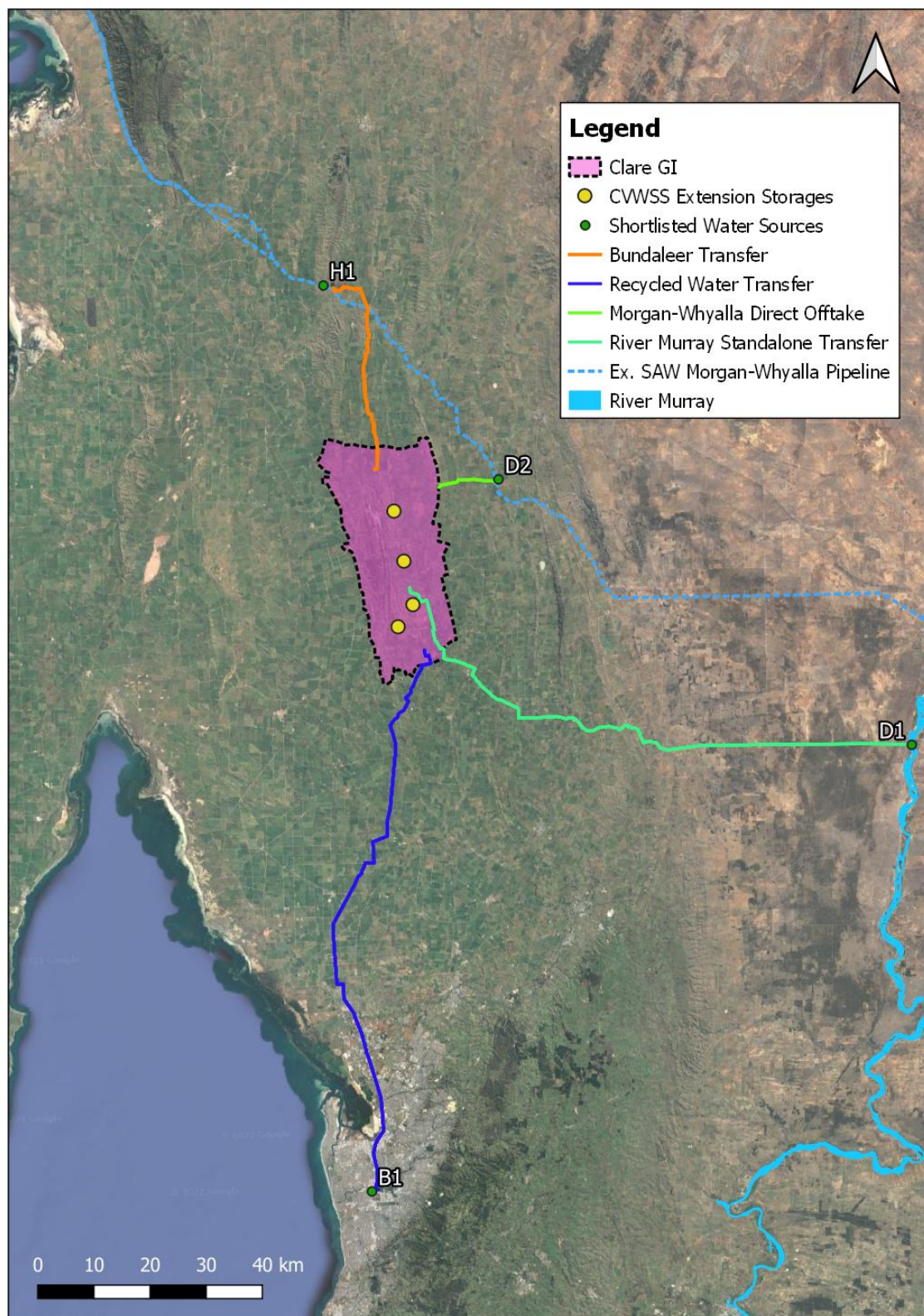


Figure 2.3: Project Area of Short-listed Options

Based on the engagement outcomes presenting ten (10) pricing scenarios of >1,000 ML/year of demand and the consideration of four (4) water supply source options to meet potential demand, a resultant matrix of forty (40) scenarios were considered.

The ten (10) pricing scenarios with potential capital project budget based on different levels of government contribution/funding is shown in Table 2.1.

Table 2.1: Options Field Budget Scenarios

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/year)	Budget 50:50 (\$M)	Budget 25:75 (\$M)
L.1	1,000	4,000	6,100	48.8	97.6
L.2	1,000	7,000	2,800	39.2	78.4
L.3	1,000	10,000	2,300	46.0	92.0
M.1	1,500	4,000	3,500	28.0	56.0
M.2	1,500	7,000	2,500	35.0	70.0
M.3	1,500	10,000	1,900	38.0	76.0
H.1	2,000	4,000	2,700	21.6	43.2
H.2	2,000	7,000	1,900	26.6	53.2
H.3	2,000	10,000	1,100	22.0	44.0
H.4	2,500	4,000	1,800	14.4	28.8

In representing the region's sensitivity to Annual Charge, the scenarios were banded into 'Low' (\$1,000/ML), 'Medium' (\$1,500/ML) and 'High' (\$2,000 - \$2,500/ML) groupings.

The capital budget range was developed based on:

- Low bound: 50% region and 50% government funding
- High bound: 25% region and 75% government funding

The level of upfront region investment was based on the Capital Charge (\$/ML) multiplied by the stated/likely demand (ML/year) for each scenario.

2.3. Design Assumptions for Scenario Screening

The overall design basis for this technical assessment is provided in Appendix D. Key assumptions adopted to inform the screening of the forty (40) option scenarios included:

- Distribution system would not be costed for the screening assessment
- MSCL pipe to be adopted for all trunk assets
- Trunk main sizing is based on a velocity of 1.2 m/s.

2.3.1. Capital Assumptions

The capital cost build-up was based on construction costs plus an allowance for contingency and owners cost to benchmark between the different options. The assessment included costs for:

- Trunk main
- Storage
- Pumping Stations
- Treatment

Distribution costs were not considered directly.

2.3.2. Annual Charge Assumptions

The annual charge for each scenario was represented by a cost build-up of:

- Source water price
- An allowance for asset renewal
- An allowance for O&M and Management
- Energy
- Treatment costs (where applicable)

The assumptions adopted for the scenario screening included:

- Water from the River Murray is assumed as \$250/ML based on the long term average (\$200/ML plus a 25% contingency for screening purposes).
- SA Water May - November price (\$1,308/ML)⁵ November - April night-time (\$1,790/ML)⁶ and November - April peak (\$2,896/ML)⁷ were based on current agreements with Clare customers
- A water demand of above 1,000 ML/year in total
- Recycled water price assumed is \$540/ML based on current NAIS offer⁸
- Water from Bundaleer catchment assumed a nominal \$200/ML price

- **Asset renewal** percentage for each option was assessed based on each asset class (trunk pipeline, storage, pumping station and treatment plant) requirement
- **Operations and Management** was based on a lump sum component management fee plus an allowance for maintenance based on a percentage varied for each option based on asset class requirements
- An **energy** price/cost of \$0.20/kWh was assumed for all scenarios in the options screening.

There was no 'profit' component considered.

Where options include or utilise SA Water assets, the above allowances were proportioned to represent a fair comparison of the expected Annual Charge.

2.3.3. Design Assumptions Summary

The basis for the capital and annual charge assessments for the options/scenarios is summarised in Table 2.2.

Table 2.2: Capital and Annual Charge Scenario Basis

Water Supply Option	Recycled	River Murray	CVWSS	Bundaleer
Capital Cost				
Trunk main	Irrigation standard	Irrigation standard	Potable standard (50% increase cost) Capacity factor (1.5) for future demand	Irrigation standard. Peaking factor) applied to transfer water to Clare GI based on peak month.
Storage	All water taken off peak (100% storage) Private/Existing: New storage ratio of 1:2 All storage is lined above ground turkey nest.	All year-round supply with 50% assumed in storage	Two thirds of water supply volume stored to capture off-peak water pricing	Water storage cap in reservoir of 3,000 ML with 1,000 ML private storage potential. \$2.5 million Morgan-Whyalla connection cost included. 100 ML Terminal storage.

⁵ SA Water: Barossa Valley, Eden Valley and Clare Valley Water Transportation. Schedule of Charges 2021-2022

⁶ SA Water: Clare Valley Peak Water Transportation, Schedule of Charges 2021-2022

⁷ SA Water Pricing Schedule Rates and Sales 2022-23

⁸ www.sawater.com.au/nais/invest-in-nais

Water Supply Option	Recycled	River Murray	CVWSS	Bundaleer
Pumping	Four pumping stations	Four pumping stations	Allowance for upgrade to Mintaro PS based on demand	Single pump station at Bundaleer
Treatment	New advanced treatment and desalination plant at Bolivar. A 2:1 blending ratio to achieve TDS.	NA	NA	NA
Annual Charge				
Water price	\$540/ML	\$250/ML	\$1,500 - \$1,990/ML inclusive of River Murray \$250/ML	\$1,000/ML to \$1,300/ML effective based on demand and catchment allowance
Asset renewal %	1.4%	1.6%	0.5%	1.6%
O&M	\$300K + 0.70%	\$300K + 0.61%	\$200K + 0.55%	\$300K + 0.61%
Energy	\$250/MWh (PS + Desal)	\$250/MWh	\$250/MWh	\$250/MWh

2.4. Screening Outcomes

The main outcomes from the screening process included:

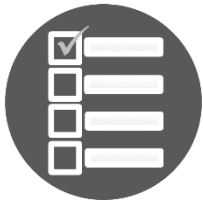
- Recycled water from metropolitan Adelaide does not appear to be cost effective under any scenarios
- Direct River Murray supply expected capital costs does not meet budget allowances from engagement outcomes

- The CVWSS has potential to meet region expectations at or near the high (\$2,000/ML Annual Charge) pricing
- The Bundaleer Reservoir option has the potential to meet engagement outcomes at a pricing between the medium (\$1,500/ML Annual Charge) and high (\$2,000/ML Annual Charge) scenarios depending on distribution requirements

The process and results are further described in Appendix A, with a summary of the options and comparative screening costs provided in Table 2.3 below.

Table 2.3: Shortlist Screening Summary

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	Recycled CAPEX (\$M)	Recycled OPEX (\$/ML)	Murray CAPEX (\$M)	Murray OPEX (\$/ML)	CVWSS CAPEX (\$M)	CVWSS OPEX (\$/ML)	Bundaleer CAPEX (\$M)	Bundaleer OPEX (\$/ML)
L.1	1,000	4,000	6,100	48.8	97.6	301	2,547	145	1,425	NA	NA	103	1,989
L.2	1,000	7,000	2,800	39.2	78.4	162	2,786	106	1,786	56	1,928	45	1,647
L.3	1,000	10,000	2,300	46.0	92.0	143	2,898	100	1,935	51	1,956	42	1,727
M.1	1,500	4,000	3,500	28.0	56.0	207	2,795	112	1,643	61	1,900	61	1,660
M.2	1,500	7,000	2,500	35.0	70.0	147	2,817	100	1,850	53	1,943	44	1,695
M.3	1,500	10,000	1,900	38.0	76.0	126	3,014	90	2,044	47	1,988	41	1,826
H.1	2,000	4,000	2,700	21.6	43.2	150	2,742	101	1,786	54	1,931	44	1,662
H.2	2,000	7,000	1,900	26.6	53.2	126	3,014	90	2,044	47	1,988	41	1,826
H.3	2,000	10,000	1,100	22.0	44.0	94	3,537	72	2,557	10	1,988	36	2,198
H.4	2,500	4,000	1,800	14.4	28.8	123	3,074	89	2,102	47	2,000	41	1,858



3. Options Analysis

3.1. Options for Analysis

The two options taken forward for further development are:

- **CVWSS Extension:** A 3,000 ML/year scheme utilising the CVWSS as a source of predominately off-peak water (captured in new 'community' storages) for irrigation to customers.
- **Bundaleer:** A 3,000 ML/year scheme utilising the Bundaleer Reservoir as an off-peak storage and to capture low-cost catchment water to potentially reduce Annual Charge.

Both options have been modelled in WaterGEMS to inform infrastructure location, sizing and material selection to best-represent the ability of each selected option to meet customer willingness to pay expectations from the engagement process.

3.1.1. Design Assumptions

The key design assumptions that informed the cost estimation and options assessment were:

1. Adopting water demand levels and seasonal supply arrangements to minimise impact and augmentation requirements on existing infrastructure
2. Customer use peaking factors:
 - a. **Peak month** factor of 2.4 based on January water demand of 19% of annual use with a 95% water infrastructure availability factor applied
 - b. **Peak week** factor for supply from transfer systems to farm gate of 3.6 which assumes that each customer can access 1% of their water requirement on any given day at target pressures
3. Water pressure to customers is based on the BIL initial prospectus and allows:

- a. Target delivery of 20m head
 - b. Guaranteed delivery of 10m head
 - c. 'by exception' allowance for <10m head
4. Storage location is indicative and is selected where:
 - a. Geographically supports system
 - b. Appears to have reasonable topography
 - c. Is not currently under vineGeotechnical analysis of individual storage sites has not been undertaken at this stage.
 5. Pumping station locations are indicative based on:
 - a. Hydraulic requirement from modelling
 - b. Respective locations of storages
 - c. Consideration of power supply

Further information on design assumptions is provided in Appendix D.

3.1.2. Volume and Distribution of Demand

A consistent distribution of demand was applied for each progressed option supported by:

1. Customer demand based on:
 - a. Location information from KBR's in-region and survey engagement processes
 - b. A total volume (ML) requirement of 4,300 ML/year factored to 3,000 ML/year based on willingness to pay
 - c. Factoring was applied evenly across all prospective demand customers.
2. Acknowledgement that some (approx. 6% potential likely demand) of the customers that responded are non-economically located and would not be included in the PBC options
3. Establishment of supply zones in the region

Indicative customer demand information was provided in GIS format and is shown in Figure 3.1 with the inclusion of the supply zones to support this process.

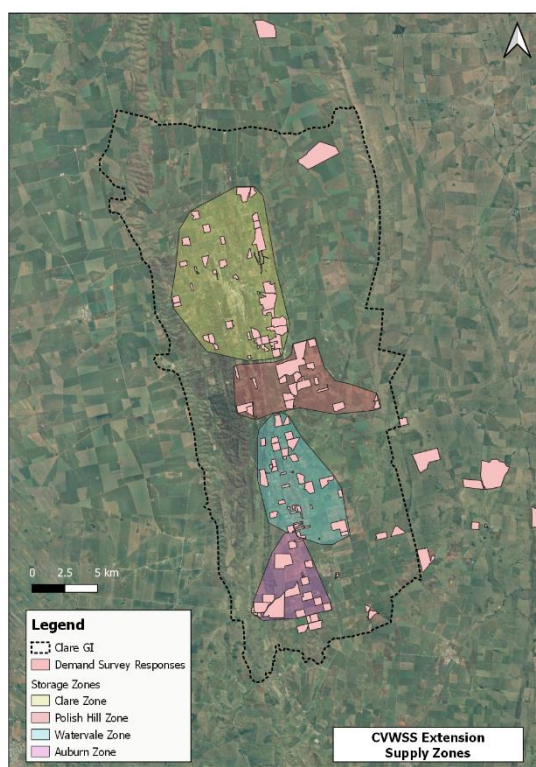


Figure 3.1: Customer Demand and Supply Zones

3.2. Option 1: CVWSS Extension

The CVWSS Extension option accesses potable supply from the CVWSS and supplies water for irrigators via large community storages.

The existing CVWSS trunk system will provide water during predominately off-peak tariff periods to a series of four major lined 'community' storages.

Trunk System

The CVWSS is understood to currently have a capacity of 38 ML/day above domestic (residential/commercial) customer requirements,

which includes a 20 ML/day bulk water transfer capacity between the Morgan-Whyalla and Swan Reach-Paskeville systems.⁹

The adoption of the large storages is to maintain an even demand on the CVWSS with the opportunity to adjust inflows to manage demand requirements elsewhere in the trunk system. This should enable the additional irrigation volume of 3,000 ML/year to be captured to best suit the CVWSS system capacity levels around the Swan Reach transfer requirements and preferable grower tariff arrangements.

For costing purposes, 2,200 ML of storage was considered, to be filled during the winter off-period. This aligns with the peak season demand percentage of 72% (December to April inclusive) from the KBR engagement process.

The remaining 800 ML is assumed to be provided at the night-time tariff over the peak irrigation season as a conservative basis, however this may be able to be managed to be supplied to customers during the off-peak season, attracting a greater proportion of the off-peak tariff.

It is recommended that a DBC seek clarification on the requirements for the 20 ML/day transfer arrangement.

Community Storages

The 2,200 ML of storage was divided across four sites:

- 600 ML - East of the Clare township
- 350 ML - Polish Hill
- 800 ML - East of Watervale
- 450 ML - West of Auburn

The costs for construction of new storages were informed by seeking budget estimates for current (2022) costings for recently constructed storages including two in the Clare Valley¹⁰. Both the Clare

⁹ Clare Valley Future Irrigation: Growth Scenarios. SA Water 11/04/2022

¹⁰ Budget costing was sought from Exact Contracting who constructed both the Clare reservoirs and the McLaren Vale

example. Costs included all earthworks, piping, liner and civil. construction/commissioning costs including and within the fenced perimeter.

storages had considerable rock management requirements.

The 500 ML Auburn Terra Rossa Storage¹¹ (Figure 3.2 and Figure 3.3) was constructed in 2019 with a 2022 cost estimate of \$6.5 million.



Figure 3.2: 500 ML Auburn Terra Rossa Storage



Figure 3.3: Auburn Terra Rossa Embankment

The Berrimans Dam¹² (Figure 3.4) was constructed in 2018/19 to store 350 ML, hard rock towards the floor of the dam was encountered which required rock hammering. The 2022 estimate for this storage was \$3.9 million.



Figure 3.4: Berrimans Dam

The fencing and civil treatment allowed for the storages in the CVWSS Extension option will be consistent with that provided for the privately storages similar to the above.

The land area assumed for acquisition/long term leasing to accommodate the storages was 70 hectares in total. The cost/ha assumed was \$40,000/ha, which is consistent with estimates for the BNW DBC work¹³ and believed to be conservative as Clare rural land is typically 60% Barossa cost (\$/ha)¹⁴.

The storages are lined and uncovered of scale 350 ML up to 800 ML and will feed an irrigation quality supply system structured in zones associated with each major storage.

3.2.1. Irrigation System

The four zones for the irrigation system are represented previously in Figure 3.1, with the potential customer demands represented in each zone.

From each of the storages, water is supplied through a PVC pipeline system that:

- Is sized to accommodate a 'peak week' demand scenario whereby 1% of every customer's water can be accessed on a given day whilst maintaining target pressures

¹¹ <https://exactcontracting.com.au/projects/auburn-terra-rossa-storage/>

¹² <https://exactcontracting.com.au/projects/berrimans-carlsfield-dams/>

¹³ Barossa New Water Detailed Business Case (Draft), June 2022

¹⁴ Australian Farmland Values, 2020 South Australia, Rural Bank

- The system was further tested with a peaking factor of 4.8 (i.e. 1.5% of water on a given day) for pipe sizing purposes to provide water at positive (not target) pressure to the farm gate
- The system includes booster pumping to meet the peak week scenario (can be

upgraded in the future to accommodate the higher 1.5%/day factor)

A schematic of the CVWSS Extension option modelled in WaterGEMS is provided in Figure 3.5 with a summary of the pipe sizes in Table 3.1 below.

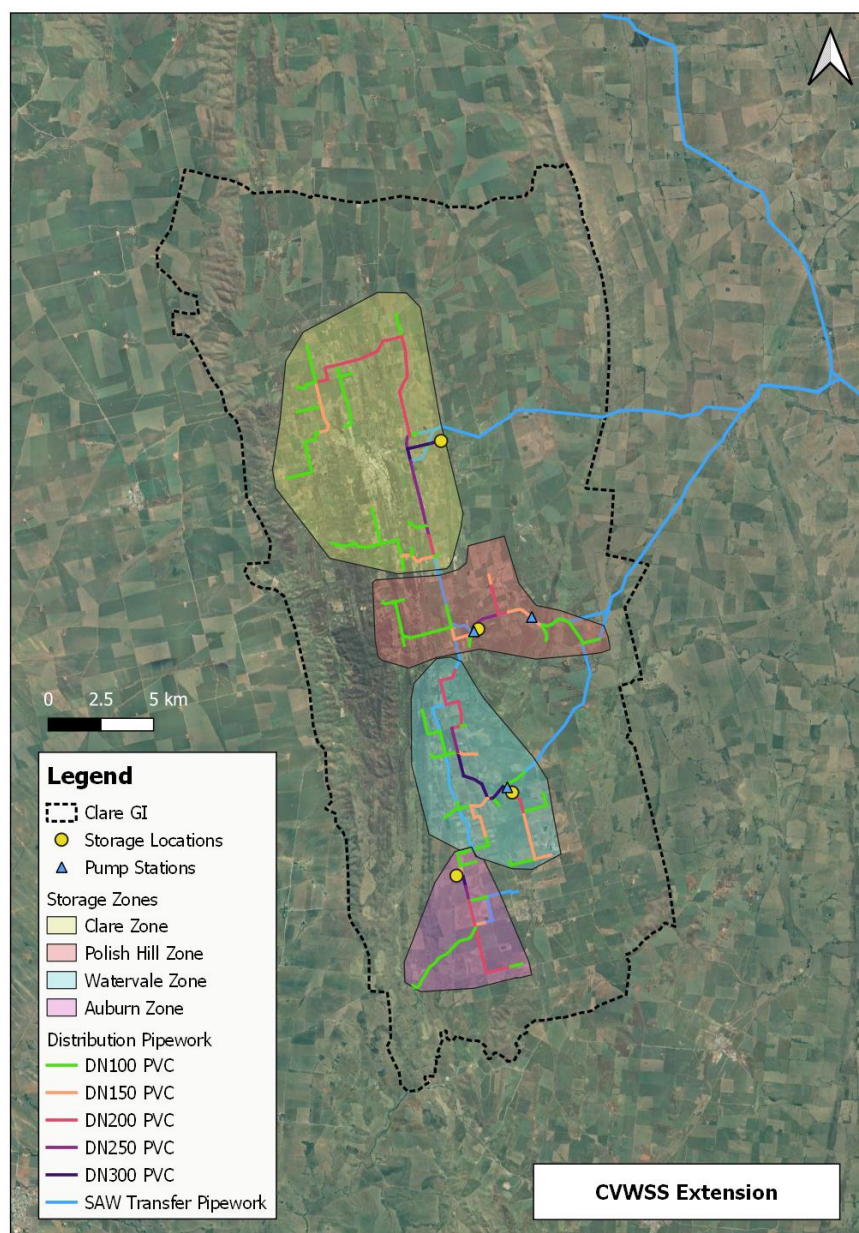


Figure 3.5: CVWSS Extension System

Table 3.1: CVWSS Extension Option Pipe Lengths

Pipe Type	Pipe Length (m)
Distribution System	
DN100 PVC PN16	51,749
DN150 PVC PN16	16,347
DN200 PVC PN16	23,339
DN250 PVC PN16	7,803
DN300 PVC PN16	7,589
Distribution Total	106,827
Transfer System	
-	-
Transfer Total	-
Total Pipework	106,827

An allowance for customer connections is included in the cost estimates based on information adopted to support the BNW DBC.

3.2.2. DBC Recommendations

It is recommended that a Detailed Business Case further investigate:

- The 20 ML/day bulk water transfer capacity requirement across each month for SA Water to manage flows in the Swan Reach Paskeville system
- Customer peaking allowances for irrigation demand.

3.3. Option 2: Bundaleer

The Bundaleer option accesses water from the Bundaleer catchment and the Morgan Whyalla system and supplies via a trunk transfer system to the Clare GI a high-quality raw water for irrigators.

**Figure 3.6: Bundaleer Reservoir**

3.3.1. Trunk System and Storage

The Bundaleer Reservoir (Figure 3.6) will enable the supply of water during off-peak tariff periods assisted by the blending with lower cost catchment water.

Trunk System

A new 40km trunk DN500 transfer system (OD502 MSCL selected for the preliminary design) will be constructed to carry water at peak-month flows to a 100 ML storage in the Clare GI.

An in-system trunk main will then courier water to customers to the middle and south of the Clare Valley sized to accommodate peak-week flows.

Two significant 0.4 MW pumping stations will be required within the valley. One will be to the North of Clare at from the transfer system terminal storage and the second along the in-system trunk main route along Spring Farm Road.

The junction of Spring Farm Road and Farrell Flat Road is shown in Figure 3.7, noting that there is existing power infrastructure along the pipe alignment that could potentially be utilised for booster pump stations.



Figure 3.7: Junction of Spring Farm Rd and Farrell Flat Rd

3.3.2. Irrigation System

The Bundaleer in-system trunk and distribution:

- Is sized to accommodate a 'peak week' demand scenario whereby 1% of every customer's water can be accessed on a given day whilst maintaining target pressures

A schematic of the Bundaleer supply option modelled in WaterGEMS is provided in Figure 3.8, with a summary of the pipe sizes in Table 3.2 below for the in-system trunk system and the distribution network.

Table 3.2: Bundaleer Option Pipe Lengths

Pipe Type	Pipe Length (m)
Distribution System	
DN100 PVC0 PN16	51,448
DN150 PVC0 PN16	12,774
DN200 PVC0 PN16	14,976
DN250 PVC0 PN16	7,559
DN300 PVC0 PN16	5,429
OD559 MSCL	22,872
Distribution Total	115,058
Transfer System	
OD502 MSCL	39,756
Transfer Total	39,756
Total Pipework	154,814

An allowance for customer connections is included in the cost estimates consistent with the CVWSS Extension option. Due to the long lengths of MSCL pipeline of trunk supply mains in this option, other cost areas included:

- Cathodic protection
- Surge protection

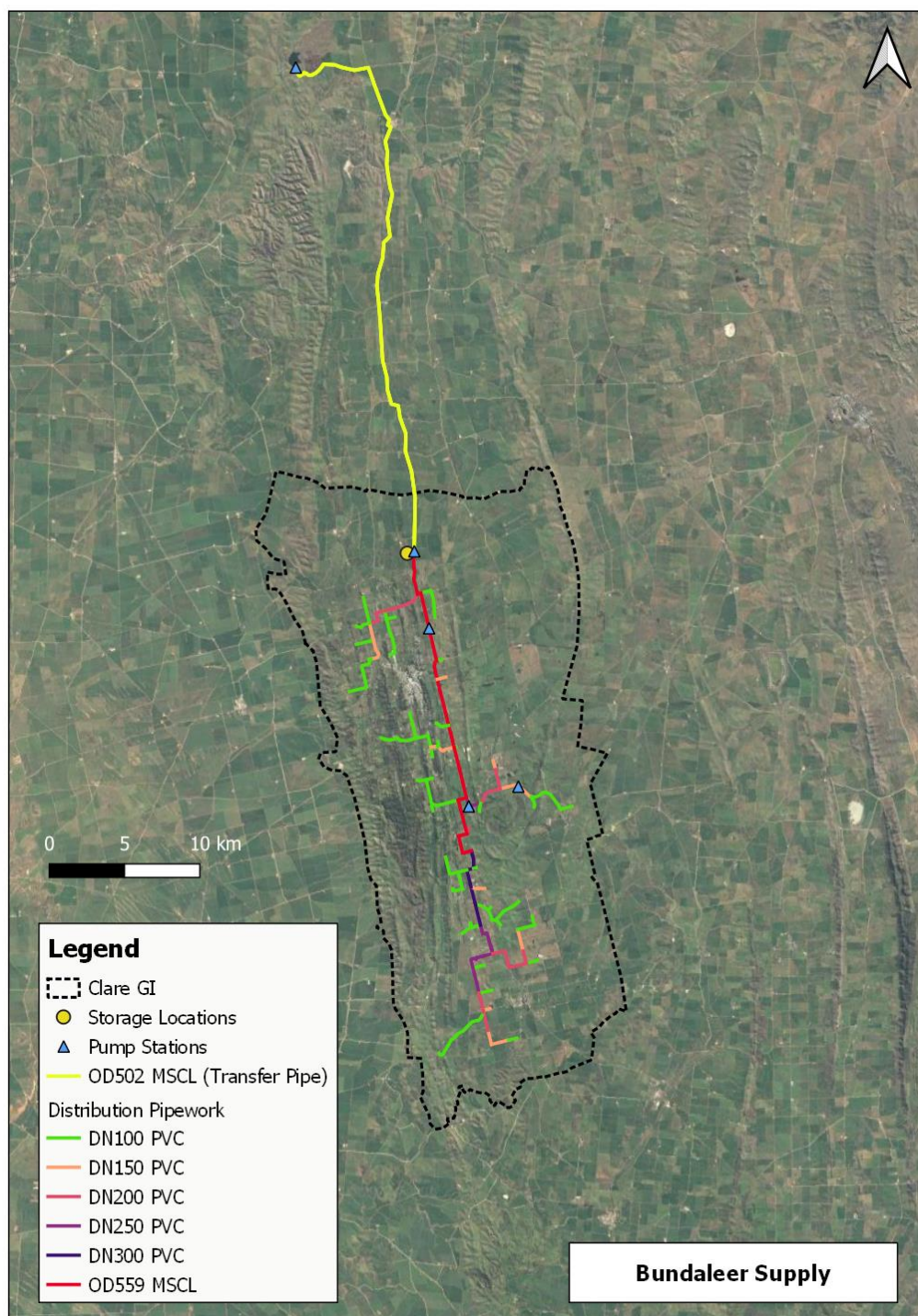
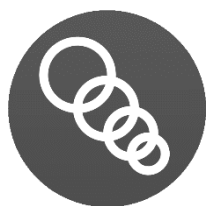


Figure 3.8: Bundaleer Option System

3.3.3. DBC Recommendations

It is recommended that a Detailed Business Case further investigate:

- Trunk system (transfer and in-system) optimisation with greater storage to reduce pipe diameters and potentially reduce MSCL main quantities.



4. Cost Comparison

4.1. Cost Basis

The cost basis adopted for options assessment is further described in Appendix C. It includes:

4.1.1. Capital Cost Estimates

Significant items (>\$0.5 million) that informed the capital cost estimates are provided in Table 4.1.

Table 4.1: Capital Cost Comparison Basis

Cost Area	Basis	Estimate
Direct Cost		
Pipe Supply	Higher of quotes from pipe suppliers and contractor ¹⁵	\$/m
Pipe Install	Factored (up) quote and recent QS project estimates ¹⁶	\$/m
Valves & Fittings	% of installed pipe cost	7.5-10%
Crossings	% of installed pipe cost	5%
Customer Connections	All (102) 'potential' demand locations applied based on BNW DBC costings ¹⁷	\$/con
Pumping	Factored from QS rates from recent project estimates	\$/kW
Storage	Comparator budget costing for \$2022 for recent similar-scale storages ¹⁸	\$/ML
Trunk connections	Allowance to connect storage to SA Water asset ¹⁹	\$/con
Total Contract Value		
Commissioning & Testing	% of direct cost	1%
Contractor preliminaries	% of direct cost	3%
Contractor OH/Margin	% of direct cost	7% ²⁰
Total (Investment) Project Cost		
Land	ha of land to accommodate storages	\$/ha

¹⁵ Supplier quotes from Steel Mains and Viadux (direct supply) and Exact Contracting (indirect supply)

¹⁶ Exact Contracting factored up by 50%, comparative II water supply projects

¹⁷ Assumed \$13,000 supply and install

¹⁸ Exact Contracting re-estimate of similar storages constructed in the past 2-3 years

Cost Area	Basis	Estimate
Owners PM	% of Total Contract Value	7.5% ²¹
Design	% of Total Contract Value	7% ²²
Contingency	% of Total Contract Value	25% ²³

Other items, e.g. commissioning, surge, cathodic protection and training levies are also included in the capital cost estimates (Appendix C) where appropriate for each option considered.

4.1.2. Operating Cost Estimates

The build-up of items for the operating cost is provided in Table 4.2. The cost of additional water purchase to cover evaporation or system losses was not included in the operating cost estimates.

Table 4.2: Operating Cost Comparison Basis

Cost Area	Basis	Estimate
Fixed Costs		
Water Supply	SA Water charge plus any raw water (River Murray or Bundaleer Catchment) allowances	\$/ML
Maintenance	% of capital cost of different asset classes	%
Labour	Allowance for operators and accommodation	item
Variable Costs		
Pumping	\$/kWh based on annual requirement to lift demand volume to meet target pressures	\$/kWh/y ²⁴
Annualised Replacement		
Pipelines	% capital cost based on expected service life	% Pipe
Pumping Stations	% capital cost based on expected service life	% Pump Station
Storages	% capital cost based on expected service life	% Storage

¹⁹ \$150,000/connection from CVWSS to community storages. \$2.5 million allowance for Bundaleer connection works

²⁰ Comparable with SA Water allowances

²¹ Assumes Irrigation Supply PM

²² No treatment design, predominately civil infrastructure

²³ Based on PBC level of certainty

²⁴ \$0.20/kWh assumed

4.2. Option 1: CVWSS Extension

4.2.1. Capital Cost

The Total Project Cost for the CVWSS Extension option is \$72.4 million as summarised in Table 4.3.

Table 4.3: CVWSS Extension Option Capital Cost Summary

Cost Area	Estimate (\$M)
Pipeline system (including connections)	15.9
Pumping	1.3
Storage	27.7
Direct Cost	44.9
Testing & Commissioning	0.4
Contractor preliminaries	1.3
Contractor margin/OH	3.2
Total Contract Cost	49.8
Training Levy	0.1
Land	2.8
Owners PM	3.8
Design	3.5
Contingency	12.4
Total (Investment) Project Cost	72.4

Factors that may have an upwards pressure on cost include:

- Option assumes that water can be sourced from the CVWSS trunk system without the requirement for significant SA Water upgrades. This needs to be tested in the DBC.
- Land acquisition.

Factors that may have a downwards opportunity to the cost include:

- Storages represent the largest element of the scheme cost comprising over 60% of the direct cost. The estimate is based on the four major storages being delivered as individual projects (as single project references were used). Delivery of the storages on a program basis should be more cost efficient and could provide a significant direct cost impact.
- The distribution system could be optimised for the peak week demand scenario (not allowing for the 45 ML/day case) which would

reduce some of the pipe sizes and reduction is cost. This would impact future system flexibility to accommodate new/increased customers.

- Land acquisition.

4.2.2. Operating Cost

The Operating Cost for the CVWSS Extension option is \$6.35 million/year as summarised in Table 4.4.

Table 4.4: CVWSS Extension Option Operating Cost Summary

Cost Area	Estimate (\$M)
Water Supply	4.90
Maintenance	0.24
Labour	0.30
Pumping	0.04
Annualised asset replacement	0.87
Total (Investment) Project Cost	6.35

Based on a 3,000 ML/year scheme, this equates to an effective annual charge of \$2,120/ML.

Factors that may have an upwards pressure on cost include:

- No allowance for water evaporation was included in the option costing. Evaporation is an existing 'cost' for demand for 'winter' off-peak water for reservoirs in the Clare region, however the DBC may seek to assess this as an additional cost/requirement
- Water Price negotiation with SA Water
- Additional co-operative or other scheme management costs
- River Murray allocation pricing fluctuates and although a long-term price was considered, this is subject to market variability

Factors that may have a downwards opportunity to the cost include:

- Demand information attained by KBR during the regional engagement process indicates

that 72%²⁵ of the annual demand is during the peak season (December to April inclusive) with the remaining demand able to be transported during the off-peak months. This may enable the off-peak tariff pricing to be accessed for the full 3,000 ML water supply

- Water price negotiation with SA Water
- Storage renewal is based on % asset construction cost. If delivered as a program, this would reduce respectively.

4.2.3. 3,000 ML Storage Scenario

A scenario to consider 3,000 ML of storage to potentially capture a scheme entirely sourced of off-peak seasonal water was assessed.

The Direct Cost of this scenario was \$53.9 million resulting in a Total Project Cost of \$86.4 million and an annual cost of \$6.2 million reverting to an annual charge of nearly \$2,070/ML based on a 3,000 ML/year scheme.

The additional capital cost of the storages is circa \$9 million in direct cost, which factors to circa \$14.5 million in total project cost and the asset renewal and maintenance allowances in the operating cost assessments nearly annul the annual charge benefits of potentially securing a lower tariff water.

Costings for this scenario are included in Appendix C, however it is not taken forward for cost comparison with the second option - Option 2: Bundaleer as there is negligible annual cost benefit and a significantly higher expected project capital cost as compared to the base CVWSS Extension option.

4.3. Option 2: Bundaleer

4.3.1. Capital Cost

The Total Project Cost for the Bundaleer option is \$102.1 million as summarised in Table 4.5.

Table 4.5: Bundaleer Option Capital Cost Summary

Cost Area	Estimate (\$M)
Pipeline system (including connections)	49.2
Pumping	12.6
Storage	3.8 ²⁶
Direct Cost	65.6
Testing & Commissioning	0.7
Contractor preliminaries	2.0
Contractor margin/OH	4.6
Total Contract Cost	72.9
Training Levy	0.2
Land	0.2
Owners PM	5.5
Design	5.1
Contingency	18.2
Total (Investment) Project Cost	102.1

Factors that may have an upwards pressure on cost include:

- Power supply for the pumping stations is assumed to be able to be sourced from nearby existing networks. This would need to be assessed further in a DBC.
- Large quantity of steel pipe which may pose a higher escalation risk.

Factors that may have a downwards opportunity to the cost include:

- Greater optimisation of pipe sizes and materials with storage volumes has the potential to decrease the costs of the transfer and in-system trunk main
- SA Water had a previous (now decommissioned) connection from the

²⁵ KBR Engagement Q15 Executive Summary worksheet. % Irrigation during December-April inclusive

²⁶ Includes a \$2.5 million connection allowance from the Morgan Whyalla to the Bundaleer Reservoir and into the transfer trunk system.

Morgan Whyalla to the Bundaleer reservoir. If (believed unlikely) this could be readily restored it would reduce the connection requirement and respective cost allowances to utilise Bundaleer.

4.3.2. Operating Cost

The Operating Cost for the Bundaleer option is \$5.80 million/year as summarised in Table 4.6.

Table 4.6: Bundaleer Option Operating Cost Summary

Cost Area	Estimate (\$M)
Water Supply	3.21
Maintenance	0.27
Labour	0.30
Pumping	1.07
Annualised asset replacement	0.95
Total (Investment) Project Cost	5.80

Factors that may have an upwards pressure on cost include:

- The option is relatively high in energy cost and an increase in power price would impact resultant annual charge
- Water price negotiation with SA Water (including allowance for catchment water)

- Low (prolonged) rainfall in the Bundaleer Reservoir receiving catchments (assumed one third (1,000 ML) of demand assumed for pricing)

Factors that may have a downwards opportunity to the cost include:

- Ability to capture levels of catchment water that offer a much higher blend ratio and lower River Murray requirement. If assessed as part of a DBC, it is recommended that a hydrological assessment on Bundaleer and its receiving catchments be undertaken to quantify this benefit.
- Water Price negotiation with SA Water (including allowance for catchment water)
- Potential to adopt a green energy supply solution (which would add capital costs).

4.4. Cost Comparison

A side-by-side comparison of the two options results in a strong recommendation for the future consideration of the CVWSS Extension as the preferred option for a DBC phase analysis. This comparison is provided in Table 4.7 and Table 4.8.

Table 4.7: Option Capital Cost Comparison

Cost Area	CVWSS Extension (\$M)	Bundaleer (\$M)	Differential (\$M)
Pipeline system	15.9	49.2	33.3
Pumping	1.3	12.6	11.3
Storage	27.7	3.8	(23.9)
Direct Cost	44.9	65.6	20.7
Testing & Commissioning	0.4	0.7	0.3
Contractor preliminaries	1.3	2.0	0.7
Contractor margin/OH	3.2	4.6	1.4
Total Contract Cost	49.8	72.9	23.1
Training Levy	0.1	0.2	0.1
Land	2.8	0.2	(2.6)
Owners PM	3.8	5.5	1.7
Design	3.5	5.1	1.6
Contingency	12.4	18.2	5.8
Total Project Cost	72.4	102.1	29.7

Table 4.8: Option Operating Cost Comparison

Cost Area	CVWSS Extension	Bundaleer	Differential
Water Supply (\$M)	4.90	3.21	(1.70)
Maintenance (\$M)	0.24	0.27	0.03
Labour (\$M)	0.30	0.30	-
Pumping (\$M)	0.04	1.07	1.03
Annualised Asset Replacement (\$M)	0.87	0.95	0.08
Total Annual Cost (\$M)	6.35	5.80	(0.55)
Annual Charge (\$/ML rounded)	2,120	1,935	(185)

The CVWSS Extension offers a Total Project cost in the order of \$30 million lower than the Bundaleer Option whereas the considered Annual Charge is only \$0.55 million/year greater - or less than \$200/ML assuming a 3,000 ML scheme.

Although the costs of the transfer system to take the water from the Bundaleer Reservoir to the Clare GI were comparable with the community storage costs in the CVWSS Extension option, the Bundaleer option was penalised by the costs of its in-system trunk main required to supply the middle and southern parts of the Clare region. This increased the overall pipe length, with a 22 km OD559 MSCL in-system trunk main supported by two substantial booster stations was the \$15-20 million difference in the direct cost of the two options and resultant \$30 million overall project cost differential.

If the engagement process had demonstrated a significant proportion of the demand in the region to the north of Clare, this would have significantly reduced the differential.

development of the water storage costings. There is also the potential to further reduce operating cost through water management with SA Water to capture off-peak tariff structures.

There are risks of cost increase in a DBC phase associated with the capabilities of the CVWSS and incorporation of water losses through evaporation in then operating cost considerations.

4.5. Preferred Option

The CVWSS Extension offers the Clare Region a water supply option that will provide the off-peak benefits to the majority of the Clare viticulture region. It does come at a capital and annual cost that appears marginal based on the willingness to pay information provided by the region to KBR in its initial engagement process.

There is the potential in a DBC phase for the capital cost (and flow on operating cost) to be improved with a program assessment and further



5. Recommendations

Recommendations from the technical options analysis for consideration in the PBC and a future DBC are provided below.

5.1. Water Source

Recommendations for further consideration in a DBC from the Options Analysis include:

- Increase understanding of the capacity of the CVWSS existing trunk system, particularly the requirements over an annual cycle for the 20 ML/day capacity allowance to transfer water through the CVWSS to the Swan Reach Paskeville system
- Hydrological assessment of the Bundaleer water capture potential based on current information would support greater consideration of this option (noting that it is not the preferred option resultant from this technical assessment).

5.2. Water Storage

Water storage considerations for a DBC phase include:

- Assessment of the cost benefits in the delivery of the storages as a program instead of individual storages to attain efficiencies in mobilisation, equipment uses and materials transport
- Further understanding of customer irrigation use to match storage volumes with the 'peak season' demand requirements thereby maximising ability to capture off-peak tariff structure
- Assess level of evaporation from the storages from monitored data on existing Clare private storage

5.3. Water Distribution

Distribution system considerations for a DBC phase include:

- Assessment of connection requirements and costs based on customer number and size
- Additional scenarios to connect up potential customers that were determined outside the supply area used in this report for costing development
- Further assessment of pressure requirements for customers and peak demand requirements for system sizing.

Appendix A Options Screening

This appendix provides the presentation of the outcomes of the options screening process.

Rev B of presentation following completion the Options Confirmation Workshop (8 June 2022).

Rev 0 (Final) screening estimates are provided in Appendix C.1.

Clare Valley Water Supply Project

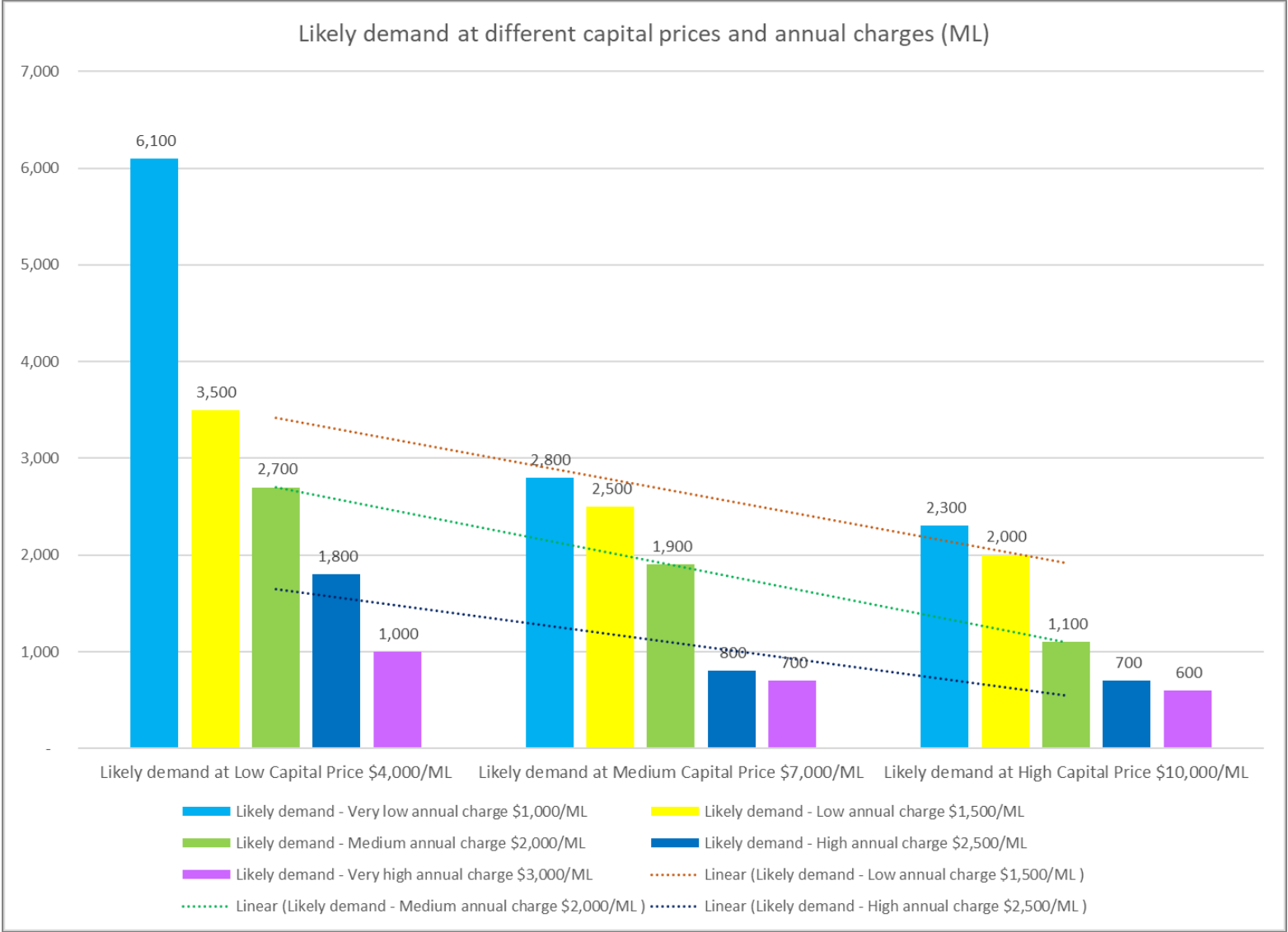
Options Confirmation Workshop (DRAFT)

● ● ● ● ● 8 June 2022 Rev B



inside
infrastructure
RICARDO

Demand Outcomes



Capital Budget and Demand

Scenario	Annual Charge	Capital Price	Demand (ML/year)	Budget 50:50	Budget 25:25:50
L.1	\$1,000/ML	\$4,000/ML	6,100 ML/year	\$48.8 million	\$97.6 million
L.2	\$1,000/ML	\$7,000/ML	2,800 ML/year	\$39.2 million	\$78.4 million
L.3	\$1,000/ML	\$10,000/ML	2,300 ML/year	\$46.0 million	\$92.0 million
M.1	\$1,500/ML	\$4,000/ML	3,500 ML/year	\$28.0 million	\$56.0 million
M.2	\$1,500/ML	\$7,000/ML	2,500 ML/year	\$35.0 million	\$70.0 million
M.3	\$1,500/ML	\$10,000/ML	1,900 ML/year	\$38.0 million	\$76.0 million
H.1	\$2,000/ML	\$4,000/ML	2,700 ML/year	\$21.6 million	\$43.2 million
H.2	\$2,000/ML	\$7,000/ML	1,900 ML/year	\$26.6 million	\$53.2 million
H.3	\$2,000/ML	\$10,000/ML	1,100 ML/year	\$22.0 million	\$44.0 million
H.4	\$2,500/ML	\$4,000/ML	1,800 ML/year	\$14.4 million	\$28.8 million

General Assumptions

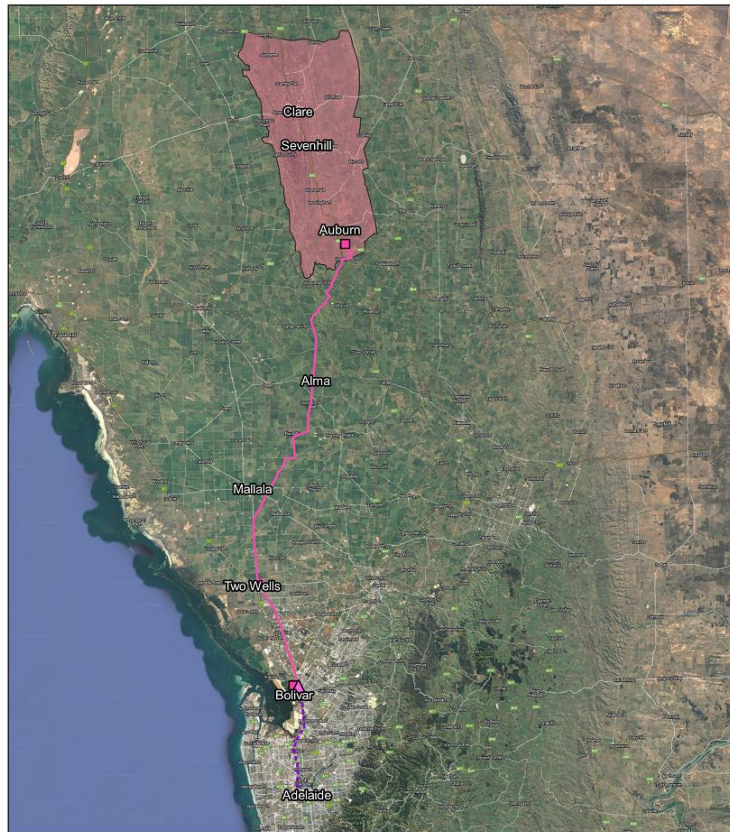
Assumptions

- Distribution system has not been costed at this stage
- 75-80% efficiency for pump station
- Pumping for each option is elevation rise to the Clare GI with 3m/km pipe friction loss allowance
- Trunk main and pump station cost is construction plus 25% allowance for preliminaries and design
- Assume 30% contingency and 10% owner's costs (construction consent, delivery etc.)
- Escalation not accounted for
- Options costing is developed for comparative and screening purposes only
- \$200/MWh assumed as energy price for comparative purposes
- Asset renewal (where appropriate) included based on typical life of each asset type
- Allowance for Operation, Maintenance and Management included as appropriate for each option
- Water pricing is based on Source Availability report and recent publicly available information

Bolivar Recycled Water

Assumptions

- Barossa New Water goes ahead - Clare is a contributor
- Water is sourced from Bolivar with additional advanced treatment
- Desalinated at a 2:1 blending ratio
- Water only available in off-season (May-October)
- New storage (at Clare GI) to capture winter water to be at 2/3 of Demand with remainder to be existing customer on property storage
- A completely new distribution system is required
- 95% availability for treatment
- 575m lift required
- No prospect of recycled options at or near \$1000/ML AC based on BNW learnings



CLARE VALLEY WATER SUPPLY
Preliminary Business Case
Bolivar WWTP / Glenelg-Adelaide Pipeline
Transfer Pipeline

0 10 20 30 40 km

Date: 11/04/2022 ; Rev: A Doc No: PIR-07_MAP-04

Legend

- Bolivar Transfer Pipeline
- - - GAP Extension (Alternative)
- Water Storage
- ▲ Treatment Plant
- Clare GI



Bolivar Recycled Water

Option Summary

Scenario	Demand (ML/y)	Capital Charge (\$/ML)	Budget Low (\$M)	Budget High (\$M)	Capital (\$M)	CAPEX	Annual Charge (\$/ML)	OPEX (\$/ML)	OPEX
L.1	6,100	4,000	48.8	97.6	301		1,000	2,634	
L.2	2,800	7,000	39.2	78.4	162		1,000	2,888	
L.3	2,300	10,000	46.0	92.0	142		1,000	3,000	
M.1	3,500	4,000	28.0	56.0	207		1,500	2,900	
M.2	2,500	7,000	35.0	70.0	147		1,500	2,921	
M.3	1,900	10,000	38.0	76.0	126		1,500	3,130	
H.1	2,700	4,000	21.6	43.2	150		2,000	2,840	
H.2	1,900	7,000	26.6	53.2	126		2,000	3,130	
H.3	1,100	10,000	22.0	44.0	94		2,000	3,688	
H.4	1,800	4,000	14.4	28.8	123		2,500	3,195	

Bolivar Recycled Water

Capital Cost Evaluation

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Recycled	\$M	Trunk Main	\$M	Storage (ML)	\$M	Pumping (kW)	\$M	Treatment (ML/day)	\$M	Distribution	\$M
L.1	1,000	4,000	6,100	48.8	97.6	33		301	92km 650mm	107.9	4,000	49.0	2,883	55.7	35	88.0	TBA	-
L.2	1,000	7,000	2,800	39.2	78.4	15		162	92km 425mm	64.5	2,300	28.6	1,323	28.4	16	40.4	TBA	-
L.3	1,000	10,000	2,300	46.0	92.0	13		142	92km 400mm	63.0	1,700	21.4	1,087	24.3	13	33.2	TBA	-
M.1	1,500	4,000	3,500	28.0	56.0	19		207	92km 500mm	99.0	1,900	23.8	1,654	34.2	20	50.5	TBA	-
M.2	1,500	7,000	2,500	35.0	70.0	14		147	92km 425mm	64.5	1,600	20.2	1,182	25.9	14	36.0	TBA	-
M.3	1,500	10,000	1,900	38.0	76.0	10		126	92km 350mm	60.7	1,300	16.6	898	21.0	11	27.4	TBA	-
H.1	2,000	4,000	2,700	21.6	43.2	15		150	92km 425mm	64.5	1,500	19.0	1,276	27.6	16	38.9	TBA	-
H.2	2,000	7,000	1,900	26.6	53.2	10		126	92km 350mm	60.7	1,300	16.6	898	21.0	11	27.4	TBA	-
H.3	2,000	10,000	1,100	22.0	44.0	6		94	92km 250mm	53.1	800	10.6	520	14.3	6	15.9	TBA	-
H.4	2,500	4,000	1,800	14.4	28.8	10		123	92km 350mm	60.7	1,300	16.6	851	20.1	10	26.0	TBA	-

Key:



Capital costs above maximum budget

Capital costs within budget range with expectation to exceed budget with inclusion of distribution system cost

Capital costs within or below budget range with potential to meet budget including distribution system cost

Bolivar Recycled Water

Operating Cost Evaluation

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	ML/day equiv	Recycled	\$M	OPEX (\$/ML)	Water Price	\$M	Asset Renewal	\$M	Pumping (MW/year)	\$M	Treatment	\$M	Operations & Management	\$M
L.1	1,000	4,000	6,100	33		301	2,634	\$540/ML allocation	3.3	1.8% of CAPEX	5.4	12,627	2.5	Desal \$500/ML	3.1	\$300K+0.5%	1.8
L.2	1,000	7,000	2,800	15		162	2,888	\$540/ML allocation	1.5	1.8% of CAPEX	2.9	5,796	1.2	Desal \$500/ML	1.4	\$300K+0.5%	1.1
L.3	1,000	10,000	2,300	13		142	3,000	\$540/ML allocation	1.2	1.8% of CAPEX	2.6	4,761	1.0	Desal \$500/ML	1.2	\$300K+0.5%	1.0
M.1	1,500	4,000	3,500	19		207	2,900	\$540/ML allocation	1.9	1.8% of CAPEX	3.7	7,245	1.4	Desal \$500/ML	1.8	\$300K+0.5%	1.3
M.2	1,500	7,000	2,500	14		147	2,921	\$540/ML allocation	1.4	1.8% of CAPEX	2.6	5,175	1.0	Desal \$500/ML	1.3	\$300K+0.5%	1.0
M.3	1,500	10,000	1,900	10		126	3,130	\$540/ML allocation	1.0	1.8% of CAPEX	2.3	3,933	0.8	Desal \$500/ML	1.0	\$300K+0.5%	0.9
H.1	2,000	4,000	2,700	15		150	2,840	\$540/ML allocation	1.5	1.8% of CAPEX	2.7	5,589	1.1	Desal \$500/ML	1.4	\$300K+0.5%	1.0
H.2	2,000	7,000	1,900	10		126	3,130	\$540/ML allocation	1.0	1.8% of CAPEX	2.3	3,933	0.8	Desal \$500/ML	1.0	\$300K+0.5%	0.9
H.3	2,000	10,000	1,100	6		94	3,688	\$540/ML allocation	0.6	1.8% of CAPEX	1.7	2,277	0.5	Desal \$500/ML	0.6	\$300K+0.5%	0.8
H.4	2,500	4,000	1,800	10		123	3,195	\$540/ML allocation	1.0	1.8% of CAPEX	2.2	3,726	0.7	Desal \$500/ML	0.9	\$300K+0.5%	0.9

Key:



Estimated OpeX above Annual Charge +10%

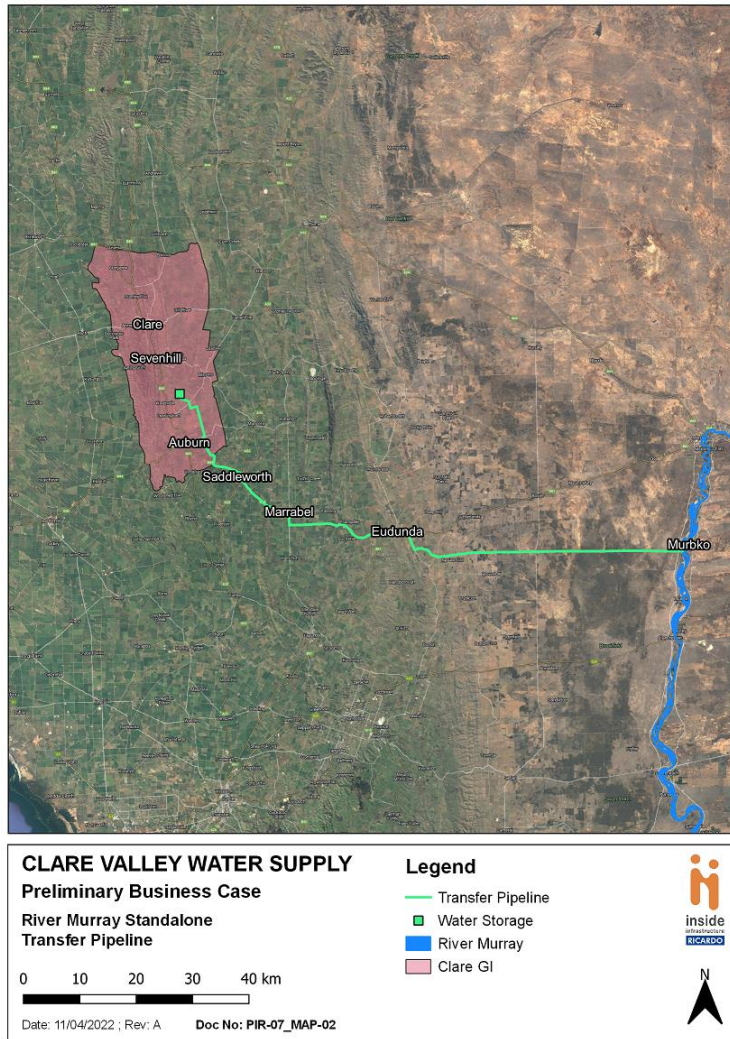
Estimated OpeX between Annual Charge +/-10%

Estimated OpeX below Annual Charge -10%

Murray Raw Water

Assumptions

- All year round supply to region
- New storage (at Clare GI) to capture winter water to be at 1/3 of Demand with remainder of winter storage to be existing customer on property storage
- A completely new distribution system is required
- 850m lift required



Murray Raw Water

Option Summary

Scenario	Demand (ML/y)	Capital Charge (\$/ML)	Budget Low (\$M)	Budget High (\$M)	Capital (\$M)	CAPEX	Annual Charge (\$/ML)	OPEX (\$/ML)	OPEX
L.1	6,100	4,000	48.8	97.6	145		1,000	1,399	
L.2	2,800	7,000	39.2	78.4	106		1,000	1,744	
L.3	2,300	10,000	46.0	92.0	100		1,000	1,887	
M.1	3,500	4,000	28.0	56.0	112		1,500	1,607	
M.2	2,500	7,000	35.0	70.0	100		1,500	1,806	
M.3	1,900	10,000	38.0	76.0	90		1,500	1,992	
H.1	2,700	4,000	21.6	43.2	96		2,000	1,704	
H.2	1,900	7,000	26.6	53.2	90		2,000	1,992	
H.3	1,100	10,000	22.0	44.0	72		2,000	2,485	
H.4	1,800	4,000	14.4	28.8	89		2,500	2,048	

Murray Raw Water

Capital Cost Evaluation

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Murray	\$M	Trunk Main	\$M	Storage (ML)	\$M	Pumping (kW)	\$M	Treatment (ML/day)	\$M	Distribution	\$M
L.1	1,000	4,000	6,100	48.8	97.6	17		145	110km 425mm	77.1	2,000	25.0	2,131	42.5	NA	-	TBA	-
L.2	1,000	7,000	2,800	39.2	78.4	8		106	110km 300mm	69.0	1,100	14.2	978	22.4	NA	-	TBA	-
L.3	1,000	10,000	2,300	46.0	92.0	6		100	110km 300mm	69.0	900	11.8	803	19.3	NA	-	TBA	-
M.1	1,500	4,000	3,500	28.0	56.0	10		112	110km 350mm	72.6	1,000	13.0	1,223	26.6	NA	-	TBA	-
M.2	1,500	7,000	2,500	35.0	70.0	7		100	110km 300mm	69.0	800	10.6	873	20.5	NA	-	TBA	-
M.3	1,500	10,000	1,900	38.0	76.0	5		90	110km 250mm	63.5	700	9.4	664	16.9	NA	-	TBA	-
H.1	2,000	4,000	2,700	21.6	43.2	7		96	110km 300mm	63.5	800	10.6	943	21.8	NA	-	TBA	-
H.2	2,000	7,000	1,900	26.6	53.2	5		90	110km 250mm	63.5	700	9.4	664	16.9	NA	-	TBA	-
H.3	2,000	10,000	1,100	22.0	44.0	3		72	110km 200mm	54.5	400	5.8	384	12.0	NA	-	TBA	-
H.4	2,500	4,000	1,800	14.4	28.8	5		89	110km 250mm	63.5	700	9.4	629	16.3	NA	-	TBA	-

Key:



- Capital costs above maximum budget
- Capital costs within budget range with expectation to exceed budget with inclusion of distribution system cost
- Capital costs within or below budget range with potential to meet budget including distribution system cost

Murray Raw Water

Operating Cost Evaluation

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	ML/day equiv	Murray	\$M	OPEX (\$/ML)	Water Price	\$M	Asset Renewal	\$M	Pumping (MW/year)	\$M	Treatment	\$M	Operations & Management	\$M
L.1	1,000	4,000	6,100	33		145	1,399	\$250/ML allocation	1.5	1.6% of CAPEX	2.3	18,666	3.7	NA	-	\$300K+0.5%	1.0
L.2	1,000	7,000	2,800	15		106	1,744	\$250/ML allocation	0.7	1.6% of CAPEX	1.6	8,568	1.7	NA	-	\$300K+0.5%	0.8
L.3	1,000	10,000	2,300	13		100	1,887	\$250/ML allocation	0.6	1.6% of CAPEX	1.6	7,038	1.4	NA	-	\$300K+0.5%	0.8
M.1	1,500	4,000	3,500	19		112	1,607	\$250/ML allocation	0.9	1.6% of CAPEX	1.7	10,710	2.1	NA	-	\$300K+0.5%	0.9
M.2	1,500	7,000	2,500	14		100	1,806	\$250/ML allocation	0.6	1.6% of CAPEX	1.6	7,650	1.5	NA	-	\$300K+0.5%	0.8
M.3	1,500	10,000	1,900	10		90	1,992	\$250/ML allocation	0.5	1.6% of CAPEX	1.4	5,814	1.2	NA	-	\$300K+0.5%	0.7
H.1	2,000	4,000	2,700	15		96	1,704	\$250/ML allocation	0.7	1.6% of CAPEX	1.5	8,262	1.7	NA	-	\$300K+0.5%	0.8
H.2	2,000	7,000	1,900	10		90	1,992	\$250/ML allocation	0.5	1.6% of CAPEX	1.4	5,814	1.2	NA	-	\$300K+0.5%	0.7
H.3	2,000	10,000	1,100	6		72	2,485	\$250/ML allocation	0.3	1.6% of CAPEX	1.1	3,366	0.7	NA	-	\$300K+0.5%	0.7
H.4	2,500	4,000	1,800	10		89	2,048	\$250/ML allocation	0.5	1.6% of CAPEX	1.4	5,508	1.1	NA	-	\$300K+0.5%	0.7

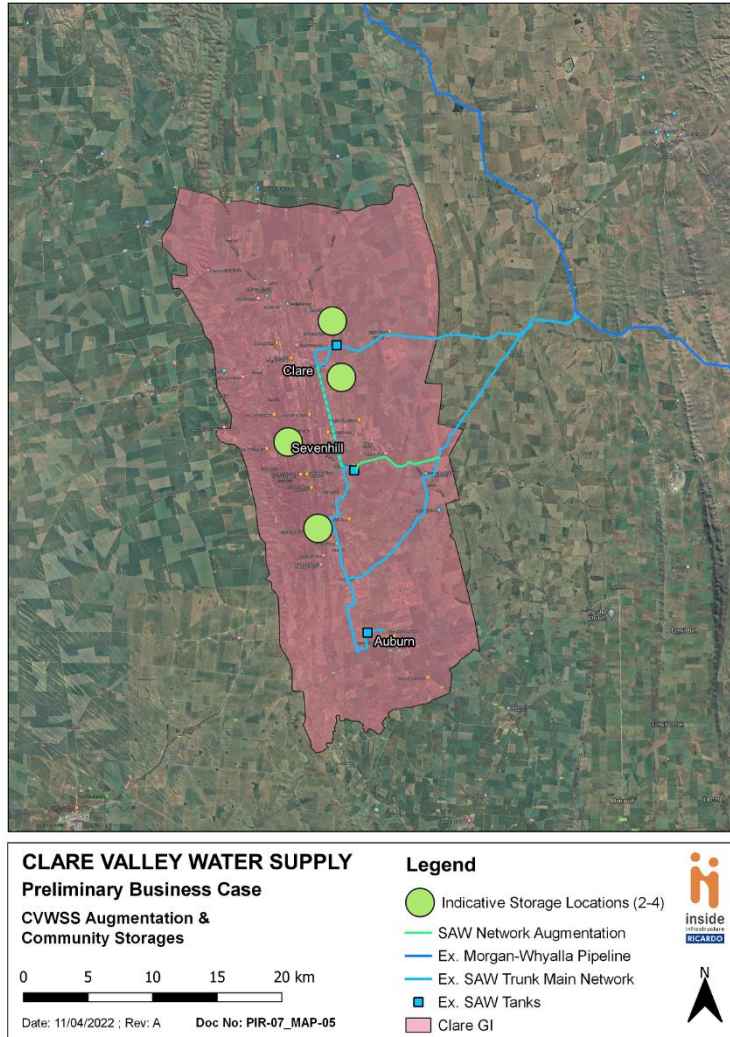
Key:

Estimated Opex above Annual Charge +10%

Estimated Opex between Annual Charge +/-10%

Estimated Opex below Annual Charge -10%

CVWSS Extension Potable



Assumptions

- All year round supply to region with 1.5 demand peaking factor for pipe sizing
- Allowance of 50% of demand in community/private new storage to allow for off-peak pricing benefits
- All new community storages will be for non-potable
- Low Demand option (1.1GL/year) based on SAW memo - no trunk augmentation required
- Medium to high Demand options (2-3GL/year) based on SAW memo - augmentation of MW - Auburn Valve req
- Assume the 6GL option unable to be met.
- Pipe to be of potable requirements (1.5 cost factor applied) and increased in size by 50% for demand peak sizing
- Allowance of \$5 million for upgrade for High Growth and \$2.5 million for Low Growth of Mintaro PS
- Tank upgrades to be incorporated as part of the distribution system consideration
- Assume that any \$1000/ML options cannot be met
- 50% markup for pipeline costs as potable/SAW standard

CVWSS Extension Potable

Option Summary

Scenario	Demand (ML/y)	Capital Charge (\$/ML)	Budget Low (\$M)	Budget High (\$M)	Capital (\$M)	CAPEX	Annual Charge (\$/ML)	OPEX (\$/ML)	OPEX
L.1	6,100	4,000	48.8	97.6	38		1,000	1,917	
L.2	2,800	7,000	39.2	78.4	56		1,000	2,026	
L.3	2,300	10,000	46.0	92.0	51		1,000	2,054	
M.1	3,500	4,000	28.0	56.0	61		1,500	1,998	
M.2	2,500	7,000	35.0	70.0	53		1,500	2,041	
M.3	1,900	10,000	38.0	76.0	47		1,500	2,086	
H.1	2,700	4,000	21.6	43.2	54		2,000	2,029	
H.2	1,900	7,000	26.6	53.2	47		2,000	2,086	
H.3	1,100	10,000	22.0	44.0	10		2,000	2,085	
H.4	1,800	4,000	14.4	28.8	47		2,500	2,098	

CVWSS Extension Potable

Capital Cost Evaluation

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	CVWSS	\$M	Trunk Main	\$M	Storage (ML)	\$M	Pumping (kW)	\$M	Treatment (ML/day)	\$M	Distribution	\$M
L.1	1,000	4,000	6,100	48.8	97.6	25		38	NA	-	3,050	37.6	NA	-	NA	-	TBA	-
L.2	1,000	7,000	2,800	39.2	78.4	12		56	32km 375mm	32.9	1,400	17.8	HG	5.0	NA	-	TBA	-
L.3	1,000	10,000	2,300	46.0	92.0	9		51	32km 350mm	31.7	1,150	14.8	HG	5.0	NA	-	TBA	-
M.1	1,500	4,000	3,500	28.0	56.0	14		61	32km 425mm	33.7	1,750	22.0	HG	5.0	NA	-	TBA	-
M.2	1,500	7,000	2,500	35.0	70.0	10		53	32km 350mm	31.7	1,250	16.0	HG	5.0	NA	-	TBA	-
M.3	1,500	10,000	1,900	38.0	76.0	8		47	32km 300mm	30.1	950	12.4	HG	5.0	NA	-	TBA	-
H.1	2,000	4,000	2,700	21.6	43.2	11		54	32km 350mm	31.7	1,350	17.2	HG	5.0	NA	-	TBA	-
H.2	2,000	7,000	1,900	26.6	53.2	8		47	32km 300mm	30.1	950	12.4	HG	5.0	NA	-	TBA	-
H.3	2,000	10,000	1,100	22.0	44.0	5		10	Low Growth NA	-	550	7.6	LG	2.5	NA	-	TBA	-
H.4	2,500	4,000	1,800	14.4	28.8	7		47	32km 300mm	30.1	900	11.8	HG	5.0	NA	-	TBA	-

Key:



Capital costs above maximum budget

Capital costs within budget range with expectation to exceed budget with inclusion of distribution system cost

Capital costs within or below budget range with potential to meet budget including distribution system cost

CVWSS Extension Potable

Operating Cost Evaluation

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	ML/day equiv	CVWSS	\$M	OPEX (\$/ML)	Water Price	\$M	Asset Renewal	\$M	Pumping (MW/year)	\$M	Treatment	\$M	Operations & Management	\$M
L.1	1,000	4,000	6,100	33		38	1,917	\$1,820/ML average	11.1	0.5% of CAPEX	0.2	NA	-	NA	-	\$200K+0.5%	0.39
L.2	1,000	7,000	2,800	15		56	2,026	\$1,820/ML average	5.1	0.5% of CAPEX	0.3	NA	-	NA	-	\$200K+0.5%	0.29
L.3	1,000	10,000	2,300	13		51	2,054	\$1,820/ML average	4.2	0.5% of CAPEX	0.3	NA	-	NA	-	\$200K+0.5%	0.27
M.1	1,500	4,000	3,500	19		61	1,998	\$1,820/ML average	6.4	0.5% of CAPEX	0.3	NA	-	NA	-	\$200K+0.5%	0.31
M.2	1,500	7,000	2,500	14		53	2,041	\$1,820/ML average	4.6	0.5% of CAPEX	0.3	NA	-	NA	-	\$200K+0.5%	0.28
M.3	1,500	10,000	1,900	10		47	2,086	\$1,820/ML average	3.5	0.5% of CAPEX	0.2	NA	-	NA	-	\$200K+0.5%	0.26
H.1	2,000	4,000	2,700	15		54	2,029	\$1,820/ML average	4.9	0.5% of CAPEX	0.3	NA	-	NA	-	\$200K+0.5%	0.29
H.2	2,000	7,000	1,900	10		47	2,086	\$1,820/ML average	3.5	0.5% of CAPEX	0.2	NA	-	NA	-	\$200K+0.5%	0.26
H.3	2,000	10,000	1,100	6		10	2,085	\$1,820/ML average	2.0	0.5% of CAPEX	0.1	NA	-	NA	-	\$200K+0.5%	0.24
H.4	2,500	4,000	1,800	10		47	2,098	\$1,820/ML average	3.3	0.5% of CAPEX	0.2	NA	-	NA	-	\$200K+0.5%	0.26

Key:

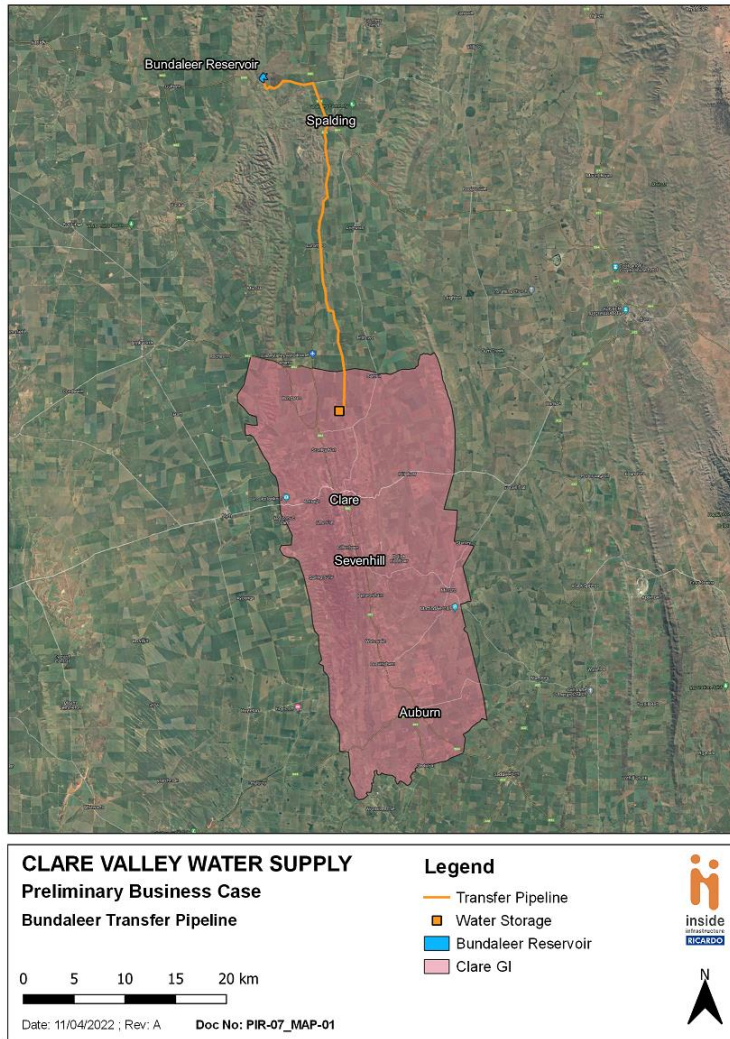


Estimated Opex above Annual Charge +10%

Estimated Opex between Annual Charge +/-10%

Estimated Opex below Annual Charge -10%

Bundaleer Mixed Water Quality



Assumptions

- All year round supply to region - weighted at 75% over growing 6 month period
- Bundaleer filled during winter period from MW and Catchment
- A completely new distribution system is required
- 250m lift required
- \$2.5m connection allowance from MW to Bundaleer reservoir - added to storage costs
- No dam safety upgrade except for 6000 ML/year scenario. \$20 million surcharge added for this upgrade or additional in system storage.
- 1 PS allowed to boost to region. Therefore the 1.25 multiple pump cost factor does not apply
- 100ML control storage allowed at termination of trunk

Bundaleer Mixed Water Quality

Option Summary

Scenario	Demand (ML/y)	Capital Charge (\$/ML)	Budget Low (\$M)	Budget High (\$M)	Capital (\$M)	CAPEX	Annual Charge (\$/ML)	OPEX (\$/ML)	OPEX
L.1	6,100	4,000	48.8	97.6	89		1,000	1,791	
L.2	2,800	7,000	39.2	78.4	42		1,000	1,561	
L.3	2,300	10,000	46.0	92.0	40		1,000	1,635	
M.1	3,500	4,000	28.0	56.0	45		1,500	1,489	
M.2	2,500	7,000	35.0	70.0	41		1,500	1,598	
M.3	1,900	10,000	38.0	76.0	38		1,500	1,716	
H.1	2,700	4,000	21.6	43.2	41		2,000	1,567	
H.2	1,900	7,000	26.6	53.2	38		2,000	1,716	
H.3	1,100	10,000	22.0	44.0	34		2,000	2,067	
H.4	1,800	4,000	14.4	28.8	38		2,500	1,746	

Bundaleer Mixed Water Quality

Capital Cost Evaluation

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Bundaleer	\$M	Trunk Main	\$M	Storage (ML)	\$M	Pumping (kW)	\$M	Treatment (ML/day)	\$M	Distribution	\$M
L.1	1,000	4,000	6,100	48.8	97.6	25		89	40km 550mm	43.9	2,000	27.5	940	17.4	NA	-	TBA	-
L.2	1,000	7,000	2,800	39.2	78.4	12		42	40km 375mm	27.4	100	4.7	432	10.2	NA	-	TBA	-
L.3	1,000	10,000	2,300	46.0	92.0	9		40	40km 350mm	26.4	100	4.7	354	9.2	NA	-	TBA	-
M.1	1,500	4,000	3,500	28.0	56.0	14		45	40km 425mm	28.1	100	4.7	539	11.8	NA	-	TBA	-
M.2	1,500	7,000	2,500	35.0	70.0	10		41	40km 350mm	26.4	100	4.7	385	9.6	NA	-	TBA	-
M.3	1,500	10,000	1,900	38.0	76.0	8		38	40km 300mm	25.1	100	4.7	293	8.3	NA	-	TBA	-
H.1	2,000	4,000	2,700	21.6	43.2	11		41	40km 350mm	26.4	100	4.7	416	10.0	NA	-	TBA	-
H.2	2,000	7,000	1,900	26.6	53.2	8		38	40km 300mm	25.1	100	4.7	293	8.3	NA	-	TBA	-
H.3	2,000	10,000	1,100	22.0	44.0	5		34	40km 250mm	23.1	100	4.7	170	6.6	NA	-	TBA	-
H.4	2,500	4,000	1,800	14.4	28.8	7		38	40km 300mm	25.1	100	4.7	277	8.1	NA	-	TBA	-

Key:



- Capital costs above maximum budget
- Capital costs within budget range with expectation to exceed budget with inclusion of distribution system cost
- Capital costs within or below budget range with potential to meet budget including distribution system cost

Bundaleer Mixed Water Quality

Operating Cost Evaluation

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	ML/day equiv	Bundaleer	\$M	OPEX (\$/ML)	Water Price	\$M	Asset Renewal	\$M	Pumping (MW/year)	\$M	Treatment	\$M	Operations & Management	\$M
L.1	1,000	4,000	6,100	25		89	1,791	\$1300/ML average	7.9	1.6% of CAPEX	1.4	4,118	0.8	NA	-	\$300K+0.5%	0.7
L.2	1,000	7,000	2,800	12		42	1,561	\$1000/ML average	2.8	1.6% of CAPEX	0.7	1,890	0.4	NA	-	\$300K+0.5%	0.5
L.3	1,000	10,000	2,300	9		40	1,635	\$1000/ML average	2.3	1.6% of CAPEX	0.6	1,553	0.3	NA	-	\$300K+0.5%	0.5
M.1	1,500	4,000	3,500	14		45	1,489	\$1000/ML average	3.5	1.6% of CAPEX	0.7	2,363	0.5	NA	-	\$300K+0.5%	0.5
M.2	1,500	7,000	2,500	10		41	1,598	\$1000/ML average	2.5	1.6% of CAPEX	0.7	1,688	0.3	NA	-	\$300K+0.5%	0.5
M.3	1,500	10,000	1,900	8		38	1,716	\$1000/ML average	1.9	1.6% of CAPEX	0.6	1,283	0.3	NA	-	\$300K+0.5%	0.5
H.1	2,000	4,000	2,700	11		41	1,567	\$1000/ML average	2.7	1.6% of CAPEX	0.7	1,823	0.4	NA	-	\$300K+0.5%	0.5
H.2	2,000	7,000	1,900	8		38	1,716	\$1000/ML average	1.9	1.6% of CAPEX	0.6	1,283	0.3	NA	-	\$300K+0.5%	0.5
H.3	2,000	10,000	1,100	5		34	2,067	\$1000/ML average	1.1	1.6% of CAPEX	0.6	743	0.1	NA	-	\$300K+0.5%	0.5
H.4	2,500	4,000	1,800	7		38	1,746	\$1000/ML average	1.8	1.6% of CAPEX	0.6	1,215	0.2	NA	-	\$300K+0.5%	0.5

Key:



Estimated Opex above Annual Charge +10%

Estimated Opex between Annual Charge +/-10%

Estimated Opex below Annual Charge -10%

Summary

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	Recycled CAPEX (\$M)	Recycled OPEX (\$/ML)	Murray CAPEX (\$M)	Murray OPEX (\$/ML)	CVWSS CAPEX (\$M)	CVWSS OPEX (\$/ML)	Bundaleer CAPEX (\$M)	Bundaleer OPEX (\$/ML)
L.1	1,000	4,000	6,100	48.8	97.6	301	2,634	145	1,399	38	1,917	89	1,791
L.2	1,000	7,000	2,800	39.2	78.4	162	2,888	106	1,744	56	2,026	42	1,561
L.3	1,000	10,000	2,300	46.0	92.0	142	3,000	100	1,887	51	2,054	40	1,635
M.1	1,500	4,000	3,500	28.0	56.0	207	2,900	112	1,607	61	1,998	45	1,489
M.2	1,500	7,000	2,500	35.0	70.0	147	2,921	100	1,806	53	2,041	41	1,598
M.3	1,500	10,000	1,900	38.0	76.0	126	3,130	90	1,992	47	2,086	38	1,716
H.1	2,000	4,000	2,700	21.6	43.2	150	2,840	96	1,704	54	2,029	41	1,567
H.2	2,000	7,000	1,900	26.6	53.2	126	3,130	90	1,992	47	2,086	38	1,716
H.3	2,000	10,000	1,100	22.0	44.0	94	3,688	72	2,485	10	2,085	34	2,067
H.4	2,500	4,000	1,800	14.4	28.8	123	3,195	89	2,048	47	2,098	38	1,746

- Recycled water from metropolitan Adelaide does not appear to be cost effective under any scenarios
- Direct River Murray supply expected capital costs does not meet budget allowances from engagement outcomes
- The CVWSS has potential to meet region expectations at or near the high (\$2,000 Annual Charge) pricing
- The Bundaleer Reservoir option has the potential to meet engagement outcomes at a pricing between the medium (\$1,500 Annual Charge) and high (\$2,000 Annual Charge) scenarios depending on distribution requirements

Options Selection to Take Forward

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	Recycled CAPEX (\$M)	Recycled OPEX (\$/ML)	Murray CAPEX (\$M)	Murray OPEX (\$/ML)	CVWSS CAPEX (\$M)	CVWSS OPEX (\$/ML)	Bundaleer CAPEX (\$M)	Bundaleer OPEX (\$/ML)
L.1	1,000	4,000	6,100	48.8	97.6	301	2,634	145	1,399	38	1,917	89	1,791
L.2	1,000	7,000	2,800	39.2	78.4	162	2,888	106	1,744	56	2,026	42	1,561
L.3	1,000	10,000	2,300	46.0	92.0	142	3,000	100	1,887	51	2,054	40	1,635
M.1	1,500	4,000	3,500	28.0	56.0	207	2,900	112	1,607	61	1,998	45	1,489
M.2	1,500	7,000	2,500	35.0	70.0	147	2,921	100	1,806	53	2,041	41	1,598
M.3	1,500	10,000	1,900	38.0	76.0	126	3,130	90	1,992	47	2,086	38	1,716
H.1	2,000	4,000	2,700	21.6	43.2	150	2,840	96	1,704	54	2,029	41	1,567
H.2	2,000	7,000	1,900	26.6	53.2	126	3,130	90	1,992	47	2,086	38	1,716
H.3	2,000	10,000	1,100	22.0	44.0	94	3,688	72	2,485	10	2,085	34	2,067
H.4	2,500	4,000	1,800	14.4	28.8	123	3,195	89	2,048	47	2,098	38	1,746

- Option A: Supply of 'up to' 3 GL/year from the existing CVWSS to target a sub \$2,000/ML Annual Charge
- Option B: Supply of 'up to' 3 GL/year from Bundaleer Reservoir to target a \$1,500-\$1,750/ML Annual Charge
- The above will be inclusive of preliminary distribution system assessments for both options

Appendix B Hydraulic Modelling

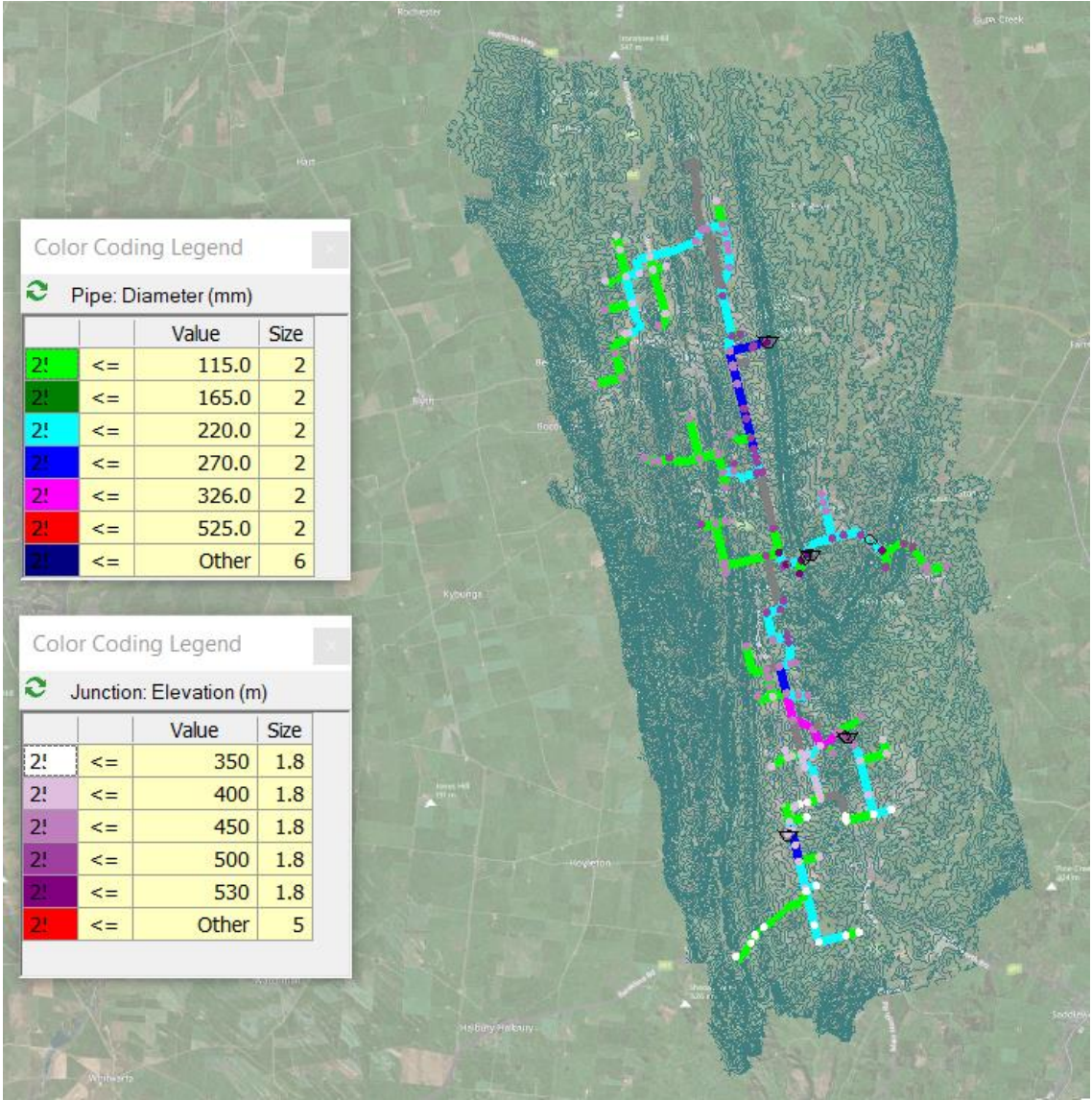
This appendix provides modelling results for:

1. The CVWSS Extension
2. The Bundaleer transfer system from Bundaleer Reservoir to the Clare GI
3. The Bundaleer in-region transfer and distribution system.

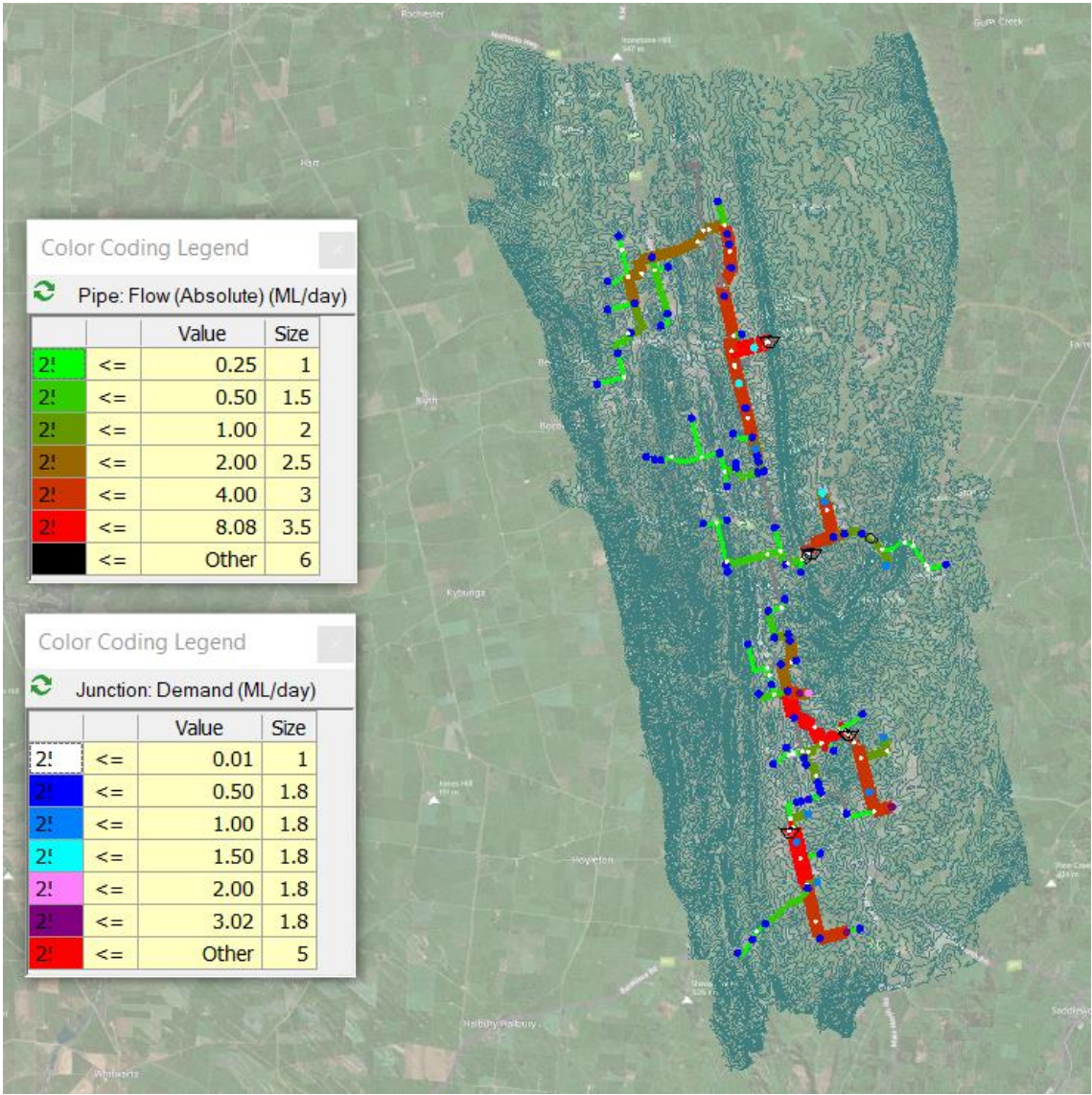
B.1 CVWSS Extension

Schematics provided include:

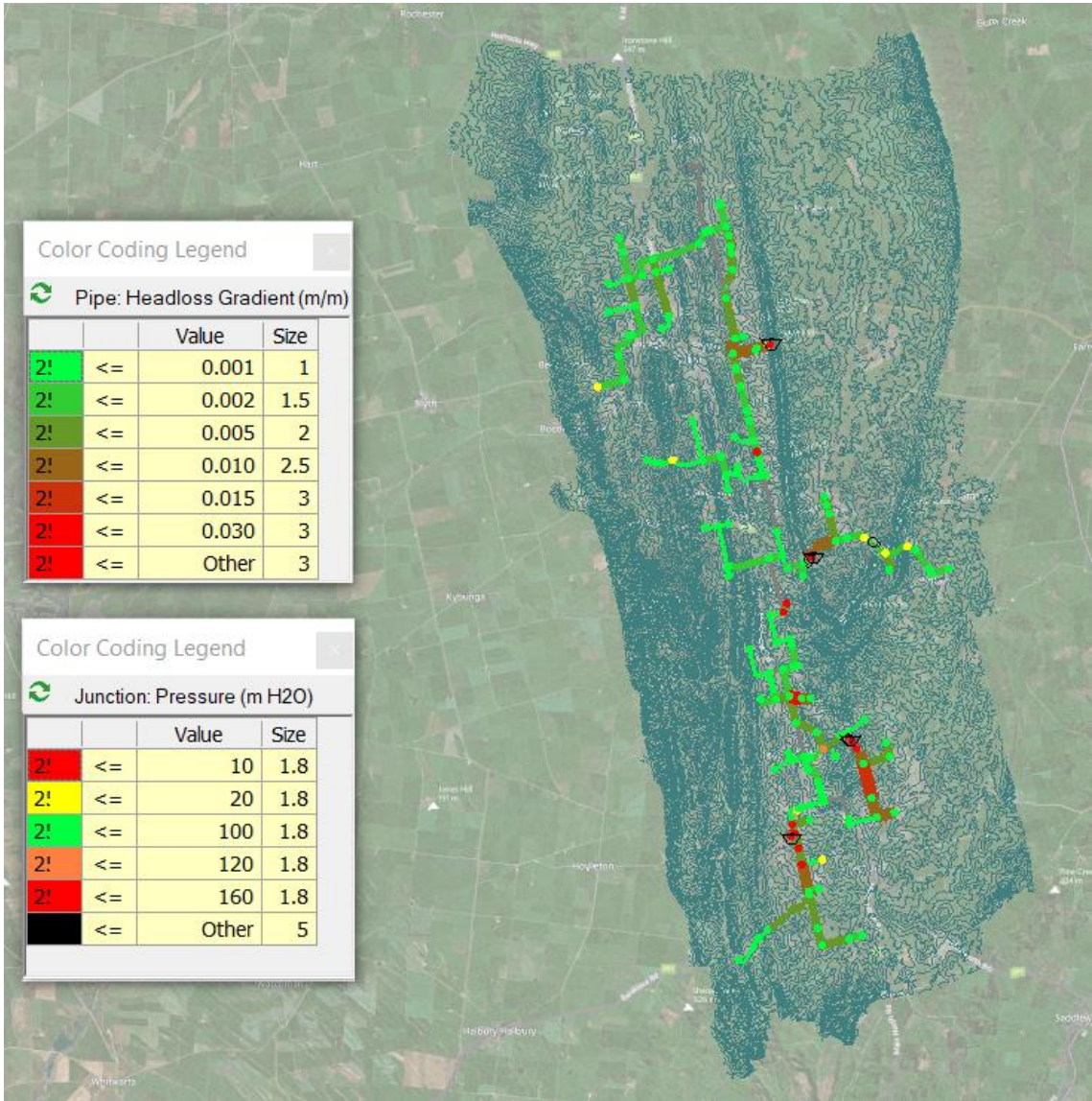
- Pipe diameters and customer elevations for the assessment
- Pipe flows and customer demands adopted for 30 ML/day (peak week)
- Pipe headloss gradient and customer pressures for 30 ML/day (peak week)
- Pipe headloss gradient and customer pressures for 45 ML/day 'high-use scenario'



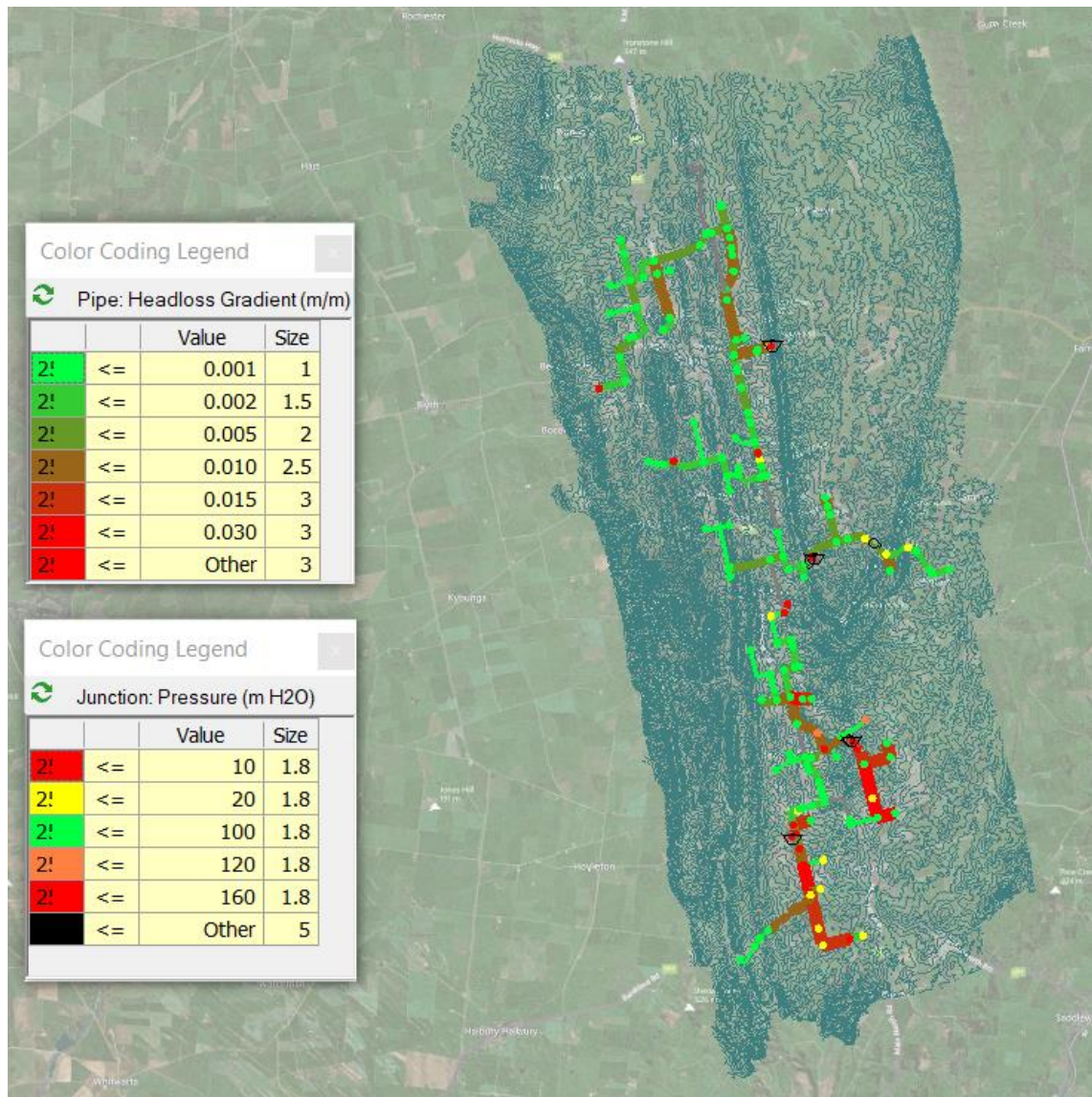
Pipe diameters and customer elevations for the assessment



Pipe flows and customer demands adopted for 30 ML/day (peak week)



Pipe headloss gradient and customer pressures for 30 ML/day (peak week)

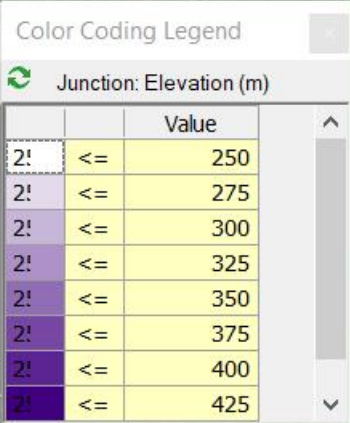


Pipe headloss gradient and customer pressures for 45 ML/day 'high-use scenario'

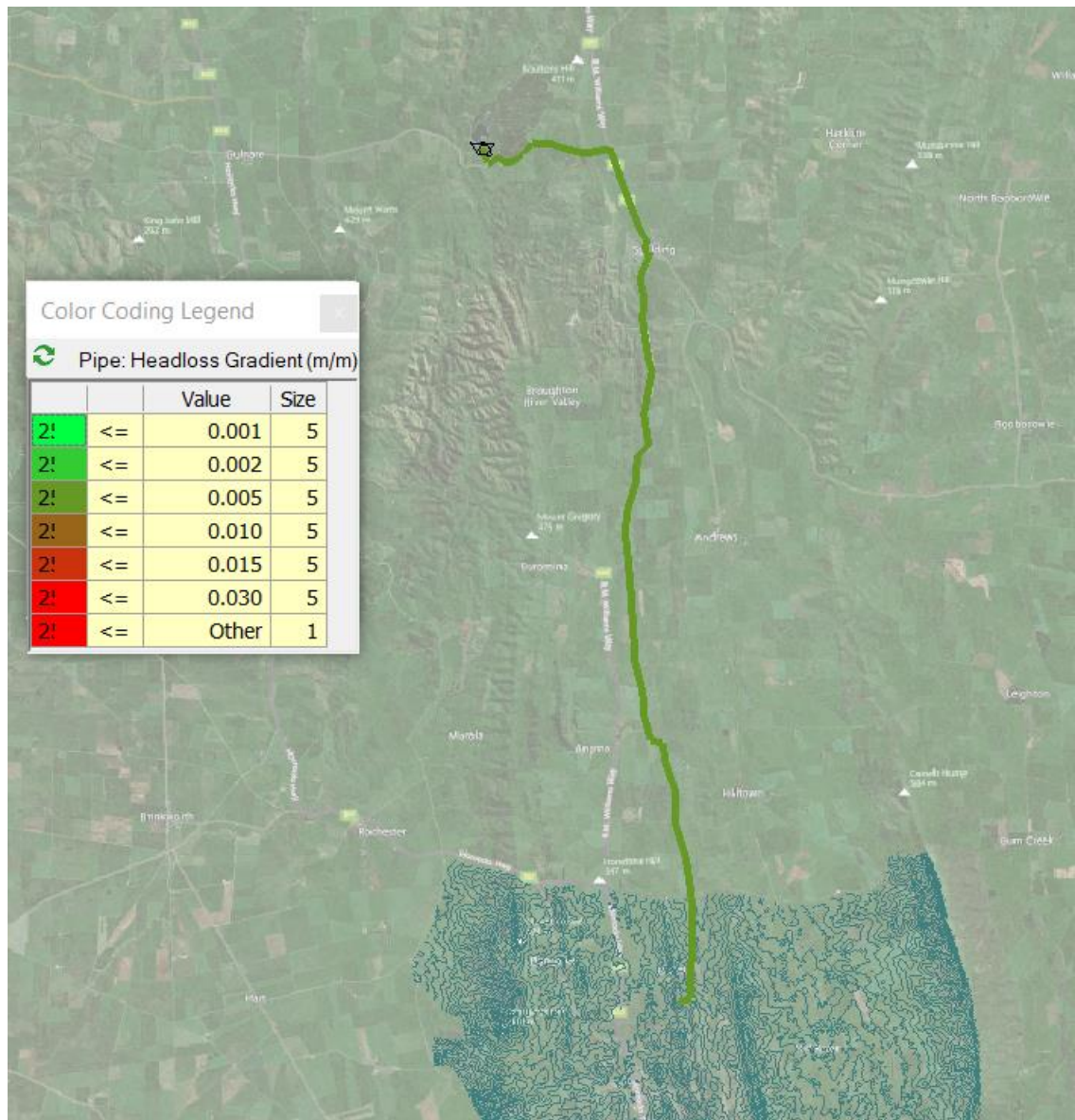
B.2 Bundaleer Transfer System

Schematics provided include:

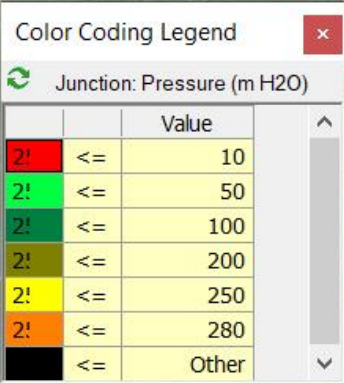
- Transfer system trunk main alignment natural elevations
- Transfer system trunk main headloss gradient
- Transfer system pressures along trunk main



Transfer system trunk main alignment natural elevations

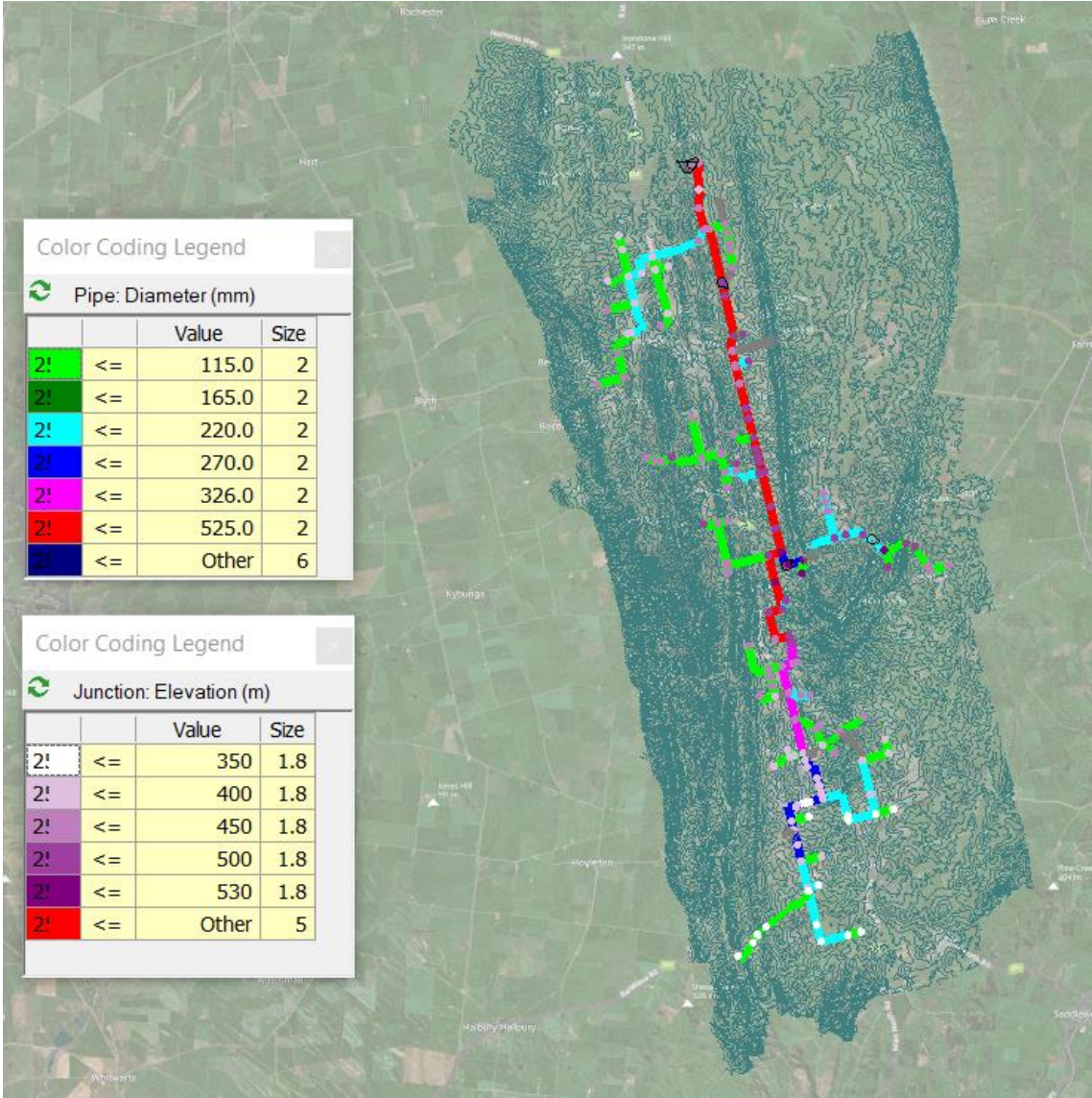


Transfer system trunk main headloss gradient

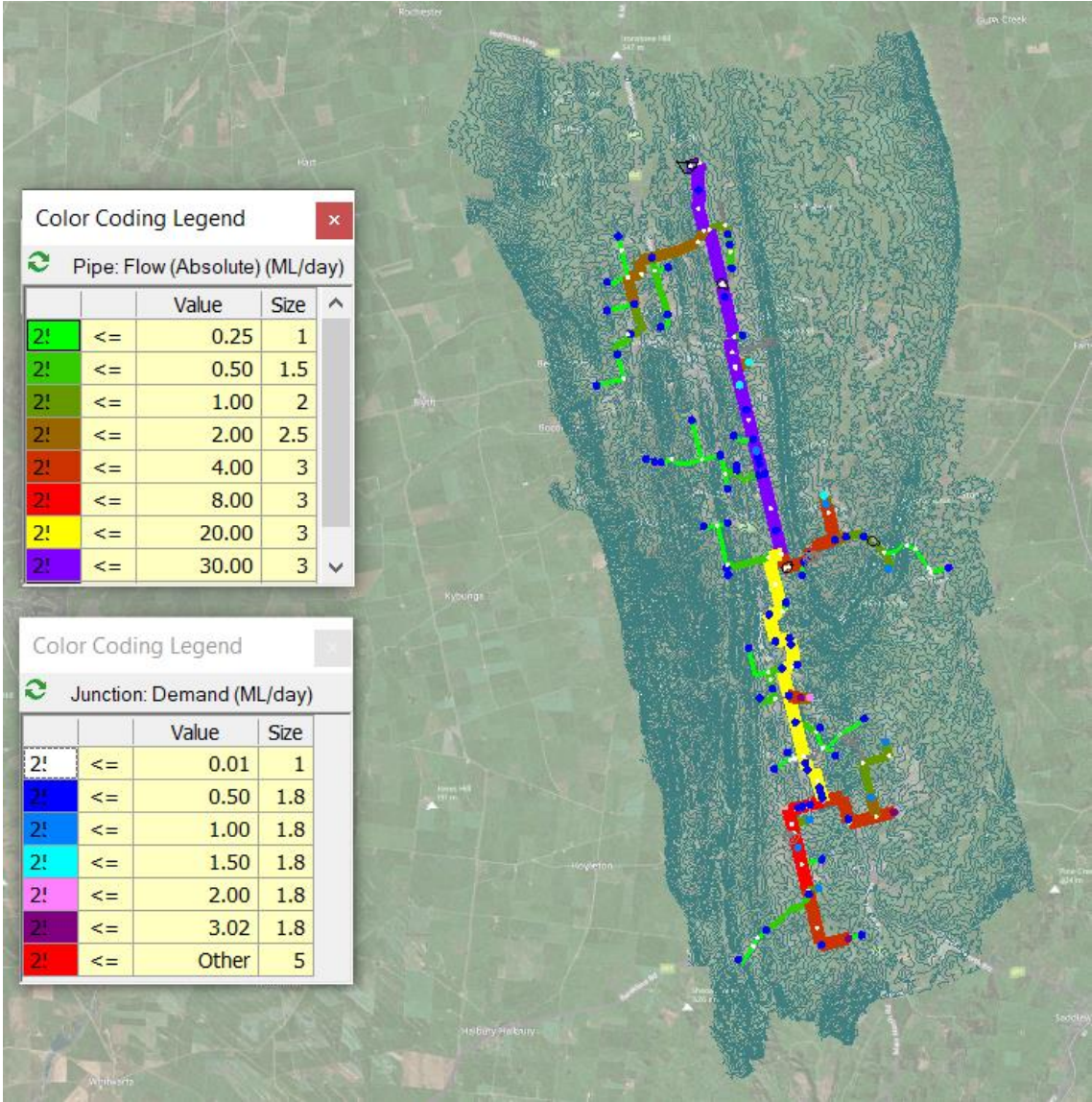


B.3 Bundaleer Distribution Network

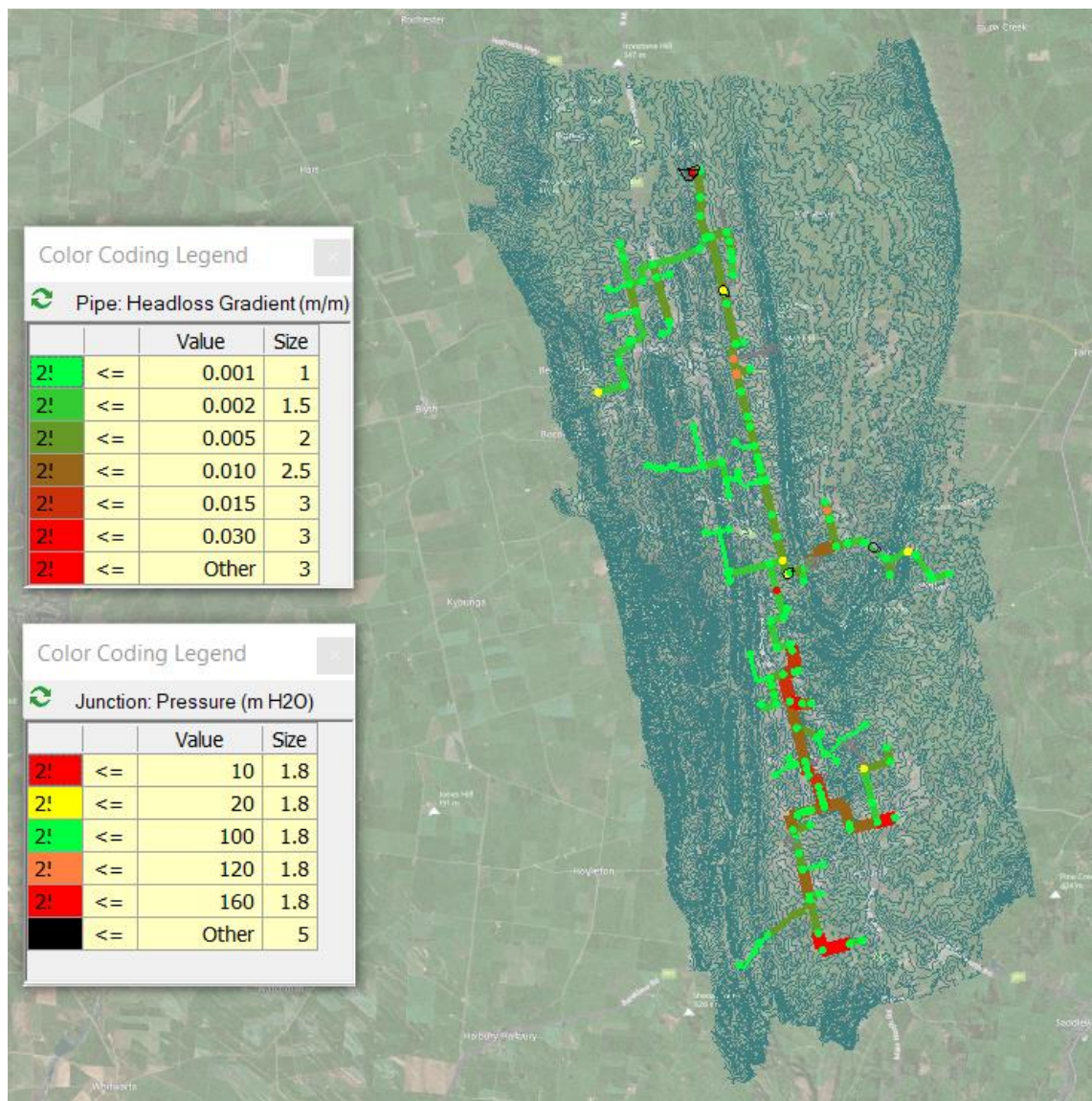
- Pipe diameters and customer elevations for the assessment
- Pipe flows and customer demands adopted for 30 ML/day (peak week)
- Pipe headloss gradient and customer pressures for 30 ML/day (peak week)



Pipe diameters and customer elevations for the assessment



Pipe flows and customer demands adopted for 30 ML/day (peak week)



Pipe headloss gradient and customer pressures for 30 ML/day (peak week)

Appendix C Cost Estimates

This appendix provides cost estimates for:

1. The Options Screening process assessing four different water supply options with ten different scenarios (forty in total)
2. Detailed (suitable for PBC) estimates for the two options (CVWSS Extension and Bundaleer) selected for further analysis and distribution system development.

C.1 Options Screening Estimates

Including:

- Recycled Water from Metropolitan Adelaide
- Raw Water (direct) from River Murray
- CVWSS extension via irrigation system and community storages
- Bundaleer

Clare Valley Water Supply Scheme - Options Assessment Calculations

Project Number: PIR-07

Document Number: PIR-07_EST-01

Client: KBR

Document Control

Revision	Date	Revision Details/ Status	Author	Reviewer	Approver
A	10/06/2022	First Draft	S Daenke	P Stutterheim	C Hewitson
B	29/06/2022	Review version P Stutterheim	S Daenke	P Stutterheim	C Hewitson
0	28/07/2022	Final	S Daenke	P Stutterheim	C Hewitson

Clare Valley Water Supply Scheme - Options Assessment Calculations

General Assumptions and Inputs

All Options

Note

- 1 Options costing is developed for comparative and screening purposes only
- 2 OPEX costings include asset renewal, operations and maintenance
- 3 Distribution system has not been costed at this stage
- 4 Concept design modelling done in WaterGEMS

Assumptions

- 1
- 2 Pumping for each option is elevation rise to the Clare GI with 3m/km pipe friction loss allowance.
- 3 75-80% efficiency for pump station
- 4 \$200/MWh assumed as energy price for comparative purposes
- 5 Allowance for Operation, Maintenance and Management included as appropriate for each option
- 6 Water pricing is based on Source Availability report and recent publicly available information
- 7 CAPEX mark ups applied
- 7.1 25% allowance for preliminaries and design
- 7.2 30% contingency and
- 7.3 10% owner's costs
- 7.4 Escalation excluded
- 8 Design life used for annual asset renewal costing
- 8.1 Pipelines 80 years
- 8.2 Pump Stations 40 years
- 8.3 Storage 50 years
- 8.4 Electrical 25 years
- 8.5 Water Treatment Plant 30 years
- 9 OPEX assumptions % of capital cost including contingency
- 9.1 Pipeline maintenance 0.5%
- 9.2 Pump station maintenance 1.0%
- 9.3 Storage maintenance 0.5%
- 9.4 Power infrastructure maintenance 0.2%
- 9.5 Water treatment maintenance 0.9%
- 10 \$0.20/kWh average energy cost assumed for budget purposes

*Used to inform
an overall
average OPEX
per option*

Pipeline unit rate costing (MSCL, velocity range 1.1 - 1.3m/s)

Flow (ML/day)	L/s	Diameter (mm)	Velocity (m/s)	MSCL Cost (\$/m)	\$M/km incl. 25% prelim + 30% contingency + 10% owners costs
3	35	200	1.1	300	\$0.50
5	58	250	1.2	350	\$0.58
7.5	87	300	1.2	380	\$0.63
10	116	350	1.2	400	\$0.66
12	139	375	1.3	415	\$0.68
13.5	156	400	1.2	420	\$0.69
15	174	425	1.2	425	\$0.70
20	231	500	1.2	652	\$1.08
25	289	550	1.2	665	\$1.10
30	347	600	1.2	690	\$1.14
35	405	650	1.2	711	\$1.17
40	463	700	1.2	816	\$1.35
45	521	750	1.2	870	\$1.44
50	579	800	1.2	939	\$1.55

Storage costing (Lined earth embankment with floating cover)

Storage capital cost = \$1million establish + \$1million/100ML construct + \$1million/500??

Includes preliminaries and contingencies as per General Assumptions item 7 above

Pumping costing

Pump kW = ML/day equivalent x Lift (m) x 150kW rating per 10ML/day per 100m of lift

Pumping capital cost = \$3million for establishment and power connection + \$1m/100kW (factor of 1.25 if multiple pump stations)

Water treatment costing

Treatment plant capital cost = \$2.5M/ML based on \$1.8M/ML/day AWWT + \$0.7M/ML/day effective desal)

Clare Valley Water Supply Scheme - Options Assessment Calculations

Calculation Summary

CAPEX and OPEX Feasibility Grading

Scenario	Annual Charge (\$/ML)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	Recycled CAPEX (\$M)	Recycled OPEX (\$/ML)	Murray CAPEX (\$M)	Murray OPEX (\$/ML)	CVWSS CAPEX (\$M)	CVWSS OPEX (\$/ML)	Bundaleer CAPEX (\$M)	Bundaleer OPEX (\$/ML)
L.1	1,000	4,000	6,100	48.8	97.6	301	2,547	145	1,425	NA	NA	103	1,989
L.2	1,000	7,000	2,800	39.2	78.4	162	2,786	106	1,786	56	1,928	45	1,647
L.3	1,000	10,000	2,300	46.0	92.0	143	2,898	100	1,935	51	1,956	42	1,727
M.1	1,500	4,000	3,500	28.0	56.0	207	2,795	112	1,643	61	1,900	61	1,660
M.2	1,500	7,000	2,500	35.0	70.0	147	2,817	100	1,850	53	1,943	44	1,695
M.3	1,500	10,000	1,900	38.0	76.0	126	3,014	90	2,044	47	1,988	41	1,826
H.1	2,000	4,000	2,700	21.6	43.2	150	2,742	101	1,786	54	1,931	44	1,662
H.2	2,000	7,000	1,900	26.6	53.2	126	3,014	90	2,044	47	1,988	41	1,826
H.3	2,000	10,000	1,100	22.0	44.0	94	3,537	72	2,557	10	1,988	36	2,198
H.4	2,500	4,000	1,800	14.4	28.8	123	3,074	89	2,102	47	2,000	41	1,858

Key:

CAPEX

- Capital costs within or below budget range with potential to meet budget including distribution system cost
- Capital costs within budget range with expectation to exceed budget with inclusion of distribution system cost
- Capital costs above maximum budget

OPEX

- Estimated Opex below Annual Charge -10%
- Estimated Opex between Annual Charge +/-10%
- Estimated Opex above Annual Charge +10%

Clare Valley Water Supply Scheme - Options Assessment Calculations

Bolivar Recycled Water

CAPEX Feasibility

Scenario	Annual Charge (\$/ML/y)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Feasibility Grading	CAPEX \$M	Costing per system component									
									Trunk Main	\$M	Storage (ML)	\$M	Pumping (kW)	\$M	Treatment (ML/day)	\$M	Distribution	\$M
L.1	1,000	4,000	6,100	48.8	97.6	33		301	92 km	650 mm	107.9	4,000	49.0	2,883	55.7	35.18	88.0	TBA
L.2	1,000	7,000	2,800	39.2	78.4	15		162	92 km	425 mm	64.5	2,300	28.6	1,323	28.4	16.15	40.4	TBA
L.3	1,000	10,000	2,300	46.0	92.0	13		143	92 km	400 mm	63.8	1,700	21.4	1,087	24.3	13.27	33.2	TBA
M.1	1,500	4,000	3,500	28.0	56.0	19		207	92 km	500 mm	99.0	1,900	23.8	1,654	34.2	20.19	50.5	TBA
M.2	1,500	7,000	2,500	35.0	70.0	14		147	92 km	425 mm	64.5	1,600	20.2	1,182	25.9	14.42	36.0	TBA
M.3	1,500	10,000	1,900	38.0	76.0	10		126	92 km	350 mm	60.7	1,300	16.6	898	21.0	10.96	27.4	TBA
H.1	2,000	4,000	2,700	21.6	43.2	15		150	92 km	425 mm	64.5	1,500	19.0	1,276	27.6	15.57	38.9	TBA
H.2	2,000	7,000	1,900	26.6	53.2	10		126	92 km	350 mm	60.7	1,300	16.6	898	21.0	10.96	27.4	TBA
H.3	2,000	10,000	1,100	22.0	44.0	6		94	92 km	250 mm	53.1	800	10.6	520	14.3	6.34	15.9	TBA
H.4	2,500	4,000	1,800	14.4	28.8	10		123	92 km	350 mm	60.7	1,300	16.6	851	20.1	10.38	26.0	TBA

Annualised replacement cost (\$ / year) - Carry forward to OPEX

Total \$/ year: 1.76 0.76 0.33 0.38 0.29

\$ CAPEX: 1.4%

Average maintenance % of CAPEX - Carry forward to OPEX

Average % 0.7% 70 22 20 38

Assumptions:

- 1 Barossa New Water goes ahead - Clare is a contributor
- 2 Water is sourced from Bolivar with additional advanced treatment
- 3 Desalinated to un-desalinated water blending ratio 1:2 (Applied in Cell U17)
- 4 Water only available in off-season (May-October)
- 5 New storage (at Clare GI) to capture winter water to be at 2/3 of Demand with remainder to be existing customer on-property storage
- 6 A completely new distribution system is required
- 7 95% availability for treatment
- 8 575m lift required
- 9 No prospect of recycled options at or near \$1000/ML AC based on BNW learnings
- 10 Pump kW is calculated for all 4 pump stations (i.e. includes SA Water pump station)
- 11 1/3 total treatment CAPEX attributed to desalination plant, 2/3 to advanced treatment

Clare Valley Water Supply Scheme - Options Assessment Calculations

Bolivar Recycled Water

OPEX Feasibility

Scenario	Annual Charge (\$/ML/y)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Feasibility Grading	CAPEX \$M	AC (\$/ML/y)	OPEX contributors									
										Water Price	\$M	Asset Renewal	\$M	Pumping (MW/year)	\$M	Treatment	\$M	Operations & Management	\$M
L.1	1,000	4,000	6,100	48.8	97.6	33		301	2,547	\$540/ML allocation	3.3	1.4% of CAPEX	4.3	12,627	2.5	Desal \$500/ML	3.1	\$300K+0.7%	2.4
L.2	1,000	7,000	2,800	39.2	78.4	15		162	2,786	\$540/ML allocation	1.5	1.4% of CAPEX	2.3	5,796	1.2	Desal \$500/ML	1.4	\$300K+0.7%	1.4
L.3	1,000	10,000	2,300	46.0	92.0	13		143	2,898	\$540/ML allocation	1.2	1.4% of CAPEX	2.0	4,761	1.0	Desal \$500/ML	1.2	\$300K+0.7%	1.3
M.1	1,500	4,000	3,500	28.0	56.0	19		207	2,795	\$540/ML allocation	1.9	1.4% of CAPEX	3.0	7,245	1.4	Desal \$500/ML	1.8	\$300K+0.7%	1.7
M.2	1,500	7,000	2,500	35.0	70.0	14		147	2,817	\$540/ML allocation	1.4	1.4% of CAPEX	2.1	5,175	1.0	Desal \$500/ML	1.3	\$300K+0.7%	1.3
M.3	1,500	10,000	1,900	38.0	76.0	10		126	3,014	\$540/ML allocation	1.0	1.4% of CAPEX	1.8	3,933	0.8	Desal \$500/ML	1.0	\$300K+0.7%	1.2
H.1	2,000	4,000	2,700	21.6	43.2	15		150	2,742	\$540/ML allocation	1.5	1.4% of CAPEX	2.1	5,589	1.1	Desal \$500/ML	1.4	\$300K+0.7%	1.3
H.2	2,000	7,000	1,900	26.6	53.2	10		126	3,014	\$540/ML allocation	1.0	1.4% of CAPEX	1.8	3,933	0.8	Desal \$500/ML	1.0	\$300K+0.7%	1.2
H.3	2,000	10,000	1,100	22.0	44.0	6		94	3,537	\$540/ML allocation	0.6	1.4% of CAPEX	1.3	2,277	0.5	Desal \$500/ML	0.6	\$300K+0.7%	1.0
H.4	2,500	4,000	1,800	14.4	28.8	10		123	3,074	\$540/ML allocation	1.0	1.4% of CAPEX	1.8	3,726	0.7	Desal \$500/ML	0.9	\$300K+0.7%	1.2

Assumptions:

- 1 NAIS availability charge (\$0.26/kL) + consumption charge (\$0.28/kL) - source: <https://www.sawater.com.au/nais/invest-in-nais>
- 2 Indicative Annualised Replacement obtained from one CAPEX scenario, value is similar across all scenarios
- 3 Pumping energy costs include 3 out of 4 pump stations (assume 1 operated by SA Water as part of water price)
- 4 Desalination costed at \$500/ML (post-blending volume rate)
- 5 Operations and maintenance estimated as \$300K salaries + 0.7% of capital cost
- 6 O&M 35% of treatment cost and 75% of pumping cost

Formula reference:

Water Price \$/ML (Column L)
 Asset Renewal % (Column N)
 Pumping MW/year and \$M (Columns P and Q);
 Treatment \$/ML (Column R)
 Operations and Maintenance \$ (Column U)
 Operations and Maintenance \$ (Column U)

Clare Valley Water Supply Scheme - Options Assessment Calculations

Murray Raw Water

CAPEX Feasibility

									Costing per system component												
Scenario	Annual Charge (\$/ML/y)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Feasibility Grading	CAPEX \$M	Trunk Main				\$M	Storage (ML)	\$M	Pumping (kW)	\$M	Treatment (ML/day)	\$M	Distribution	\$M
L.1	1,000	4,000	6,100	48.8	97.6	17		145	110	km	425	mm	77.1	2,000	25.0	2,131	42.5	NA		TBA	
L.2	1,000	7,000	2,800	39.2	78.4	8		106	110	km	300	mm	69.0	1,100	14.2	978	22.4	NA		TBA	
L.3	1,000	10,000	2,300	46.0	92.0	6		100	110	km	300	mm	69.0	900	11.8	803	19.3	NA		TBA	
M.1	1,500	4,000	3,500	28.0	56.0	10		112	110	km	350	mm	72.6	1,000	13.0	1,223	26.6	NA		TBA	
M.2	1,500	7,000	2,500	35.0	70.0	7		100	110	km	300	mm	69.0	800	10.6	873	20.5	NA		TBA	
M.3	1,500	10,000	1,900	38.0	76.0	5		90	110	km	250	mm	63.5	700	9.4	664	16.9	NA		TBA	
H.1	2,000	4,000	2,700	21.6	43.2	7		101	110	km	300	mm	69.0	800	10.6	943	21.8	NA		TBA	
H.2	2,000	7,000	1,900	26.6	53.2	5		90	110	km	250	mm	63.5	700	9.4	664	16.9	NA		TBA	
H.3	2,000	10,000	1,100	22.0	44.0	3		72	110	km	200	mm	54.5	400	5.8	384	12.0	NA		TBA	
H.4	2,500	4,000	1,800	14.4	28.8	5		89	110	km	250	mm	63.5	700	9.4	629	16.3	NA		TBA	

Total \$/ year: 1.39

\$ CAPEX: 1.6%

Average % 0.61%

Annualised replacement cost (\$ / year)

0.79 0.19 0.41

Average maintenance % of CAPEX - Carry forward to OPEX

67 12 22 NA

Assumptions:

- 1 All year round supply to region
- 2 New storage (at Clare GI) to capture winter water to be at 1/3 of
- 3 A completely new distribution system is required
- 4 850m lift required

Clare Valley Water Supply Scheme - Options Assessment Calculations

Murray Raw Water

OPEX Feasibility

Scenario	Annual Charge (\$/ML/y)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Feasibility Grading	CAPEX \$M	AC (\$/ML/y)	OPEX contributors								
										Water Price \$M	Asset Renewal \$M	Pumping (MW/year) \$M	Treatment (ML/day) \$M	Operations & Management \$M				
L.1	1,000	4,000	6,100	48.8	97.6	17		145	1,425	\$250/ML allocation	1.5	1.6% of CAPEX	2.3	18,666	3.7	NA	\$300K+0.61%	1.2
L.2	1,000	7,000	2,800	39.2	78.4	8		106	1,786	\$250/ML allocation	0.7	1.6% of CAPEX	1.6	8,568	1.7	NA	\$300K+0.61%	0.9
L.3	1,000	10,000	2,300	46.0	92.0	6		100	1,935	\$250/ML allocation	0.6	1.6% of CAPEX	1.6	7,038	1.4	NA	\$300K+0.61%	0.9
M.1	1,500	4,000	3,500	28.0	56.0	10		112	1,643	\$250/ML allocation	0.9	1.6% of CAPEX	1.7	10,710	2.1	NA	\$300K+0.61%	1.0
M.2	1,500	7,000	2,500	35.0	70.0	7		100	1,850	\$250/ML allocation	0.6	1.6% of CAPEX	1.6	7,650	1.5	NA	\$300K+0.61%	0.9
M.3	1,500	10,000	1,900	38.0	76.0	5		90	2,044	\$250/ML allocation	0.5	1.6% of CAPEX	1.4	5,814	1.2	NA	\$300K+0.61%	0.8
H.1	2,000	4,000	2,700	21.6	43.2	7		101	1,786	\$250/ML allocation	0.7	1.6% of CAPEX	1.6	8,262	1.7	NA	\$300K+0.61%	0.9
H.2	2,000	7,000	1,900	26.6	53.2	5		90	2,044	\$250/ML allocation	0.5	1.6% of CAPEX	1.4	5,814	1.2	NA	\$300K+0.61%	0.8
H.3	2,000	10,000	1,100	22.0	44.0	3		72	2,557	\$250/ML allocation	0.3	1.6% of CAPEX	1.1	3,366	0.7	NA	\$300K+0.61%	0.7
H.4	2,500	4,000	1,800	14.4	28.8	5		89	2,102	\$250/ML allocation	0.5	1.6% of CAPEX	1.4	5,508	1.1	NA	\$300K+0.61%	0.8

Assumptions:

- 1 \$250/ML for River Murray water (Source: Availability Report: long term average of \$200/ML +25% contingency)
- 2 Operations and maintenance estimated as \$300K salaries +0.61% of capital cost

Formula reference:

Water Price \$/ML (Column L)

Operations and Maintenance \$ (Column U)

Clare Valley Water Supply Scheme - Options Assessment Calculations

CVWSS Extension Potable

CAPEX Feasibility

Scenario	Annual Charge (\$/ML/y)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Feasibility Grading	CAPEX \$M	Costing per system component										
									Trunk Main				\$M	Storage (ML)	\$M	Pumping (kW)	\$M	Treatment (ML/day)	\$M
L.1	1,000	4,000	6,100	48.8	97.6	25		NA	NA	NA	-	3,050	37.6	NA		NA	TBA		
L.2	1,000	7,000	2,800	39.2	78.4	12		56	32	km	375	mm	32.9	1,400	17.8	HG	5.0	NA	TBA
L.3	1,000	10,000	2,300	46.0	92.0	9		51	32	km	350	mm	31.7	1,150	14.8	HG	5.0	NA	TBA
M.1	1,500	4,000	3,500	28.0	56.0	14		61	32	km	425	mm	33.7	1,750	22.0	HG	5.0	NA	TBA
M.2	1,500	7,000	2,500	35.0	70.0	10		53	32	km	350	mm	31.7	1,250	16.0	HG	5.0	NA	TBA
M.3	1,500	10,000	1,900	38.0	76.0	8		47	32	km	300	mm	30.1	950	12.4	HG	5.0	NA	TBA
H.1	2,000	4,000	2,700	21.6	43.2	11		54	32	km	350	mm	31.7	1,350	17.2	HG	5.0	NA	TBA
H.2	2,000	7,000	1,900	26.6	53.2	8		47	32	km	300	mm	30.1	950	12.4	HG	5.0	NA	TBA
H.3	2,000	10,000	1,100	22.0	44.0	5		10	NA		NA	-	550	7.6	LG	2.5	NA	TBA	
H.4	2,500	4,000	1,800	14.4	28.8	7		47	32	km	300	mm	30.1	900	11.8	HG	5.0	NA	TBA

Acronyms:

HG - High Growth (based on SA Water assessment)

LG - Low Growth (based on SA Water assessment)

Total \$/ year: 0.24

\$ CAPEX: 0.5%

Annualised replacement cost (\$ / year)

0.24

Average maintenance % of CAPEX - Carry forward to OPEX

Average % 0.55%

25

17

5

NA

Assumptions:

- 1 All year round supply to region with 1.5 demand peaking factor for pipe sizing
- 2 Allowance of 50% of demand in community/private new storage to allow for off-peak pricing benefits
- 3 All new community storages will be for non-potable
- 4 Low Demand option (1.1GL/year) based on SAW memo - no trunk augmentation required
- 5 Medium to high Demand options (2-3GL/year) based on SAW memo - augmentation of MW - Auburn Valve req
- 6 Assume the 6GL option unable to be met.
- 7 Pipe to be of potable requirements (1.5 cost factor applied) and increased in size by 50% for demand peak sizing
- 8 Allowance of \$5 million for upgrade for High Growth and \$2.5 million for Low Growth of Mintaro PS
- 9 Tank upgrades to be incorporated as part of the distribution system consideration
- 10 Assume that any \$1000/ML options cannot be met
- 11 50% markup for pipeline costs as potable/SAW standard

Clare Valley Water Supply Scheme - Options Assessment Calculations

CVWSS Extension Potable

OPEX Feasibility

Scenario	Annual Charge (\$/ML/y)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Feasibility Grading	CAPEX \$M	AC (\$/ML/y)	OPEX contributors							
										Water Price \$M	Asset Renewal \$M	Pumping (MW/year) \$M	Treatment (ML/day) \$M	Operations & Management \$M			
L.1	1,000	4,000	6,100	48.8	97.6	25		NA	NA	\$1,720/ML average	10.5	0.5% of CAPEX	NA	NA	NA	\$200K+0.55%	0.41
L.2	1,000	7,000	2,800	39.2	78.4	12		56	1,928	\$1,720/ML average	4.8	0.5% of CAPEX	0.3	NA	NA	\$200K+0.55%	0.30
L.3	1,000	10,000	2,300	46.0	92.0	9		51	1,956	\$1,720/ML average	4.0	0.5% of CAPEX	0.3	NA	NA	\$200K+0.55%	0.28
M.1	1,500	4,000	3,500	28.0	56.0	14		61	1,900	\$1,720/ML average	6.0	0.5% of CAPEX	0.3	NA	NA	\$200K+0.55%	0.32
M.2	1,500	7,000	2,500	35.0	70.0	10		53	1,943	\$1,720/ML average	4.3	0.5% of CAPEX	0.3	NA	NA	\$200K+0.55%	0.29
M.3	1,500	10,000	1,900	38.0	76.0	8		47	1,988	\$1,720/ML average	3.3	0.5% of CAPEX	0.2	NA	NA	\$200K+0.55%	0.27
H.1	2,000	4,000	2,700	21.6	43.2	11		54	1,931	\$1,720/ML average	4.6	0.5% of CAPEX	0.3	NA	NA	\$200K+0.55%	0.29
H.2	2,000	7,000	1,900	26.6	53.2	8		47	1,988	\$1,720/ML average	3.3	0.5% of CAPEX	0.2	NA	NA	\$200K+0.55%	0.27
H.3	2,000	10,000	1,100	22.0	44.0	5		10	1,988	\$1,720/ML average	1.9	0.5% of CAPEX	0.1	NA	NA	\$200K+0.55%	0.24
H.4	2,500	4,000	1,800	14.4	28.8	7		47	2,000	\$1,720/ML average	3.1	0.5% of CAPEX	0.2	NA	NA	\$200K+0.55%	0.26

Assumptions:

1 Water price calculation

	\$/kL	Proportion used	Effective price
Winter Price	\$1.55	65%	
Off Peak	\$2.04	35%	\$1.72
On Peak	\$2.81	0%	

Formula reference:

Water Price \$/ML (Column L)

2 Operations and maintenance estimated as \$200K+0.55% of capital cost

Operations and Maintenance \$ (Column U)

Clare Valley Water Supply Scheme - Options Assessment Calculations

Bundaleer Mixed Water Quality

CAPEX Feasibility

Scenario	Annual Charge (\$/ML/y)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Feasibility Grading	CAPEX \$M	Trunk Main	\$M	Storage (ML)	\$M	Pumping (kW)	\$M	Treatment (ML/day)	\$M	Distribution	\$M
L.1	1,000	4,000	6,100	48.8	97.6	38		103	38 km 700 mm	51.2	2,000	27.5	1,426	24.2	NA		TBA	
L.2	1,000	7,000	2,800	39.2	78.4	17		45	38 km 425 mm	26.6	100	4.7	654	13.4	NA		TBA	
L.3	1,000	10,000	2,300	46.0	92.0	14		42	38 km 375 mm	26.0	100	4.7	538	11.7	NA		TBA	
M.1	1,500	4,000	3,500	28.0	56.0	22		61	38 km 500 mm	40.9	100	4.7	818	15.7	NA		TBA	
M.2	1,500	7,000	2,500	35.0	70.0	16		44	38 km 425 mm	26.6	100	4.7	584	12.4	NA		TBA	
M.3	1,500	10,000	1,900	38.0	76.0	12		41	38 km 375 mm	26.0	100	4.7	444	10.4	NA		TBA	
H.1	2,000	4,000	2,700	21.6	43.2	17		44	38 km 425 mm	26.6	100	4.7	631	13.0	NA		TBA	
H.2	2,000	7,000	1,900	26.6	53.2	12		41	38 km 375 mm	26.0	100	4.7	444	10.4	NA		TBA	
H.3	2,000	10,000	1,100	22.0	44.0	7		36	38 km 300 mm	23.8	100	4.7	257	7.8	NA		TBA	
H.4	2,500	4,000	1,800	14.4	28.8	11		41	38 km 375 mm	26.0	100	4.7	421	10.1	NA		TBA	

Annualised replacement cost (\$ / year)				
Total \$/ year:	0.67	0.33	0.09	0.25
\$ CAPEX:	1.6%			
Average maintenance % of CAPEX - Carry forward to OPEX				
Average %	0.63%	30	7	13
				NA

Assumptions:

- 1 All year round supply to region - weighted at 65% over growing 6 month period (35% taken during winter period for on-farm storage) with a further 1.75 PF applied (3.5 effective)
- 2 Bundaleer to be filled during winter period from MW and Catchment
- 3 A completely new distribution system is required
- 4 250m lift required
- 5 \$2.5m connection allowance from MW to Bundaleer reservoir - added to storage costs
- 6 No dam safety upgrade except for 6000 ML/year scenario. \$20 million surcharge added for this upgrade or additional in system storage.
- 7 1 PS allowed to boost to region. Therefore the 1.25 multiple pump cost factor does not apply
- 8 100ML control storage allowed at termination of trunk

Clare Valley Water Supply Scheme - Options Assessment Calculations

Bundaleer Mixed Water Quality

OPEX Feasibility

Scenario	Annual Charge (\$/ML/y)	Capital Charge (\$/ML)	Demand (ML/y)	Budget Low (\$M)	Budget High (\$M)	ML/day equiv	Feasibility Grading	\$M	AC (\$/ML/y)	OPEX contributors								
										Water Price	\$M	Asset Renewal	\$M	Pumping (MW/year)	\$M	Treatment (ML/day)	\$M	Operations & Management
L.1	1,000	4,000	6,100	48.8	97.6	25		103	1,989	\$1380/ML average	8.4	1.6% of CAPEX	1.7	5,490	1.1	NA	\$300K+0.61%	0.9
L.2	1,000	7,000	2,800	39.2	78.4	12		45	1,647	\$1000/ML average	2.8	1.6% of CAPEX	0.7	2,520	0.5	NA	\$300K+0.61%	0.6
L.3	1,000	10,000	2,300	46.0	92.0	9		42	1,727	\$1000/ML average	2.3	1.6% of CAPEX	0.7	2,070	0.4	NA	\$300K+0.61%	0.6
M.1	1,500	4,000	3,500	28.0	56.0	14		61	1,660	\$1000/ML average	3.5	1.6% of CAPEX	1.0	3,150	0.6	NA	\$300K+0.61%	0.7
M.2	1,500	7,000	2,500	35.0	70.0	10		44	1,695	\$1000/ML average	2.5	1.6% of CAPEX	0.7	2,250	0.5	NA	\$300K+0.61%	0.6
M.3	1,500	10,000	1,900	38.0	76.0	8		41	1,826	\$1000/ML average	1.9	1.6% of CAPEX	0.7	1,710	0.3	NA	\$300K+0.61%	0.6
H.1	2,000	4,000	2,700	21.6	43.2	11		44	1,662	\$1000/ML average	2.7	1.6% of CAPEX	0.7	2,430	0.5	NA	\$300K+0.61%	0.6
H.2	2,000	7,000	1,900	26.6	53.2	8		41	1,826	\$1000/ML average	1.9	1.6% of CAPEX	0.7	1,710	0.3	NA	\$300K+0.61%	0.6
H.3	2,000	10,000	1,100	22.0	44.0	5		36	2,198	\$1000/ML average	1.1	1.6% of CAPEX	0.6	990	0.2	NA	\$300K+0.61%	0.5
H.4	2,500	4,000	1,800	14.4	28.8	7		41	1,858	\$1000/ML average	1.8	1.6% of CAPEX	0.7	1,620	0.3	NA	\$300K+0.61%	0.5

Assumptions:

1 Water price calculation:

	\$/kL	Proportion	Effective \$	Proportion	Effective \$
Catchment Water	\$0.20	20%		40%	
Winter Price	\$1.55	60%	\$1.38	60%	\$1.01
Off Peak	\$2.04	20%		0%	
On Peak	\$2.81	0%		0%	

2 Pumping energy calculated from 2 separate pumping duties, 65% annual demand delivered in summer and 35% in winter

3 Operations and maintenance estimated as \$300K+0.61% capital cost

Formula reference:

Water Price \$/ML (Column L)

Operations and Maintenance \$ (Column U)

	ML	ML/d equiv	kW	MW/year
Growing 6 months	4575	25	940	4,117.5
Winter 6 months	1525	8	313	1,372.5
TOTAL				5490

C.2 Options Analysis of Shortlisted Options

Including:

- CVWSS Extension Capital Cost Estimate (Base 2.2 GL storage)
- CVWSS Extension Operating Cost Estimate (Base 2.2 GL storage)
- CVWSS Extension Capital Cost Estimate (3.0 GL storage added scenario)
- CVWSS Extension Operating Cost Estimate (3.0 GL storage added scenario)
- Bundaleer Capital Cost Estimate
- Bundaleer Operating Cost Estimate

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
Document Number: PIR-07_EST-03
Client: KBR
Option: CVWSS
Document Control

Revision	Date	Revision Details/ Status	Author	Reviewer	Approver
A	6/07/2022	First Draft	P Stutterheim	S Daenke	C Hewitson
B	11/07/2022	Updated Draft including 3GL storage options and customer connection allowance	P Stutterheim	C Hewitson	C Hewitson
C	11/07/2022	Updated with 300mm system length corrected	C Hewitson	S Daenke	C Hewitson
D	13/07/2022	3GL option asset renewal and maintenance costs revised based on greater storage CAPEX.	C Hewitson	S Daenke	C Hewitson

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
Document Number: PIR-07_EST-03
Client: KBR
Option: CVWSS

Assumptions

Ref	Item	Assumption
CAPEX		
1	Pipelines	
1.1	PVC pipe	
1.1.1	Supply rates	Pipe supply to Adelaide metro sourced from local supplier
1.1.2	Construction cost derived from QS costing for a similar project in 2022, as well as indicative contractor costing received from a local contractor.	
1.2	MSCL pipe	
1.2.1	Supply rates	Based on QS costing for a similar project in 2022. Supply pipe and deliver to laydown yard, equivalent of distance Adelaide metro from Clare region.
1.2.1	Construction cost derived from QS costing for a similar project in 2022	
1.2.1	MSCL rates account for the following:	
		Extra over for all bends and waste - 2% of pipe supply cost, excludes valves
		String pipe
		Excavation of pipe trench
		Extra over for blasting/Jack hammering - 1% provision
		Place bedding
		Extra over for cement for stabilising material - 5% cement/ lime for 1% of select backfill mixed on site
		Place pipe
		Selected backfill over pipe
		Backfill over pipe cover
1.3	Extra over allowance for isolation, scour and air valves; fittings; thrust blocks	Based on QS costing for a similar project in 2022. 10% for distribution network 6% for transfer pipeline
1.4	Extra over item for i) crossing of major roads (paved) including temporary diversions roads and traffic management, and ii) existing services. QS values ranged from 1.3% to 3.8% for large and small pipelines on a similar project in a more remote area.	5%
	This rate includes:	Extra over item for gravel road and access crossings
		Extra over item for railway crossings (pipe jacking/microtunnelling/HDD including launch and retrieval pits)
		Extra over item for creek crossings in salt lake areas (GRP pipe, erosion and floating mitigation e.g. pipe depth)
		Extra over item for minor creek crossings (MSCL pipe, erosion mitigation e.g. pipe depth, additional corrosion treatment).
		Provision for making good other infrastructure (fencing etc.)
1.5	Allowance for material transport to site	Included in rates
1.6	Extra over for Cathodic Protection	\$15/m
1.7	Allowance for imported bedding	10% of bedding material
		Pipe Bedding (m3) = (DN+ Lo + Lb) x (DN + 2Lc) - Pipe Area = (DN + 0.3m)*(DN + 0.6m) - Pipe Area
1.8	Irrigation Outlets	\$13,000 supply and install based on application of 0.501 ML/d supply and medium outlet install rates adopted for BNW Business case (KBR, NS 7/7/22)

	Water Treatment Plant	30
7	Maintenance cost (% Capital Cost including contingency)	
	Pipeline maintenance	0.25%
	Pump station maintenance	1.0%
	Storage maintenance	0.5%
	Power infrastructure maintenance	0.2%
	Water treatment maintenance	0.9%
8	OPEX staff costs	
	Staff salaries (\$/year)	100000.00
9	Costs exclude GST	

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
Document Number: PIR-07_EST-03
Client: KBR
Option: CVWSS

CAPEX Estimate Summary - 2.2GL Storage							
Item	Description	Comments	Quantity	Unit	Rate	Cost	%
1	PIPELINES						22%
	Distribution						
1	100	Supply PVC-O PN16	51,749	m	19.00	983,231	
2	150	Supply PVC-O PN16	16,347	m	29.00	474,063	
3	200	Supply PVC-O PN16	23,339	m	50.50	1,178,620	
4	225	Supply PVC-O PN16		m	60.00	-	
5	250	Supply PVC-O PN16	7,803	m	72.00	561,816	
6	300	Supply PVC-O PN16	7,589	m	109.00	827,201	
7	375	Supply PVC-O PN16		m	150.98	-	
8	500	Supply MSCL PN35		m	312.00	-	
9	560	Supply MSCL PN24		m	349.20	-	
10	100	Install PVC-O PN16	51,749	m	72.00	3,725,928	
11	150	Install PVC-O PN16	16,347	m	78.00	1,275,066	
12	200	Install PVC-O PN16	23,339	m	84.75	1,977,980	
13	225	Install PVC-O PN16		m	88.13	-	
14	250	Install PVC-O PN16	7,803	m	91.50	713,975	
15	300	Install PVC-O PN16	7,589	m	100.50	762,695	
16	375	Install PVC-O PN16		m	104.10	-	
17	500	Install MSCL PN35		m	163.86	-	
18	560	Install MSCL PN24		m	176.32	-	
37	Extra over allowance for isolation, scour and air valves; fittings; thrust blocks	Refer to Assumptions sheet	12,480,574	%	10%	1,248,057	
38	Extra over allowance for road, rail and creek crossings; dealing with existing services, and making good existing infrastructure (e.g. fencing).	Refer to Assumptions sheet	12,480,574	%	5%	624,029	
39	Extra over allowance for importation of pipeline bedding and embedment material.	Refer to Assumptions sheet 1.2.3, and calculation alongside. 1620kg/m3, \$35/ton Assumed 10% imported material	1,969,780.91	%	10%	196,978	
40	Allowance for material transport to site from Adelaide metro	Budget rates assumed to include freight	4,024,930.50	%		-	
41	Allowance for customer connections	Supply (\$7K) and Install (\$6K) from BNV Supply (0.5-1.0 ML/day) and Install (Medium Size) allowances Refer to Assumptions sheet	102		\$ 13,000	1,326,000	
42	Extra over for cathodic protection	Refer to Assumptions sheet	-	m	15	-	
2	PUMP STATIONS						2%
1	Watervale PS1	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	65.42	kW	Allowance	1,000,000	
2	Polish Bill PS1	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	7.03	kW	Allowance	200,000	
3	Polish Hill PS2	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	5.31	kW	Allowance	100,000	
4	Surge vessels, including concrete slabs, pipework and valves	MSCL only	1,300,000	%	0%	-	
3	STORAGES						38%
1	Clare	Based on contractor rates	600	ML		8,100,000	
2	Polish	Based on contractor rates	350	ML		3,900,000	
3	Watervale	Extrapolation for economy of scale	800	ML		9,500,000	
4	Auburn	Interpolated based on rates	450	ML		5,600,000	
5	Connection allowance to Bundaleer (Bundaleer option only)	\$2.5m	0.00	No.	2,500,000	-	
6	Connection allowance to CVWSS (4 storages)	500m connection pipeline and fittings	4.00	No.	150,000	600,000	
A	SUB TOTAL CONTRACTORS DIRECT COST - EXCLUDING TEMP WORKS ETC					44,875,638	
	PERCENTAGE BASED DIRECT COSTS						
1	Temporary works	Allowance over & above what is allocated within the Direct Costs.	0				
2	% of capital cost for urban design	Replacement of streetscape	0				
3	Testing and Commissioning	Allowance over & above what is allocated within the Direct Costs. SAW Standard rate: 3%. QS: 0.25% pipeline, 2% PS, 1% storages Some testing & commissioning included in rates used. 1% adopted.	1.0%			448,756	

B	SUB TOTAL PERCENTAGE BASED DIRECT COST					448,756	
C	SUB TOTAL CONTRACTOR'S DIRECT COST (C = A + B)					45,324,394	
	CONTRACTOR'S DISTRIBUTABLE COSTS						
1	Mob/Demob	% of DJC	Included in C2				
2	General preliminaries and site running costs	% of DJC. 3% allowed	3%			1,346,269	
3	Contractors Project Management - On Site	% of DJC	Included in C2				
4	Contractors Overhead Management - Off Site	% of DJC. QS - Contractors offsite overhead and margin. SAW apply a contractors margin of 6.95%.	7%			3,141,295	
D	SUB TOTAL CONTRACTORS DISTRIBUTABLE COSTS					4,487,564	
E	TOTAL DIRECT ESTIMATED COST EXCLUDING DESIGN, FEES AND LAND COSTS (E = C + D)					49,811,958	
	DESIGN - CONTRACTOR						
	Detailed Design - Contractor includes as-cons, RPEQ and Update of functional specifications	% of DJC	0				
	Engineering Support - RFIs, Quality & Construction	% of DJC	Included in N1				
F	SUBTOTAL DESIGN					-	
G	CONTRACTOR'S RISK						
	Contractor's Risk - value calculated from @Risk	Included in item C4	0%			-	
H	Early Contractor Involvement (ECI) COSTS						
	ECI Design	% of DJC	0				
	Contractors Project Management - During ECI	% of DJC	0				
	Contractors Overhead Management - During ECI	% of DJC	0				
I	CONTRACTOR'S TDC - EXCLUDES FEE					49,811,958	
	HEAD CONTRACTOR'S FEE						
		If there is no Head Contractor then this stays at 0%					
1	Contractors fee during works delivery phase (Profit and OH)		0				
1	Contractors fee during ECI phase (Profit and OH)		0				
J	CONTRACTORS FEE						
	RECOMMENDED CONTINGENCY	As per Contingency tab					
	Escalation	As per Escalation tab. Paste as value after each update.					
K	TOTAL CONTRACT VALUE					49,811,958	
	FEES AND INSURANCES						
		Choose State where project is located					
	Portable Long Service Leave Levy	SA	0.000%				
	Industry training Scheme Levy	SA	0.25%			124,529.90	
L	FEES AND INSURANCES					124,530	0.2%
	LAND & ELECTRICAL UTILITY COSTS						
	Land / Easement Costs	Based on BNW example rates	70 ha	40,000		2,800,000	
	Contingencies on Easement		Excluded				
	Electrical Utilities		Excluded				
	Contingencies on Electrical Utilities		Excluded				
M	SUB TOTAL LAND & ELECTRICAL UTILITY COSTS					2,800,000	3.9%
	OWNER'S PROJECT MANAGEMENT						
1	Owner's Operators Costs	Allowance for spares. QS % excluding preliminaries	0.5%			249,059.79	
2	Owner's Project management during construction and commissioning	SAW use 10% project delivery cost.	7%			3,486,837.07	
N	SUB TOTAL PROJECT MANAGEMENT COSTS					3,735,897	5.2%
	OWNERS FIXED OVERHEAD COSTS						
1	Owners Fixed Overhead	Provision for design. QS % for transfer systems. SAW use 5% contractor + 4% SAW design cost for transfer systems.	7%			3,486,837.07	
O	SUBTOTAL OWNERS OVERHEADS					3,486,837	4.8%
P	RECOMMENDED CONTINGENCY					12,452,990	
		As recommended by KBR (NS 12/7/22)			25%		
Q	TOTAL ESTIMATED OWNER'S COST (P = L + M + N + O)					22,600,253	31.2%
R	TOTAL FUTURE COMMITMENT (Q = K + P)					72,412,211	100%
	SUNK COSTS						
	Sunk Costs						
S	TOTAL SUNK COSTS						0.0%
T	TOTAL INVESTMENT					72,412,211	100%

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
 Document Number: PIR-07_EST-03
 Client: KBR
 Option: CVWSS

OPEX Estimate Summary - 2.2GL Storage							
Item	Description	Comments	Quantity	Unit	Rate	Cost (\$/year)	%
A	OPEX - Fixed Costs						
1	Water Supply						77%
1.1	Supply Charge	Refer to Assumptions Sheet	3,000	ML/year	1,633	4,899,000	
2	Maintenance						4%
2.1	Pipelines	Refer to Assumptions Sheet	0.25%	% Capital Cost	17,621,958	44,055	
2.2	Pump Stations	Refer to Assumptions Sheet	1.0%	% Capital Cost	1,443,000	14,430	
2.3	Storage	Refer to Assumptions Sheet	0.5%	% Capital Cost	30,747,000	153,735	
2.4	Storage Safety Inspections		1.00		30,000	30,000	
2	Labour						5%
2.1	Staffing allowance	Allow for \$100,000 annual salary per operator (2 allowed) + office costs (\$100,000 for accommodation, vehicles, etc.)	2.00	No.	100,000	300,000	
B	OPEX - Variable Costs						
1	Pump Stations						1%
1.1	Pumping Cost	Operational cost (\$/year) = kWh/year x \$/ kWh	186,619	kWh/y	0.20	37,324	
C	Annualised Replacement						14%
	Pipelines	Refer to Assumptions Sheet		Capital cost/ EUL	17,621,958	220,274	
	Pump Stations	Refer to Assumptions Sheet		Capital cost/ EUL	1,443,000	36,075	
	Storage	Refer to Assumptions Sheet		Capital cost/ EUL	30,747,000	614,940	
D	ANNUAL OPERATION AND MAINTENANCE COST (Rounded)					6,349,833	100%

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
Document Number: PIR-07_EST-03
Client: KBR
Option: CVWSS

CAPEX Estimate Summary - 3GL Storage

Item	Description	Comments	Quantity	Unit	Rate	Cost	%
1	PIPELINES						18%
	Distribution						
1	100	Supply PVC-O PN16	51,749	m	19.00	983,231	
2	150	Supply PVC-O PN16	16,347	m	29.00	474,063	
3	200	Supply PVC-O PN16	23,339	m	50.50	1,178,620	
4	225	Supply PVC-O PN16		m	60.00	-	
5	250	Supply PVC-O PN16	7,803	m	72.00	561,816	
6	300	Supply PVC-O PN16	7,589	m	109.00	827,201	
7	375	Supply PVC-O PN16		m	150.98	-	
8	500	Supply MSCL PN35		m	312.00	-	
9	560	Supply MSCL PN24		m	349.20	-	
10	100	Install PVC-O PN16	51,749	m	72.00	3,725,928	
11	150	Install PVC-O PN16	16,347	m	78.00	1,275,066	
12	200	Install PVC-O PN16	23,339	m	84.75	1,977,980	
13	225	Install PVC-O PN16		m	88.13	-	
14	250	Install PVC-O PN16	7,803	m	91.50	713,975	
15	300	Install PVC-O PN16	7,589	m	100.50	762,695	
16	375	Install PVC-O PN16		m	104.10	-	
17	500	Install MSCL PN35		m	163.86	-	
18	560	Install MSCL PN24		m	176.32	-	
	Transfer						
19	100	Supply PVC-O PN16		m	19.00	-	
20	150	Supply PVC-O PN16		m	29.00	-	
21	200	Supply PVC-O PN16		m	50.50	-	
22	225	Supply PVC-O PN16		m	60.00	-	
23	250	Supply PVC-O PN16		m	72.00	-	
24	300	Supply PVC-O PN16		m	109.00	-	
25	375	Supply PVC-O PN16		m	150.98	-	
26	500	Supply MSCL PN35		m	312.00	-	
27	560	Supply MSCL PN24		m	349.20	-	
28	100	Install PVC-O PN16		m	72.00	-	
29	150	Install PVC-O PN16		m	78.00	-	
30	200	Install PVC-O PN16		m	84.75	-	
31	225	Install PVC-O PN16		m	88.13	-	
32	250	Install PVC-O PN16		m	91.50	-	
33	300	Install PVC-O PN16		m	100.50	-	
34	375	Install PVC-O PN16		m	104.10	-	
35	500	Install MSCL PN35		m	163.86	-	
36	560	Install MSCL PN24		m	176.32	-	
37	Extra over allowance for isolation, scour and air valves; fittings; thrust blocks	Refer to Assumptions sheet	12,480,574	%	10%	1,248,057	
38	Extra over allowance for road, rail and creek crossings; dealing with existing services, and making good existing infrastructure (e.g. fencing).	Refer to Assumptions sheet	12,480,574	%	5%	624,029	
39	Extra over allowance for importation of pipeline bedding and embedment material.	Refer to Assumptions sheet 1.2.3, and calculation alongside. 1620kg/m3; \$35/ton Assumed 10% imported material	1,969,780.91	%	10%	196,978	
40	Allowance for material transport to site from Adelaide metro	Refer to Assumptions sheet	4,024,930.50	%		-	
41	Allowance for customer connections	Supply (\$7K) and Install (\$6K) from BNW Supply (0.5-1.0 ML/day) and Install (Medium Size) allowances	102		\$ 13,000	1,326,000	
42	Extra over for cathodic protection	Refer to Assumptions sheet	-	m	15	-	
2	PUMP STATIONS						2%
1	Watervale PS1	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	65.42	kW	Allowance	1,000,000	
2	Polish Bill PS1	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	7.03	kW	Allowance	200,000	
3	Polish Hill PS2	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	5.31	kW	Allowance	100,000	

4	Surge vessels, including concrete slabs, pipework and valves	MSCL only	1,300,000	%	0%	-	
3	STORAGES						42%
1	Clare	Extrapolation for economy of scale	850	ML		9,500,000	
2	Polish	Based on contractor rates	500	ML		6,100,000	
3	Watervale	Extrapolation for economy of scale	1,200	ML		12,000,000	
4	Auburn	Extrapolation for economy of scale	650	ML		8,500,000	
5	Connection allowance to Bundaleer (Bundaleer option only)	\$2.5m	0.00	No.	2,500,000	-	
6	Connection allowance to CVWSS (4 storages)	500m connection pipeline and fittings	4.00	No.	150,000	600,000	
A	SUB TOTAL CONTRACTORS DIRECT COST - EXCLUDING TEMP WORKS ETC					53,875,638	
	PERCENTAGE BASED DIRECT COSTS						
1	Temporary works	Allowance over & above what is allocated within the Direct Costs.	0				
2	% of capital cost for urban design	Replacement of streetscape	0				
3	Testing and Commissioning	Allowance over & above what is allocated within the Direct Costs. SAW Standard rate: 3%. QS: 0.25% pipeline, 2% PS, 1% storages Some testing & commissioning included in rates used. 1% adopted.	1.0%			538,756	
B	SUB TOTAL PERCENTAGE BASED DIRECT COST					538,756	
C	SUB TOTAL CONTRACTOR'S DIRECT COST (C = A + B)					54,414,394	
	CONTRACTOR'S DISTRIBUTABLE COSTS						
1	Mob/Demob	% of DJC	Included in C2				
2	General preliminaries and site running costs	% of DJC. 3% allowed	3%			1,616,269	
3	Contractors Project Management - On Site	% of DJC	Included in C2				
4	Contractors Overhead Management - Off Site	% of DJC. QS - Contractors offsite overhead and margin. SAW apply a contractors margin of 6.95%.	7%			3,771,295	
D	SUB TOTAL CONTRACTORS DISTRIBUTABLE COSTS					5,387,564	
E	TOTAL DIRECT ESTIMATED COST EXCLUDING DESIGN, FEES AND LAND COSTS (E = C + D)					59,801,958	
	DESIGN - CONTRACTOR						
	Detailed Design - Contractor includes as-cons, RPEQ and Update of functional specifications	% of DJC	0				
	Engineering Support - RFIs, Quality & Construction	% of DJC	Included in N1				
F	SUBTOTAL DESIGN					-	
G	CONTRACTOR'S RISK						
	Contractor's Risk - value calculated from @Risk	Included in item C4	0%			-	
H	Early Contractor Involvement (ECI) COSTS						
	ECI Design	% of DJC	0				
	Contractors Project Management - During ECI	% of DJC	0				
	Contractors Overhead Management - During ECI	% of DJC	0				
I	CONTRACTOR'S TDC - EXCLUDES FEE					59,801,958	
	HEAD CONTRACTOR'S FEE	If there is no Head Contractor then this stays at 0%					
1	Contractors fee during works delivery phase (Profit and OH)		0				
1	Contractors fee during ECI phase (Profit and OH)		0				
J	CONTRACTORS FEE						
	RECOMMENDED CONTINGENCY	As per Contingency tab					
	Escalation	As per Escalation tab. Paste as value after each update.					
K	TOTAL CONTRACT VALUE					59,801,958	
	FEES AND INSURANCES	Choose State where project is located					
	Portable Long Service Leave Levy	SA	0.000%				
	Industry training Scheme Levy	SA	0.25%			149,504.90	
L	FEES AND INSURANCES					149,505	0.2%
	LAND & ELECTRICAL UTILITY COSTS						
	Land / Easement Costs	Based on BNW example rates	70	ha	40,000	2,800,000	
	Contingencies on Easement	Excluded					
	Electrical Utilities	Excluded					
	Contingencies on Electrical Utilities	Excluded					
M	SUB TOTAL LAND & ELECTRICAL UTILITY COSTS					2,800,000	3.2%

	OWNER'S PROJECT MANAGEMENT						
1	Owner's Operators Costs	Allowance for spares. QS % excluding preliminaries	0.5%			299,009.79	
2	Owner's Project management during construction and commissioning	SAW use 10% project delivery cost.	7%			4,186,137.07	
N	SUB TOTAL PROJECT MANAGEMENT COSTS					4,485,147	5.2%
	OWNERS FIXED OVERHEAD COSTS						
1	Owners Fixed Overhead	Provision for design. QS % for transfer systems. SAW use 5% contractor + 4% SAW design cost for transfer systems.	7%			4,186,137.07	
O	SUBTOTAL OWNERS OVERHEADS					4,186,137	4.8%
P	RECOMMENDED CONTINGENCY		As recommended by KBR (NS 12/7/22)	25%		14,950,490	
Q	TOTAL ESTIMATED OWNER'S COST (P = L + M + N +O)					26,571,278	30.8%
R	TOTAL FUTURE COMMITMENT (Q = K + P)					86,373,236	100%
	SUNK COSTS						
	Sunk Costs						
S	TOTAL SUNK COSTS						0.0%
T	TOTAL INVESTMENT					86,373,236	100%

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
Document Number: PIR-07_EST-03
Client: KBR
Option: CVWSS

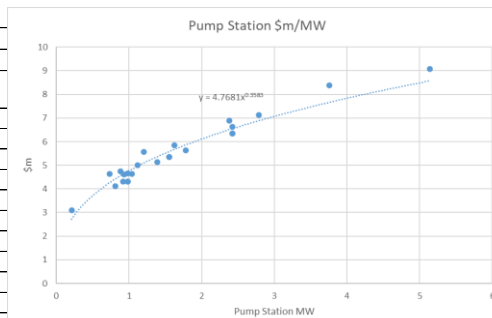
OPEX Estimate Summary - 3GL Storage							
Item	Description	Comments	Quantity	Unit	Rate	Cost (\$/year)	%
A	OPEX - Fixed Costs						
1	Water Supply						73%
1.1	Supply Charge	Refer to Assumptions Sheet	3,000	ML/year	1,500	4,500,000	
2	Maintenance						5%
2.1	Pipelines	Refer to Assumptions Sheet	0.25%	% Capital Cost	17,621,958	44,055	
2.2	Pump Stations	Refer to Assumptions Sheet	1.0%	% Capital Cost	1,443,000	14,430	
2.3	Storage	Refer to Assumptions Sheet	0.5%	% Capital Cost	40,737,000	203,685	
2.4	Storage Safety Inspections		1.00		30,000	30,000	
2	Labour						5%
2.1	Staffing allowance	Allow for \$100,000 annual salary per operator (2 allowed) + office costs (\$100,000 for accommodation, vehicles, etc.)	2.00	No.	100,000	300,000	
B	OPEX - Variable Costs						
1	Pump Stations						1%
1.1	Pumping Cost	Operational cost (\$/year) = kWh/year x \$/ kWh	186,619	kWh/y	0.20	37,324	
C	Annualised Replacement						17%
	Pipelines	Refer to Assumptions Sheet		Capital cost/ EUL	17,621,958	220,274	
	Pump Stations	Refer to Assumptions Sheet		Capital cost/ EUL	1,443,000	36,075	
	Storage	Refer to Assumptions Sheet		Capital cost/ EUL	40,737,000	814,740	
D	ANNUAL OPERATION AND MAINTENANCE COST (Rounded)					6,200,583	100%

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
Document Number: PIR-07_EST-02
Client: KBR
Option: Bundaleer
Document Control

Revision	Date	Revision Details/ Status	Author	Reviewer	Approver
A	6/07/2022	First Draft	P Stutterheim	S Daenke	C Hewitson
B	11/07/2022	Inclusive of customer connections	P Stutterheim	C Hewitson	C Hewitson
C	13/07/2022	Adjustment of pipe system total costs to inform valves, crossings %. Version A and B had not incorporated transfer main install	C Hewitson	S Daenke	C Hewitson

Project Number:	PIR-07
Document Number:	PIR-07_EST-02
Client:	KBR
Option:	Bundaleer

[illegible]

		Note rates exclude the construction of a HV substation e.g. 132kV/11kV. Substation costing = \$6m.
2.2	Rates account for the following:	Superseded for smaller pump stations where an allowance is adopted instead Sifeworks Precast concrete building - 4 pumps Extra over for gantry crane DNxx Pipework allowance, including all valves xxW Pumpsets (2d + 1s) HV Electrical switchboard and cabling total installed power xx kW, including softstarters LV electrical switchboards Instrumentation Allowance PLC and Control Extra over for VSD's Transformer - 11kV/3.3kV Transformer - 3.3kV/0.4kV Site communications tower (microwave) Power Supply: Equivalent of 400m of 132kV overhead line Surge: Surge vessels, including concrete slabs, pipework and valves
3	Storages	
3.1	Estimate based on \$2022 updated contractor 'constructed storage' costs for actual storages recently built in the Clare region and other wine regions.	Formula based on pricing for 3 storages - Earth bank lined storage, including pipework and fittings
		Water Storage \$/ML Cost (\$ millions) Storage (ML) $y = 0.0168x - 1.9737$
OPEX		
4	Energy price assumption (\$/kWh)	0.2
	Annual energy use (kWh/year) = kW*operating hours	
	Operational cost (\$/year) = kWh/year x \$/ kWh	
5	Water price (\$/ML)	
	Bundaleer	1071.00
	CVWSS	1633.33
	CVWSS - 3 GL Storage	1500.00
6	Design Life (years)	
	Pipelines	80
	Pump Stations	40
	Storage	50
	Electrical	25
	Water Treatment Plant	30
7	Maintenance cost (% Capital Cost including contingency)	
	Pipeline maintenance	0.25%
	Pump station maintenance	1.0%
	Storage maintenance	0.5%
	Power infrastructure maintenance	0.2%
	Water treatment maintenance	0.9%
8	OPEX staff costs	
	Staff salaries (\$/year)	100000.00
9	Costs exclude GST	

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
Document Number: PIR-07_EST-02
Client: KBR
Option: Bundaleer

CAPEX Estimate Summary - Bundaleer							
Item	Description	Comments	Quantity	Unit	Rate	Cost	%
1	PIPELINES						48%
	Distribution						
1	100	Supply PVC-O PN16	51,448	m	19.00	977,512	
2	150	Supply PVC-O PN16	12,774	m	29.00	370,446	
3	200	Supply PVC-O PN16	14,976	m	50.50	756,288	
4	225	Supply PVC-O PN16		m	60.00	-	
5	250	Supply PVC-O PN16	7,559	m	72.00	544,248	
6	300	Supply PVC-O PN16	5,429	m	109.00	591,761	
7	375	Supply PVC-O PN16		m	150.98	-	
8	500	Supply MSCL PN35		m	312.00	-	
9	560	Supply MSCL PN24	22,872	m	349.20	7,986,902	
10	100	Install PVC-O PN16	51,448	m	72.00	3,704,256	
11	150	Install PVC-O PN16	12,774	m	78.00	996,372	
12	200	Install PVC-O PN16	14,976	m	84.75	1,269,216	
13	225	Install PVC-O PN16		m	88.13	-	
14	250	Install PVC-O PN16	7,559	m	91.50	691,649	
15	300	Install PVC-O PN16	5,429	m	100.50	545,615	
16	375	Install PVC-O PN16		m	104.10	-	
17	500	Install MSCL PN35		m	163.86	-	
18	560	Install MSCL PN24	22,872	m	176.32	4,032,700	
	Transfer						
19	100	Supply PVC-O PN16		m	19.00	-	
20	150	Supply PVC-O PN16		m	29.00	-	
21	200	Supply PVC-O PN16		m	50.50	-	
22	225	Supply PVC-O PN16		m	60.00	-	
23	250	Supply PVC-O PN16		m	72.00	-	
24	300	Supply PVC-O PN16		m	109.00	-	
25	375	Supply PVC-O PN16		m	150.98	-	
26	500	Supply MSCL PN35	39,756	m	312.00	12,403,872	
27	560	Supply MSCL PN24		m	349.20	-	
28	100	Install PVC-O PN16		m	72.00	-	
29	150	Install PVC-O PN16		m	78.00	-	
30	200	Install PVC-O PN16		m	84.75	-	
31	225	Install PVC-O PN16		m	88.13	-	
32	250	Install PVC-O PN16		m	91.50	-	
33	300	Install PVC-O PN16		m	100.50	-	
34	375	Install PVC-O PN16		m	104.10	-	
35	500	Install MSCL PN35	39,756	m	163.86	6,514,418	
36	560	Install MSCL PN24		m	176.32	-	
37	Extra over allowance for isolation, scour and air valves; fittings; thrust blocks	Refer to Assumptions sheet 1.3	41,385,254	%	7.5%	3,103,894	
38	Extra over allowance for road, rail and creek crossings; dealing with existing services, and making good existing infrastructure (e.g. fencing).	Refer to Assumptions sheet	41,385,254	%	5%	2,069,263	
39	Extra over allowance for importation of pipeline bedding and embedment material.	Refer to Assumptions sheet 1.2.3, and calculation alongside. 1620kg/m3; \$35/ton	4,177,678	%	10%	417,768	
40	Allowance for material transport to site from Adelaide metro	Budget rates assumed to include freight	23,631,029	%		-	
41	Allowance for customer connections	Supply (\$7K) and Install (\$6K) from BNV Supply (0.5-1.0 ML/day) and Install (Medium Size) allowances Refer to Assumptions sheet	102		\$ 13,000	1,326,000	
42	Extra over for cathodic protection	Refer to Assumptions sheet	62,628	m	15	939,420	
2	PUMP STATIONS						12%
1	Bundaleer Transfer PS	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	929.58	kW	Formula	4,644,967.24	
2	Bundaleer PS1	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	395.67	kW	Formula	3,420,345.23	
3	Bundaleer PS2	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	402.31	kW	Formula	3,440,786.86	
4	Bundaleer PS3	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	29.32	kW	Allowance	500,000	
5	Polish Hill PS2	\$ = f(pump station power). Based on QS rates - Refer to Assumptions sheet	5.31	kW	Allowance	100,000	
6	Surge vessels, including concrete slabs, pipework and valves	MSCL only	7,461,132	%	6%	447,668	
3	STORAGES						3.8%
1	Transfer Storage	\$1.35m	100	ML	Allowance	1,350,000	
2	Connection allowance to Bundaleer (Bundaleer option only)	\$2.5m	1.00	No.	2,500,000	2,500,000	
3	Connection allowance to CVWSS (4 storages)	500m connection pipeline and fittings	0.00	No.	150,000	-	
A	SUB TOTAL CONTRACTORS DIRECT COST - EXCLUDING TEMP WORKS ETC					65,645,366	
	PERCENTAGE BASED DIRECT COSTS						
1	Temporary works	Allowance over & above what is allocated within the Direct Costs.	0				
2	% of capital cost for urban design	Replacement of streetscape	0				

3	Testing and Commissioning	Allowance over & above what is allocated within the Direct Costs. SAW Standard rate: 3%. QS: 0.25% pipeline, 2% PS, 1% storages Some testing & commissioning included in rates used. 1% adopted.	1.0%			656,454	
B	SUB TOTAL PERCENTAGE BASED DIRECT COST					656,454	
C	SUB TOTAL CONTRACTOR'S DIRECT COST (C = A + B)					66,301,820	
	CONTRACTOR'S DISTRIBUTABLE COSTS						
1	Mob/Demob	% of DJC	Included in C2				
2	General preliminaries and site running costs	% of DJC. 3% allowed	3%			1,969,361	
3	Contractors Project Management - On Site	% of DJC	Included in C2				
4	Contractors Overhead Management - Off Site	% of DJC. QS - Contractors offsite overhead and margin. SAW apply a contractors margin of 6.95%.	7%			4,595,176	
D	SUB TOTAL CONTRACTORS DISTRIBUTABLE COSTS					6,564,537	
E	TOTAL DIRECT ESTIMATED COST EXCLUDING DESIGN, FEES AND LAND COSTS (E = C + D)					72,866,356	
	DESIGN - CONTRACTOR						
	Detailed Design - Contractor includes as-cons, RPEQ and Update of functional specifications	% of DJC	0				
	Engineering Support - RFIs, Quality & Construction	% of DJC	Included in N1				
F	SUBTOTAL DESIGN					-	
G	CONTRACTOR'S RISK						
	Contractor's Risk - value calculated from @Risk	Included in item C4	0%			-	
H	Early Contractor Involvement (ECI) COSTS						
	ECI Design	% of DJC	0				
	Contractors Project Management - During ECI	% of DJC	0				
	Contractors Overhead Management - During ECI	% of DJC	0				
I	CONTRACTOR'S IDC - EXCLUDES FEE					72,866,356	
	HEAD CONTRACTOR'S FEE						
1	Contractors fee during works delivery phase (Profit and OH)	If there is no Head Contractor then this stays at 0%	0				
1	Contractors fee during ECI phase (Profit and OH)		0				
J	CONTRACTORS FEE						
	RECOMMENDED CONTINGENCY	As per Contingency tab					
	Escalation	As per Escalation tab. Paste as value after each update.					
K	TOTAL CONTRACT VALUE					72,866,356	
	FEES AND INSURANCES						
	Portable Long Service Leave Levy	Choose State where project is located					
	Industry training Scheme Levy	SA	0.000%			182,165.89	
L	FEES AND INSURANCES					182,166	0.2%
	LAND & ELECTRICAL UTILITY COSTS						
	Land / Easement Costs	Based on BNW example rates	5 ha		40,000	200,000	
	Contingencies on Easement		Excluded				
	Electrical Utilities		Excluded				
	Contingencies on Electrical Utilities		Excluded				
M	SUB TOTAL LAND & ELECTRICAL UTILITY COSTS					200,000	0.2%
	OWNER'S PROJECT MANAGEMENT						
1	Owner's Operators Costs	Allowance for spares. QS % excluding preliminaries	0.5%			364,331.78	
2	Owner's Project management during construction and commissioning	SAW use 10% project delivery cost.	7%			5,100,644.93	
N	SUB TOTAL PROJECT MANAGEMENT COSTS					5,464,977	5.4%
	OWNERS FIXED OVERHEAD COSTS						
1	Owners Fixed Overhead	Provision for design. QS % for transfer systems. SAW use 5% contractor + 4% SAW design cost for transfer systems.	7%			5,100,644.93	
O	SUBTOTAL OWNERS OVERHEADS					5,100,645	5.0%
P	RECOMMENDED CONTINGENCY					18,216,589	
Q	TOTAL ESTIMATED OWNER'S COST (P = L + M + N + O)					29,164,377	28.6%
R	TOTAL FUTURE COMMITMENT (Q = K + P)					102,030,733	100%
	SUNK COSTS						
	Sunk Costs						
S	TOTAL SUNK COSTS						0.0%
T	TOTAL INVESTMENT					102,030,733	100%

Clare Valley Water Supply Scheme - Options Assessment Costing

Project Number: PIR-07
 Document Number: PIR-07_EST-02
 Client: KBR
 Option: Bundaleer

OPEX Estimate Summary - Bundaleer							
Item	Description	Comments	Quantity	Unit	Rate	Cost (\$/year)	%
A	OPEX - Fixed Costs						
1	Water Supply						55%
1.1	Supply Charge	Refer to Assumptions Sheet	3,000	ML/year	1,071	3,213,000	
2	Maintenance						5%
2.1	Pipelines	Refer to Assumptions Sheet	0.25%	% Capital Cost	51,679,836	129,200	
2.2	Pump Stations	Refer to Assumptions Sheet	1.0%	% Capital Cost	8,778,768	87,788	
2.3	Storage	Refer to Assumptions Sheet	0.5%	% Capital Cost	4,273,500	21,368	
2.4	Storage Safety Inspections		1.00		30,000	30,000	
2	Labour						5%
2.1	Staffing allowance	Allow for \$100,000 annual salary per operator + office costs (\$100,000 for accommodation, vehicles, etc.)	2.00	No.	100,000	300,000	
B	OPEX - Variable Costs						
1	Pump Stations						18%
1.1	Pumping Cost	Operational cost (\$/year) = kWh/year x \$/ kWh	5,344,748	kWh/y	0.20	1,068,950	
C	Annualised Replacement						16%
	Pipelines	Refer to Assumptions Sheet		Capital cost/ EUL	51,679,836	645,998	
	Pump Stations	Refer to Assumptions Sheet		Capital cost/ EUL	8,778,768	219,469	
	Storage	Refer to Assumptions Sheet		Capital cost/ EUL	4,273,500	85,470	
D	ANNUAL OPERATION AND MAINTENANCE COST (Rounded)					5,801,241	100%

Appendix D Basis of Design Report

Clare Valley Water

Preliminary Business Case

Basis of Design

Prepared for: Department of Primary Industries and Regions

Date: 28 July 2022

Revision: A



inside
infrastructure

Contents

1. Background	1
1.1. Design Basis Background	1
2. Basis of Design	2
2.1. Deliverables List	2
2.2. Standard and Guidelines	2
2.3. Environmental Data and Site Conditions	3
2.3.1. Climate Data	3
2.3.2. Geotechnical Conditions	3
2.3.3. Groundwater and Surface Water	4
2.3.4. Corrosive Soils	5
2.3.5. Topography	7
2.3.6. Heritage, Environmental and Stakeholder Considerations	7
2.4. Battery Limits	7
2.4.1. Ancillaries	7
2.5. Project Assumptions	8
2.5.1. General	8
2.5.2. Storages	8
2.5.3. Power	8
2.6. Design Criteria	8
2.6.1. Pipelines – Transfer and Distribution Systems	8
2.6.2. Hydraulic Design	11
2.6.3. Pump Stations	11
2.6.4. Storages	12
2.6.5. Existing Services and Creek Crossings	13
2.6.6. Trench Design	13
2.6.7. Construction Methodologies	15
2.6.8. Safety in Design	15
2.6.9. Design Life	15
2.7. Costing Criteria	15

Tables

Table 2.1: Australian Standards	2
Table 2.2: Codes and Industry Guidelines	2
Table 2.3: Design Technical Standards and Guidelines	2
Table 2.4: Pipeline Design Basis	8
Table 2.5: Design Flows per Option and Annual Demand Scenario	11
Table 2.6: Hydraulic Design Basis	11
Table 2.7: Pump Station Design Basis	11

Table 2.8: CVWSS Storage – 2.2 GL Option	12
Table 2.9: Infrastructure Design Life	15
Table 2.10: Basis of Project CAPEX Costing	16
Table 2.11: Basis of Project OPEX Costing	17

Figures

Figure 1.1: Project Transfer Options Locality Map	1
Figure 2.1: Project Area Geology Surveyed by the Department of Mining and Energy	3
Figure 2.2: Project Area Geology as Provided by the Department for Environment and Water	4
Figure 2.3: Acid Sulphate Soils Characteristic to Project Area	5
Figure 2.4: Soil pH Levels Characteristic to Project Area	6
Figure 2.5: Soil Salinity Levels Characteristic to Project Area	6
Figure 2.6: Indicative Trench Configurations Based on WSAA Standards WAT-1201 and WAT-1202	13
Figure 2.7: Indicative Road Crossing Trench Configuration (WAT-1201)	14
Figure 2.8: Indicative Road Crossing Trench Configuration (WAT-1201)	14



1. Background

1.1. Design Basis Background

This report serves to document the approach and assumptions used for the concept design and costing of the Bundaleer and Clare Valley Water Supply System (CVWSS) options.

The locality of these two options is provided in Figure 1.1 below, together with the 5 initial augmentation options namely i) Bolivar WWTP, ii) Bundaleer, iii) Direct Offtake from the Morgan-Whyalla pipeline, iv) New pipeline from the River Murray, and v) Community storage with the CVWSS.

This document should be read in conjunction with the Capex and Opex estimate (Document: PIR-07_EST-02).

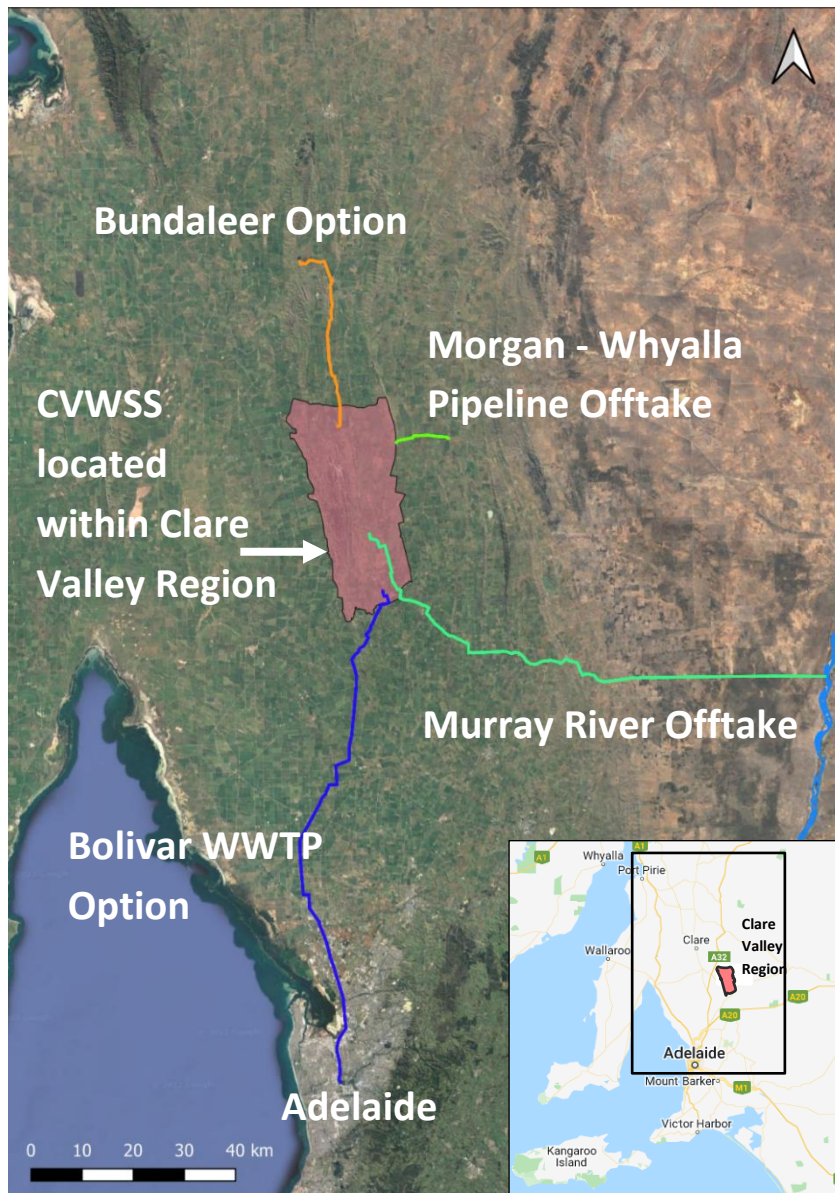


Figure 1.1: Project Transfer Options Locality Map



2. Basis of Design

2.1. Deliverables List

The primary deliverables for the Transfer System concept design and costing include:

- WaterGEMS hydraulic model with scenarios for each option and stage
- Hydraulic Grade Line profiles for each option and stage
- Layout plans for each option and stage
- Material Take-Offs (MTOs) for each option and stage
- Initial CAPEX and OPEX costing serving as an input for further cost modelling

2.2. Standard and Guidelines

Australian Standards (AS) that will apply are provided in Table 2.1 and other codes and industry guidelines are provided in Table 2.2. SA Water standards that are also likely to be applicable are provided in Table 2.3. The proposed options are governed by laws, legislation and regulations of South Australia.

Table 2.1: Australian Standards

AS Reference	AS Title
AS 1000	The International System of Units (SI) and its applications
AS 1657	Fixed platforms, walkways, stairways and ladders
AS 2129	Flanges for pipes, valves and fittings
AS/NZS 2566.1	Buried flexible pipelines - Structural design
AS/NZS 2566.2	Buried flexible pipelines Part 2: Installation
AS 2638	Gate valves for waterworks purposes
AS2927	The storage and handling of liquefied chlorine gas
AS 3600	Concrete structures
AS 4041	Pressure piping
AS 4087	Metallic flanges for waterworks purposes
AS 4100	Steel structures
AS/NZS 4331	Metallic flanges and other sections

Table 2.2: Codes and Industry Guidelines

Reference	Title
ASCC Guideline	Australian Safety and Compensation Council Guideline on the Principles of Safety Design
AS CB15	SAA code for pipe welding
AS CB18	SAA pressure pipe code
CIRIA Report 128	Thrust block design
WSA 03-2011	Water Supply Code of Australia

Table 2.3: Design Technical Standards and Guidelines

No.	Title
SA Water TS4	Packing sand for pipe laying and trench fill
SA Water TS0230	Gate and butterfly valve requirements
SA Water TG96	Guidelines for the design of anchors and thrust blocks on buried pipelines with

2.3. Environmental Data and Site Conditions

2.3.1. Climate Data

Location specific climate data is to be sourced for subsequent design phases of the project. From a climate perspective, the concept design is informed primarily by the regional average irrigation demands further discussed in the Basis of Design chapter below.

2.3.2. Geotechnical Conditions

The project area encompasses a diverse range of soil types as shown in Figure 2.1 and Figure 2.2. The project area is characterised by underlying bed rock, primarily sandstone, shale and dolomite overlain by loam soils.

The soil depth is medium to shallow, and averages 0.5m deep¹ where shallow soils are 30-50cm deep, medium soils 50-90cm deep and deep soils 90-150cm deep. Clays are present over a 30-100cm depth of soil throughout the project area, with circa 50% of soil having 20-35% clay, and 50% having 35-45% clay content. Sand content is in the 40-60% range over the project area for 30-100cm depth.

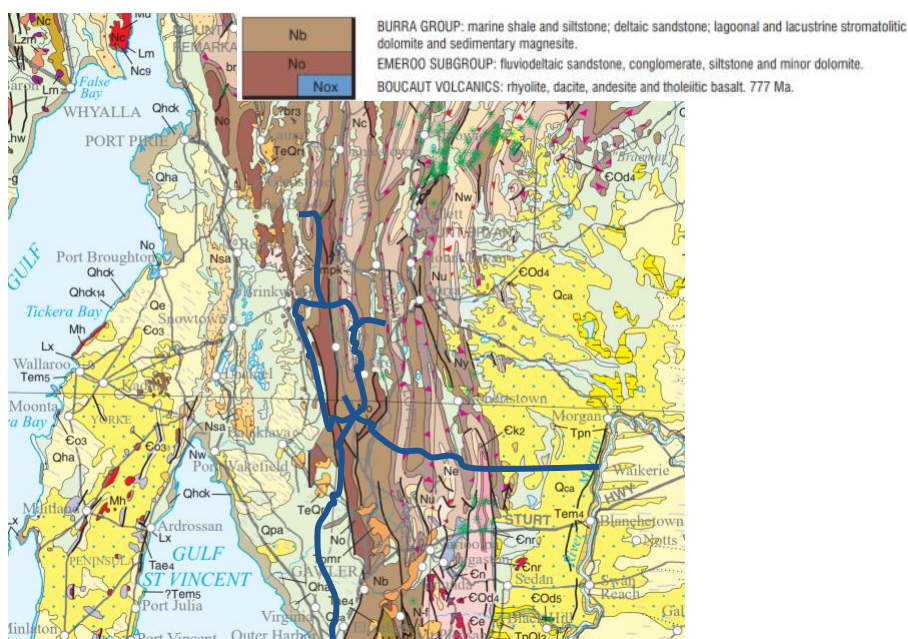


Figure 2.1: Project Area Geology Surveyed by the Department of Mining and Energy²

¹ National Map resource provided by the Australian Government, 2022. Website: <https://nationalmap.gov.au/>. Geotechnical and Land Use data from the National Datasets section.

² Geological Map South Australia, Geological Survey of South Australia, Department of Mining and Energy, 2020

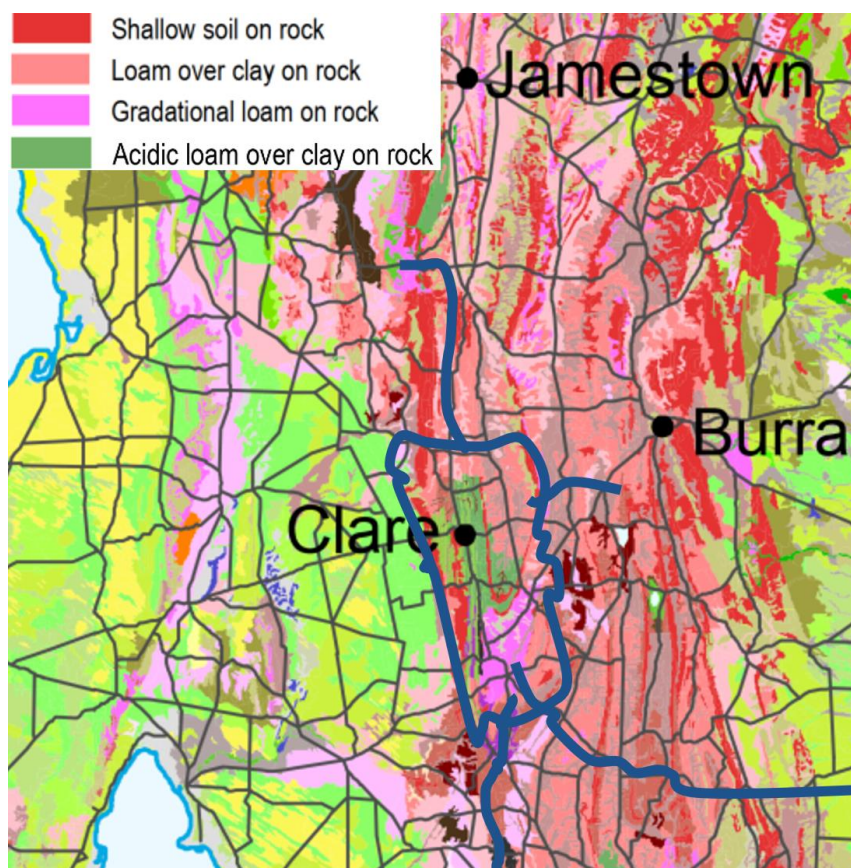


Figure 2.2: Project Area Geology as Provided by the Department for Environment and Water³

Based on the above review, the bulk of the pipeline routes are expected to be constructed using conventional excavation equipment. An allowance for hard rock excavation has been made in the accompanying costing (refer to Table 2.4).

The presence of both clay and rock in the excavated material will require grading, blending and overhaul activities to achieve a suitable standard of bedding and backfill material. A requirement for imported bedding material is also foreseen, and an allowance for imported sand has been made in the accompanying costing (refer to Table 2.4).

It is assumed that minimal rock will require disposal, with the bulk of excavated rock being spread over the pipeline route post backfill.

2.3.3. Groundwater and Surface Water

Groundwater and surface water are not expected to have a significant impact on the respective pipeline routes. A buried pipeline is proposed which mitigates some of the risk associated with pipeline damage due to surface water impacts. However, factors such as erosion and pipeline floating will need to be taken into account during detailed design.

³ Southern South Australia - Soils, Department for Environment and Water, 2018

2.3.4. Corrosive Soils

The project area is not impacted by acid sulphate soils as indicated in Figure 2.3, and corrosive soils are on the whole not considered to pose any risks to the project given that the majority of the pipelines are proposed as PVC, with two sections of the Barossa options being MSCL.

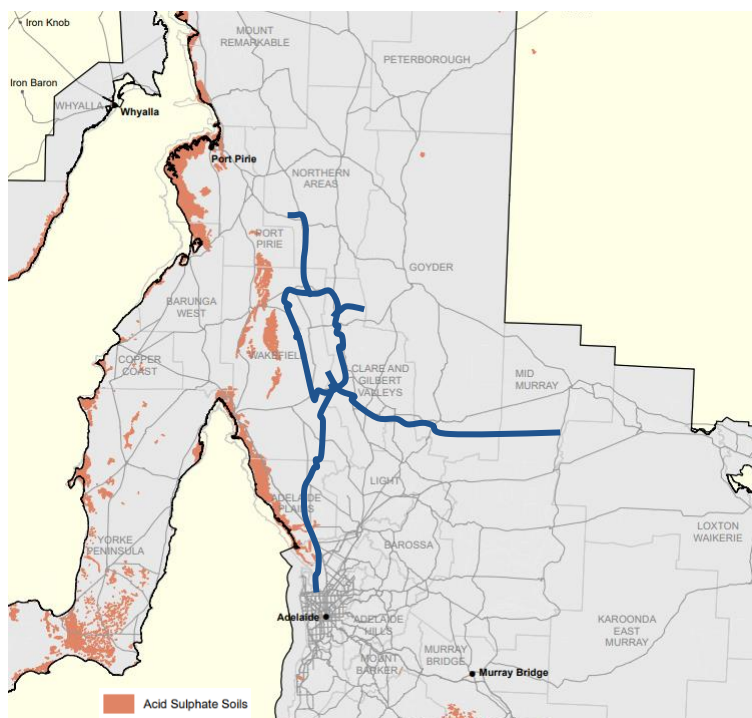


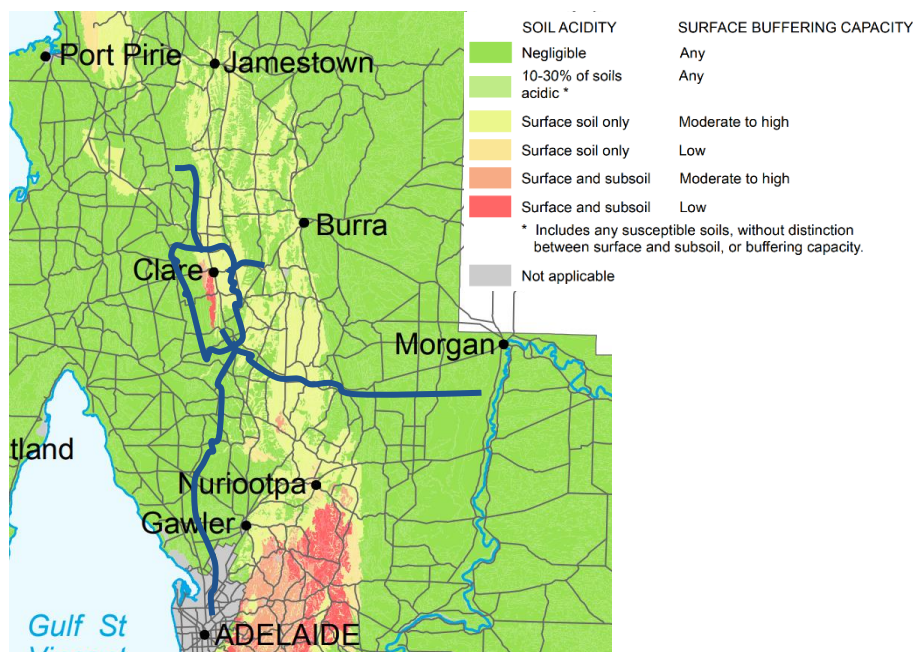
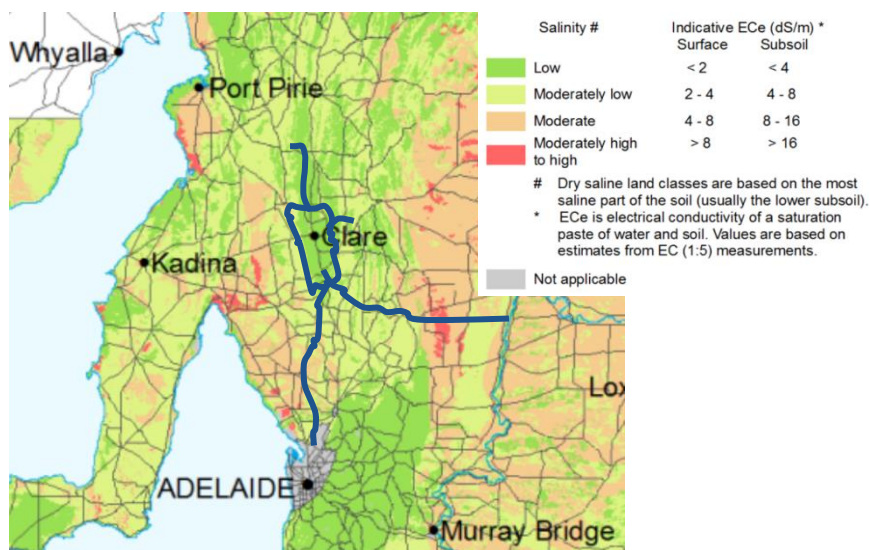
Figure 2.3: Acid Sulphate Soils Characteristic to Project Area⁴

In terms of soil pH level, localised areas of high soil pH are present central to the Clare Valley region as shown in Figure 2.4, and the project area otherwise presents negligible or surface only acidity which will have minimal impact on the installed pipeline (surface acidity being within the top 30cm). This aligns with the acidic loam region indicated in Figure 2.2.

From a salinity perspective, localised regions with salinity can be expected in the eastern extent of the project area, and the project area is otherwise expected to have minimal instances of high salinity (refer Figure 2.5).

MSCL pipe routes through areas with high pH or salinity will require site specific engineering assessment in subsequent design phases which would likely lead to the use of Glass Reinforced Plastic (GRP) pipes for impacted sections.

⁴ Government of Australia Planning and Design Code Phase 1 – Acid Sulphate Soil Overlay, 2019, https://plan.sa.gov.au/_data/assets/pdf_file/0006/532599/MAP - Phase 1 - Acid Sulphate Soils Overlay.pdf

Figure 2.4: Soil pH Levels Characteristic to Project Area⁵Figure 2.5: Soil Salinity Levels Characteristic to Project Area⁶

⁵ Southern South Australia - Acidity, Department for Environment and Water, 2018, https://data.environment.sa.gov.au/Content/Downloads/SoilAttrib_SA_Acidity.pdf

⁶ Salinity – Non water table, Department of Environment, Water and Natural Resources 2016. https://data.environment.sa.gov.au/Content/Publications/SoilAttrib_FactSheet24_Salinity-NonWatertable.pdf

2.3.5. Topography

Elevation data has been sourced from 1 second Digital Surface Model (DSM) data available from Geoscience Australia (Gallant et al, 2011). This data results in approximately 30 m resolution with data presented as 5m contours. For the transfer pipeline model, this data was used to apply elevations to pipelines at every 100m to support the hydraulic design of the system. For the distribution system, elevations were applied to customer nodes, changes of pipe diameter and intermediate nodes as required.

The level of detail used is sufficient for this stage of design. However, greater resolution topographic data will be required during detailed design to more accurately account for the number of local high points for air valves, low points for scour valves and to ensure the pipelines have appropriate grading.

2.3.6. Heritage, Environmental and Stakeholder Considerations

Heritage and environmental aspects are not expected to have a significant impact on the project, given the pipe alignments are largely within or adjacent to road reserves.

Stakeholder management will be a critical success factor of the project, in terms of both customer buy-in and landowners impacted along the pipe alignments. Management of relations with potential customers falling just outside of the feasible project extents, and landowners of storage locations will require particular attention.

2.4. Battery Limits

The battery limits associated with this Technical Report focus on the transfer pipeline system options, which includes pump stations, treatment plants, power supply, pipelines, storages, isolation valves, air valves, scour valves and other pipeline ancillaries.

- Bundaleer Reservoir – The system limits start at a new branch pit and pump station at the reservoir, include a new command storage Northern of the Clare Valley region, and terminate at control valves located at the end of each distribution branch at the farm gate.
- Connection to Clare GI – The system limits for this option include the branch connection from the existing CVWSS pipe network to four (4) reservoirs located at strategic locations within the Clare Valley region and terminates at control valves located at the end of each distribution branch at the farm gate.

2.4.1. Ancillaries

The project battery limits will include power supply from the point of access to existing grid infrastructure.

Upgrades to transmission infrastructure may also be required to enable power supply at specific locations, which is a risk covered in the project contingency.

2.5. Project Assumptions

2.5.1. General

- Project demands
 - Bundaleer
 - 3 GL/year demand
 - The Bundaleer Storage is 6 GL in volume. It is assumed that the system demands will be met by the Bundaleer Reservoir year round.
 - Proportion of total supply from catchment water is 33%
 - Supply has an availability of 95%
 - CVWSS
 - 3 GL/ year demand, 2.2 GL new storage capacity total (including 10% allowance for evaporation)
 - Supply has an availability of 95%

2.5.2. Storages

All storages to be earth bank lined, with no floating covers or chlorination equipment. Potable water stored in command reservoirs will not be re-treated to potable water standards (i.e. pH 6.5 – 8.5, TDS <600 mg/L).

2.5.3. Power

It is assumed that an 11kV power supply connection will be available within reasonable distance for all pumping options for the project which will meet the pumping requirements of each pump station. It is also assumed that there is adequate existing capacity in the network and no additional upgrades will be required.

2.6. Design Criteria

2.6.1. Pipelines – Transfer and Distribution Systems

The pipelines are considered to be designed in accordance with WSA 03-2011. Given the scheme is primarily for irrigation purposes, the scheme should be designed to irrigation system standards rather than utility potable water standards.

Table 2.4: Pipeline Design Basis

Item	Design Basis
Minimum Pipeline Velocity	-
Maximum Pipeline Velocity	3 m/s (as per WSA-03)
Pipe Material	Below ground generally • ≥ 400mm diameter ○ Mild Steel Cement Lined 12mm wall ("MSCL PN30") Rubber ring joint (RRJ) • < 400mm diameter ○ PCV-O PN16 Rubber ring joint (RRJ) Note: suitable material alternatives can be considered in the subsequent design phases based on economic assessment

Item	Design Basis
Maximum Allowable Operating Pressure (MAOP)	To be confirmed further during subsequent design phases MAOP is the maximum head which can be sustained by the pipeline for extended periods of time under normal operating conditions, which include i) Normal steady state operation, and ii) Pump dead head operation (against a closed valve or blockage) MAOP is to include pumping head and surge allowance up to PN30
Maximum Allowable Pressure (MAP)	To be confirmed further during subsequent design phases MAP is the maximum head which can be sustained by the pipeline for occasional short periods of time of up to a few minutes' duration (i.e.: under abnormal operating conditions), such as: i) Pressure surge events (e.g. pump start/stop, valve slam, air locks along pipeline) ii) Pipeline pressure testing at commissioning
Valves	Valve quantities to be catered for as a % of pipeline installation cost. The following criteria will apply to valve positioning and quantities in subsequent design phases:
Air Valves	Maximum spacing 800m or otherwise at all local high points Located upstream of main-line valves Downstream of branch valves Air valves to be automatic, double acting (performing air release under normal conditions and air entry to prevent negative pressures) Sizing to be confirmed during detailed design but rule of thumb sizing adopted for concept design based on Bermad sizing guidelines: DN80 automatic, double acting, full-port air valve for mains > DN450 DN100 automatic, double acting, full-port air valve for mains > DN600 DN150 automatic, double acting, full-port air valves for mains > DN900 DN200 automatic, double acting, full-port air valve for mains > DN1200 Surge analysis in subsequent phases may identify additional air valve requirements
Line (Stop) Valves	All isolation valves are to be located in valve pits with stairs/access in accordance with AS1657 Valving is to be designed to consider operational requirements during failure and maintenance events for the pipelines. Valve size based on pipeline sizes for each option. All valves assumed to be PN35. All mainline isolation valves are assumed to be located in below ground valve pits.
Scour Valves	Scours/drains located at low points at ends of water mains, and at low points between main-line isolation valves. Allowance of scours every 3km has been included. Scour valve sizing to be calculated according to WSA-03, Table 8.4: DN80 scour for mains ≤ DN 200 DN100 scour for DN200 up to and including DN300 DN150 scour for DN300 up to and including DN900 DN200 scour for mains larger than DN900
Surge mitigation facilities	Allowance for surge tanks at pump stations to be made for MSCL pipe sections only. Surge requirements to be confirmed in further detail during subsequent design phases
Design Temperature (pipe)	Above ground: -10 to +80°C Below ground: +8 to +40°C
Roughness coefficient:	Hazen Williams Coefficient (C) PVC – 130, MSCL – 125
Cathodic Protection.	Allowance for cathodic protection to be made for MSCL pipes only. For further confirmation during subsequent design phases. Road and railway crossings, as well as RRJ in general may be exceptions.
Minimum Pipeline Grade	Not considered at this stage of design
Availability	95% availability allowance. Includes: Allowance for 2% system downtime (8 days per year)

Item	Design Basis
	1.5% unplanned system outages (6 days per year) 1.5% planned system outages (6 days per year) Maintenance to be scheduled for the winter season as far as possible.
Design parameters applicable to subsequent design phases:	
Air Valves	Maximum spacing 800m or otherwise at all local high points Located upstream of main-line valves Downstream of branch valves Air valves to be automatic, double acting (performing air release under normal conditions and air entry to prevent negative pressures) Sizing to be confirmed during detailed design but rule of thumb sizing adopted for concept design based on Bermad sizing guidelines: DN80 automatic, double acting, full-port air valve for mains > DN450 DN100 automatic, double acting, full-port air valve for mains > DN600 DN150 automatic, double acting, full-port air valves for mains > DN900 DN200 automatic, double acting, full-port air valve for mains > DN1200 Surge analysis in subsequent phases may identify additional air valve requirements
Line (Stop) Valves	Isolation gate valves are assumed to be required 1 per 50 km of treated water pipeline, at pump stations, storages and branches All isolation valves are to be located in valve pits with stairs/access in accordance with AS1657 Valving is to be designed to consider operational requirements during failure and maintenance events for the pipelines. Valve size based on pipeline sizes for each option. All valves assumed to be PN35. All mainline isolation valves are assumed to be located in below ground valve pits.
Scour Valves	Scours/drains located at low points at ends of water mains, and at low points between main-line isolation valves. Allowance of scours every 3km has been included. Scour valve sizing to be calculated according to WSA-03, Table 8.4: DN80 scour for mains ≤ DN 200 DN100 scour for DN200 up to and including DN300 DN150 scour for DN300 up to and including DN900 DN200 scour for mains larger than DN900
Pipeline Field Test Pressure	As per manufacturer specifications Estimate at 1.25 times MAOP
Minimum Depth of Cover	600mm
Pipeline Standards:	Buried: AS/NZS 2566
Valve Standards:	Gate Valves: AS 2638, Butterfly Valves: AS 4795, Ball Valves: ASME B16.34 Air Valves: AS 4956 Check Valves: AS 2845
Flanges:	Up to PN16 Pipe: AS 2129 Up to PN25 Pipe: ISO 1092
Pipe Bending	Via joint deflection along trunk main alignment Elbows and bends required at specific locations (e.g. valve pits, pump stations, storages and for crossings)
Minimum Cover to Top of Pipe	800mm and determined by traffic loads on largest pipe proposed (worst case). Calculations provided in Appendix A.7
Maximum Cover to Top of Pipe	1200mm (subject to specific measures required at service, road or rail crossings)

2.6.2. Hydraulic Design

The design flows and demands are provided in Table 2.5. The hydraulic basis adopted is given in Table 2.6.

Table 2.5: Design Flows per Option and Annual Demand Scenario

Input	CVWSS Extension	Bundaleer
Annual Demand	3,000 ML/y	3,000 ML/y
Peak Month Demand	570 ML/month (19% of annual)	570 ML/month (19% of annual)
Average System Availability	95%	95%
Peak Week Demand Peaking Factor	1.5	1.5
Distribution Peak Week Flow (Average Daily Flow)	30 ML/d Equivalent to 1% of annual demand i.e. system has capacity to supply full annual demand over 100 days; or 1% of annual demand per day	30 ML/d Equivalent to 1% of annual demand i.e. system has capacity to supply full annual demand over 100 days; or 1% of annual demand per day
Transfer System Supply	2,200 ML over winter months	20 ML/d
Peak Day Distribution System Capacity	45 ML/d	30 ML/d

Table 2.6: Hydraulic Design Basis

Item	Design Basis
Minimum Pipe Size	DN100
Hazen Williams Coefficient	PVC – 130 MSCL – 125
Minimum Target Pressure at Customer Off-take	20m

2.6.3. Pump Stations

The transfer pump stations have been designed to pump to the command storage with pump control based on the command storage level.

Table 2.7: Pump Station Design Basis

Item	Design Basis		
General			
Option	Pump station	Duty Flow and Duty Head Now	Duty Flow and Duty Head Future
Bundaleer	Transfer	20.0 ML/d @ 280m	No change
	1	30.0 ML/d @ 80m	No change
	2	27.1 ML/d @ 90m	No change
	3	4.0 ML/d @ 44m	No change
	4	0.8 ML/d @ 40m	No change
CVWSS	1	7.7 ML/d @ 51m	11.5 ML/d @ 62m
	2	0.7 ML/d @ 60m	1.1 ML/d @ 58m
	3	0.8 ML/d @ 40m	1.2 ML/d @ 40m
Maximum Operating Pressure	Maximum operating head per pump lift = 160m		
Operating Availability	As per Average System Availability in Table 2.5 Maximum pumping availability is 24 hours per option		
Reliability	As per Availability in Table 2.4		
Pump Station Housing	Assume steel framed building		

Item	Design Basis
Access type	Permanent gravel road
Mechanical	
Pump Type	Fixed speed centrifugal, electric motor drive with soft-starters 2-3 duty and 1 standby pump
Filtering / Strainers	Required for reservoir and river offtakes
Flow control	Isolation valves upstream and downstream of pumps
Electrical	
Power Supply	Primary power per pump station from suitable local network 11 kV. Buried cable to be used unless unfeasible. Provision to be made for relocatable diesel generator to supply full load.

2.6.4. Storages

For the purposes of the concept design, the transfer system is considered to terminate in a single command storage within the Clare Valley region for the Bundaleer option, and at four (4) command storages for the connection to the Clare GI option. The storage volume may ultimately be achieved through multiple storages.

The Bundaleer option includes a 100 ML balancing storage in the northern region of the Clare Valley at the termination of the transfer network from Bundaleer reservoir. This acts as a balancing storage to manage peak day demands and reduce transfer supply requirements back to peak week flows.

Storages for the CVWSS extension option were based on two thirds (67%) of the annual demand in winter storages for use over the irrigation period (this broadly aligns with current seasonal water practices for on-vine irrigation from the KBR engagement process). Four (4) supply zones were selected based on the topography and geographical location within the Clare Valley, each supplied by one storage. The capacity of each storage was based on the predicted demand of the supplied customers from community engagement by KBR. The volume of each storage in the concept design for the CVWSS extension option is presented in Table 2.8.

Table 2.8: CVWSS Storage – 2.2 GL Option

Storage	Demand (ML/y)	Evaporation allowance	Storage size (ML)
Clare	810	10%	600
Polish Hill	435		350
Watervale	1155		800
Auburn	600		450
Total	3,000		2,200

It is assumed that storages will be full going into the summer season.

Storages will be earthen bank (cut to fill) with dual liner and leak detection system for storages > 10 ML in capacity. Storages ≤ 10 ML are assumed to be above ground tanks (e.g. concrete tilt-up panel, lined covered storages or similar). No potable water storages are required in the current approach, potable storages are to have covers.

2.6.5. Existing Services and Creek Crossings

The pipe alignments developed follow existing road routes as far as possible and involve a number of road and potentially rail crossings. The design requirements for crossings are identified in the Trench Design section below.

Dealing with landlord permissions and existing services is foreseen to be a significant factor impacting costs and construction timeframes.

2.6.6. Trench Design

2.6.6.1. Standard Trench Detail

The pipeline trench design is based on the trenching parameters defined in WSA-03 standard drawings.

For the purposes of estimation, all trenches are assumed to require Type B support and the following dimension parameters. Refer to Figure 2.6 below for further justification.

Bedding depth (Lb) of 150mm up to and including DN900 pipe and 250mm above DN900

Pipe overlay ("Lo") of 150mm up to and including DN900 pipe and 250mm above DN900

Trench clearance ("Lc") 300mm for below DN900 and 350mm for the trunk main DN900-DN1500 and 400mm for diameters above DN1500.

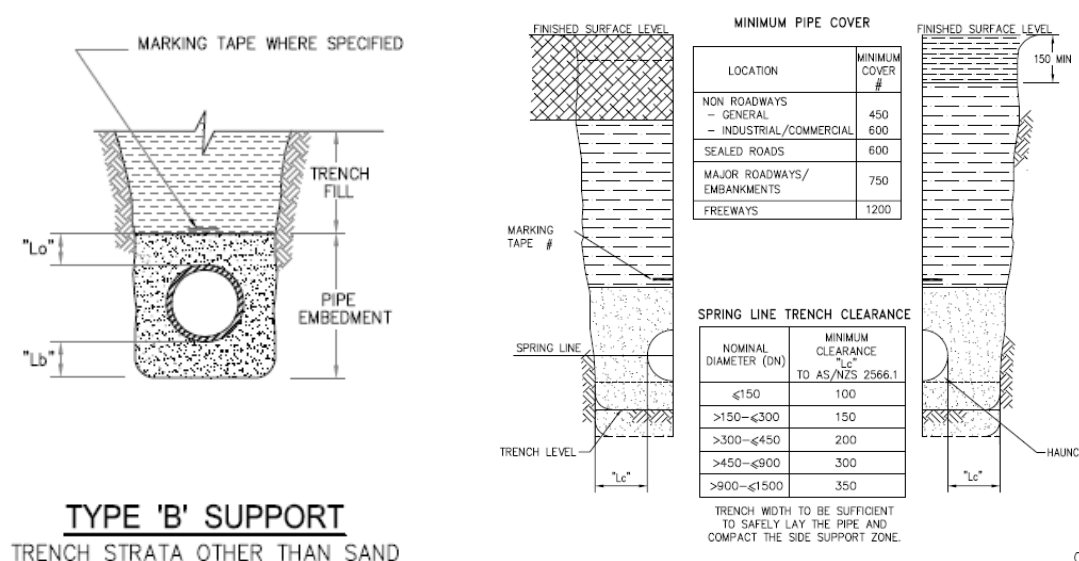


Figure 2.6: Indicative Trench Configurations Based on WSAA Standards WAT-1201 and WAT-1202

2.6.6.2. Highways and Major Road Crossings

Major road crossings are assumed to have a minimum cover of 1200mm from road surface to top of pipe. Pipelines are assumed to be direct buried and continuous welded below major roads. Refer to Figure 2.7 for dimensions and further detail.

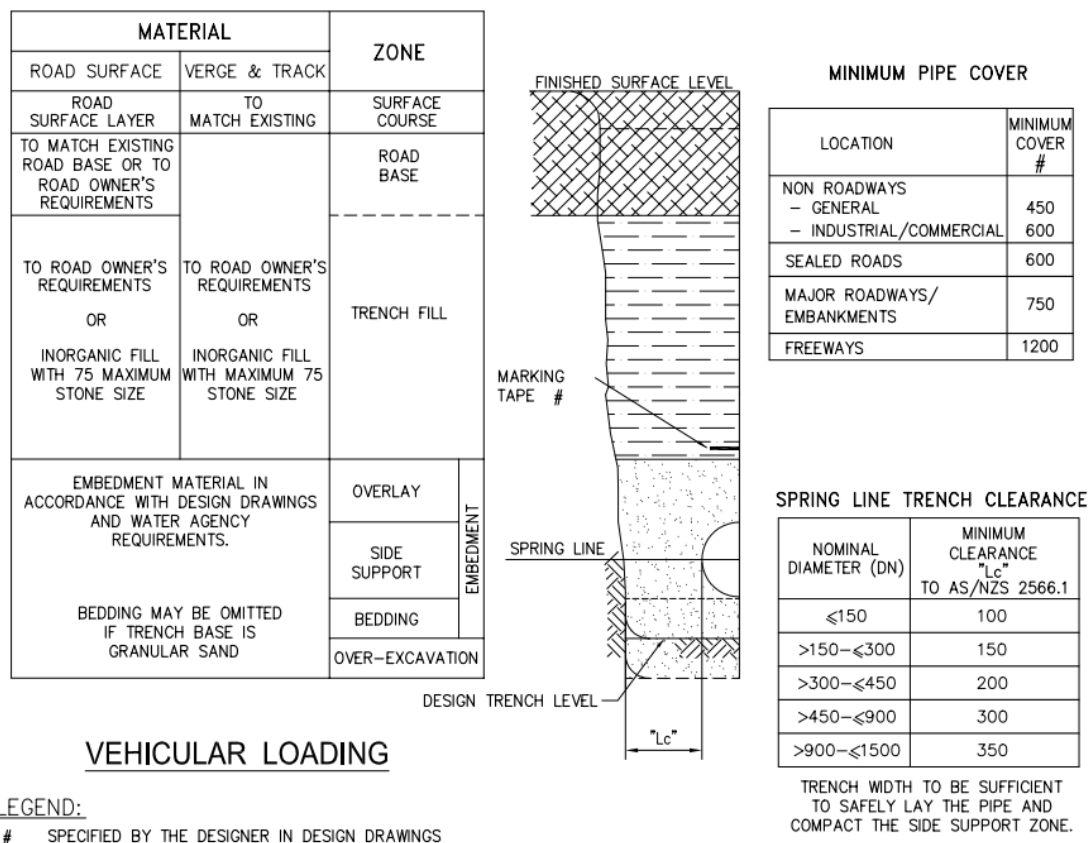


Figure 2.7: Indicative Road Crossing Trench Configuration (WAT-1201)

2.6.6.3. Railway Crossings (as per ARTC ETG-17-01, WAT-1213 and WAT-1214)

All pipelines under existing railway lines are assumed to be sleeve encased below ground, with encasement pipe complying with AS 4799. The minimum cover to the encasement pipe is 1600mm.

Refer to Figure 2.8 for dimensions and further detail.

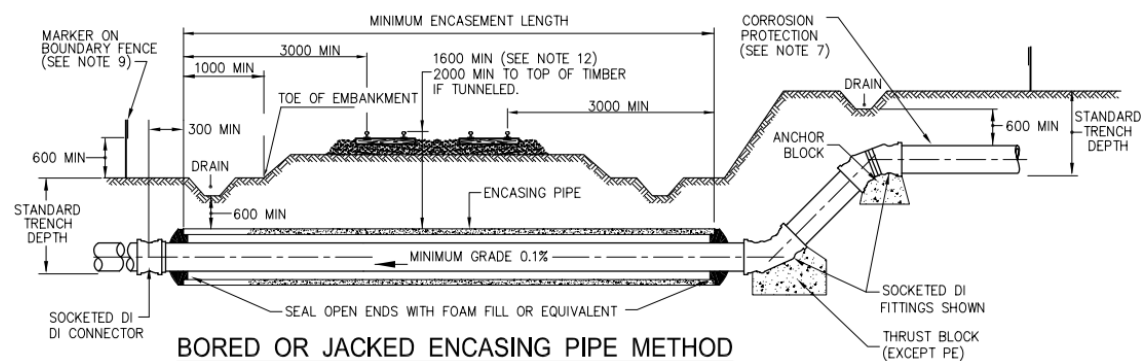


Figure 2.8: Indicative Road Crossing Trench Configuration (WAT-1201)

2.6.7. Construction Methodologies

Excavation equipment is assumed to be excavators and most of the pipeline route is expected to be rippable with conventional excavation equipment.

An adequate disturbance area (i.e. corridor width) is assumed to allow for conventional construction methodologies.

It is assumed that additional area will be available along the pipeline alignment for the following activities:

- Laydown areas
- Pipe stockpiles
- Bedding and backfill (separated and stored along the length of the pipeline)
- Sand stockpiles
- Road base rubble stockpiles
- Construction facilities (i.e. offices)
- Temporary accommodation facilities where the pipeline section is some distance from existing towns or accommodation centres

2.6.8. Safety in Design

No unmitigated high risks have been identified at this stage of design for the options developed, as all options involve solely commonly used elements of a water supply scheme, and site conditions are what can generally be expected for a rural water supply scheme.

2.6.9. Design Life

The design life given in Table 2.9 has been used to estimate annualised replacement costs.

Table 2.9: Infrastructure Design Life

Asset Class	Minimum Design Life
Pipelines	80
Pump Stations	40
Storage	50
Electrical	25
Water Treatment Plant	30

2.7. Costing Criteria

The basis of the project costing is summarised in Table 2.10 below for both the Bundaleer and CVWSS options. Material and construction costs were sourced from suppliers, contractors and recently completed costings for similar projects by quantity surveyors.

Refer to the assumptions page within the project costing spreadsheet for more detail on the assumptions made.

Table 2.10: Basis of Project CAPEX Costing

System Component	Costing Basis
Direct construction costs	
Pipelines	
Pipe material	
PVC	Rates from a local supplier and a contractor familiar with the region where obtained. The higher of the two rates was used.
MSCL	Rates from a 2022 costing for a similar project were used
Pipeline construction	
PVC	Rates from a contractor familiar with the region where used, noting that a factor of 1.5 was applied to account for the ongoing 2022 global market volatility.
MSCL	Rates from a 2022 costing for a similar project were used
Extra over pipeline allowances	10% allowance for valve fittings and structures, and thrust block 5% allowance for dealing with existing services Rock excavation 1% of excavated material Imported bedding 10% of pipe embedment material
Pump Stations	Rates from a 2022 costing for a similar project were used. The project was based on utility standards, and the scope of work was reduced as follows, which resulted in a 30% decrease in the pricing. 1. Precast concrete building reduced to a shed structure 2. Higher power requirements of the baseline projects were reduced to align with the power demands of this project 3. Surge allowance was removed for the PVC distribution network
Storages	Contractor rates (based on current \$2022 escalated cost information) for similar sized storages recently constructed in relatable topographies.
Preliminaries and profit	3% preliminaries 7% allowance for contractor's profit
Additional indirect costs	
Land procurement	Procurement of land for storage and servitudes allowed at \$40,000 per ha
Owners operating costs	0.5%
Owners project management costs	7%
Allowance for design and consultant involvement	7%
Allowance for contingency	30%

Table 2.11: Basis of Project OPEX Costing

System component	Costing basis
Fixed costs	
Water supply charge	Bundaleer – \$1,071 /ML CVWSS – \$1,633 /ML
Maintenance costs	Annual maintenance costs were calculated based on an annual percentage of capital cost as follows: - Pipelines 0.25% - Pump stations 1% - Storages 0.5%
Staffing allowance	Allowance for \$100,000 annual salary per operator (2 allowed) + office costs (\$100,000 for accommodation, vehicles, etc.)
Variable costs	
Pumping costs	$(\$/\text{year}) = \text{kWh}/\text{year} \times \$/\text{kWh}$ Where: $\text{kWh}/\text{year} = \text{Ph(kW)} \times n (\text{motor} + \text{pump}) \times \text{Annual operating hours}$ $\text{Ph(kW)} = q \rho g h / (3.6 \times 10^6)$ Ph(kW) = hydraulic power (kW) q = flow (m³/h) ρ = density of fluid (kg/m³) g = acceleration of gravity (9.81 m/s²) h = differential head (m) n motor = 90% n pump = 80% Annual operation period for Bundaleer and CVWSS = 100 days
Annualised replacement	
Application of design life as per Table 2.9	

Document Properties

Document History and Status

Revision	Date Issued	Reviewed	Approved By	Date Approved	Revision Type
A	28 July 2022	PS	CH	28 July 2022	Final Draft

Distribution of Copies

Version	Date Issued	Quantity	Electronic	Issued To
A	29 July 2022	1	pdf	KBR (LC)

Document Number	PIR-07_REP-01
File Name	PIR-07_REP-01_A Basis of Design
Client	Department of Primary Industries and Regions
Document Title	Clare Valley Water
Document Version	A
Project Number	PIR-07
Limitation	This report has been prepared on behalf of and for the exclusive use of Inside Infrastructure Pty Ltd's Client, and is subject to and issued in connection with the provisions of the agreement between Inside Infrastructure and its Client. Inside Infrastructure accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.
Copyright	The concepts and information contained in this document are the property of Inside Infrastructure Pty Ltd. Use or copying of this document in whole or in part without the written permission of Inside Infrastructure constitutes an infringement of copyright.

Inside Infrastructure

ABN 89145499789

E: inside@insideinfrastructure.com.au

www.insideinfrastructure.com.au

SOUTH AUSTRALIA

Level 1, 101 Flinders Street

Adelaide SA 5000

VICTORIA

108 Gheringhap Street

Geelong VIC 3220

QUEENSLAND

310 Edwards St

Brisbane QLD 4000



Document Properties

Document history and Status

Revision	Date Issued	Reviewed	Approved By	Date Approved	Revision Type
A	13 July 2022	SD	CH	13 July 2022	DRAFT
0	29 July 2022	SD	CH	29 July 2022	FINAL

Distribution of Copies

Version	Date Issued	Quantity	Electronic	Issued To
Draft	13 July 2022	1	pdf	KBR (LC)
Final	29 July 2022	1	pdf	KBR (LC)

Document Number	PIR-07_REP-02
File Name	PIR-07_REP-02_0 Clare Valley Water Options Summary Report
Client	PIRSA
Document Title	Clare Valley Water
Document Version	0
Project Number	PIR-07
Limitation	This report has been prepared on behalf of and for the exclusive use of Inside Infrastructure Pty Ltd's Client, and is subject to and issued in connection with the provisions of the agreement between Inside Infrastructure and its Client. Inside Infrastructure accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.
Copyright	The concepts and information contained in this document are the property of Inside Infrastructure Pty Ltd. Use or copying of this document in whole or in part without the written permission of Inside Infrastructure constitutes an infringement of copyright.

Inside Infrastructure

ABN 89145499789

E: inside@insideinfrastructure.com.au

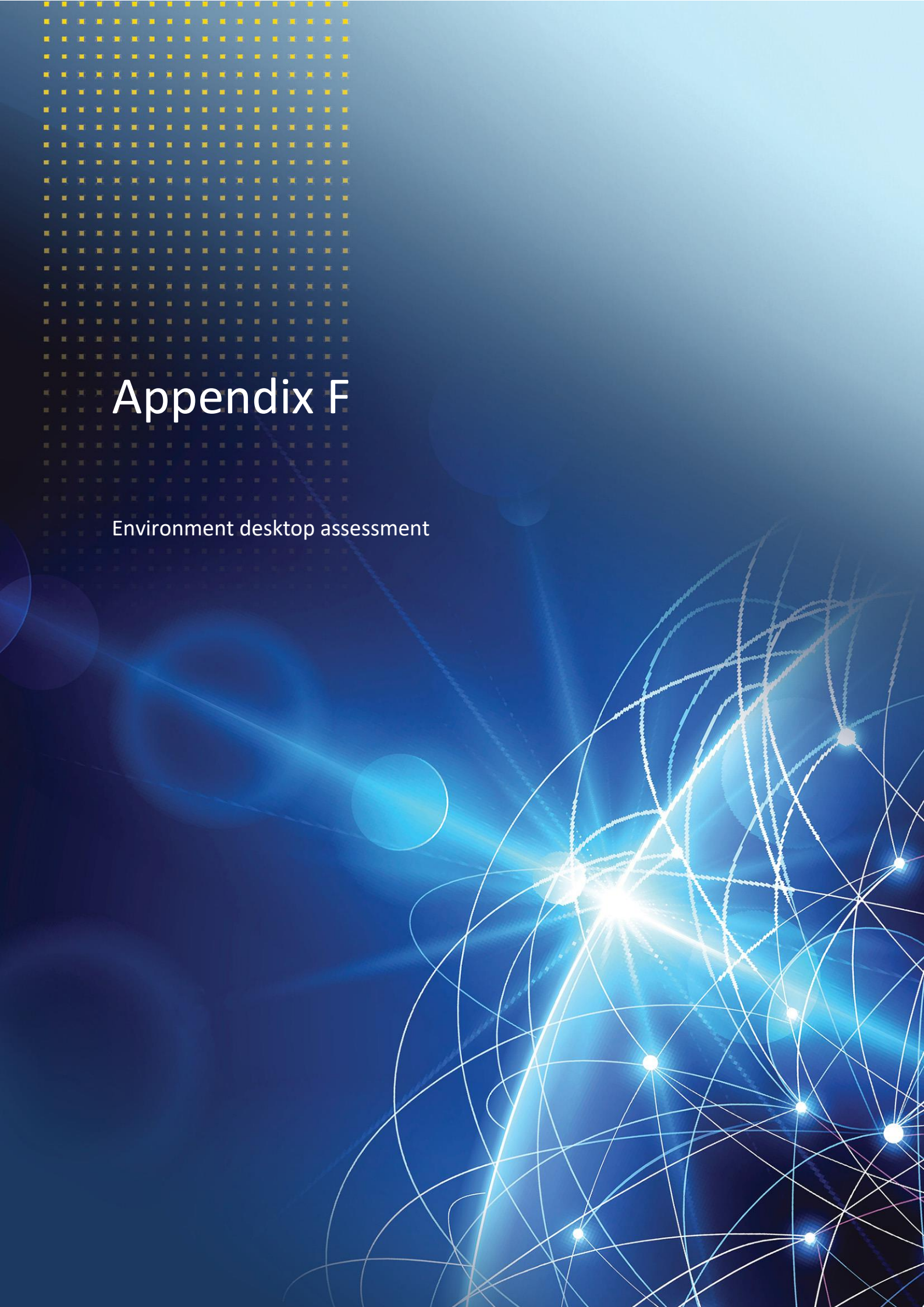
www.insideinfrastructure.com.au

SOUTH AUSTRALIA

Level 1, 101 Flinders Street

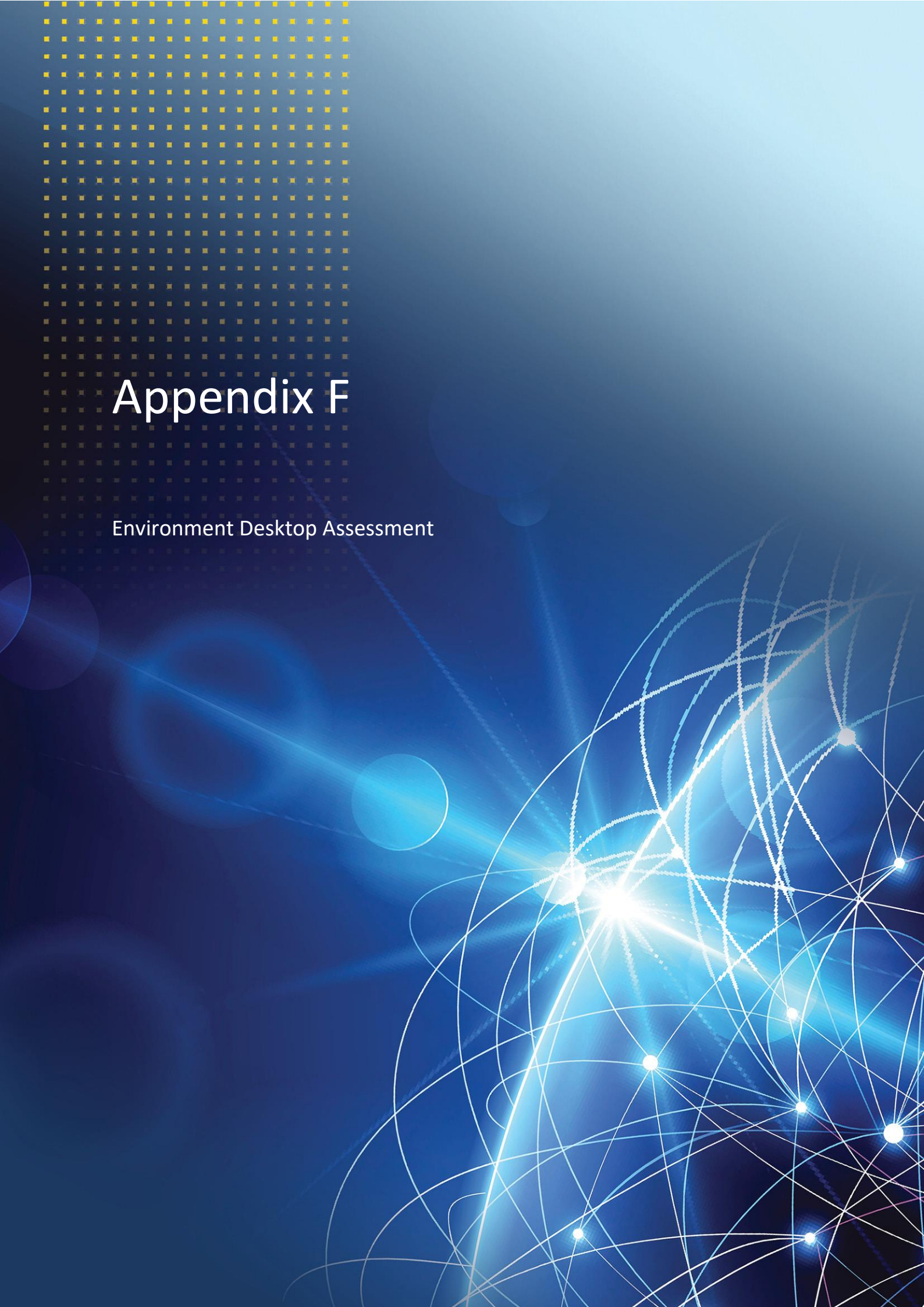
Adelaide SA 5000





Appendix F

Environment desktop assessment



Appendix F

Environment Desktop Assessment

19 July 2022

Luke Curtain
KBR
Principal Strategic and Commercial Advisor
luke.curtain@kbr.com

Dear Luke,

Re: Environment Assessment - Clare Valley Preliminary Business Case

Green Edge Environmental P/L has been engaged by KBR to undertake an environmental assessment for the preliminary business case (PBC) of imported water into the Clare Valley wine region. This high-level environmental assessment address' the environmental challenges and opportunities. A number of options are under consideration and the environmental assessment will assist in the overall analysis of the options and assist to narrow down the preferred option/s.

Two options are being explored:

- An upgrade of the existing Clare Valley Water Supply Scheme – including extending the pipeline, upgrading capacities and constructing four community storages
- A pipeline from the Bundaleer Dam with supplement water supply from the Morgan – Whyalla pipeline.

1. Purpose of this report

The high-level assessment has been undertaken determine if there are any showstoppers associated with the proposed. The Environmental Assessment will fulfil the aims of:

- Undertaking State and Commonwealth Database searches to determine the potential for threatened species to occur
- identification of flora and fauna issues requiring mitigation measures, proposed changes or approaches to mitigate issues, costs and timeframes

KBR are working through a PBC for the project and identified require a high-level assessment of potential impacts to the project.

The desktop assessment of the proposed work areas (study area) utilised the following datasets and sources:

- State threatened flora and fauna databases
- Commonwealth Protected Matters Search Tool
- South Australian Department of Environment, Water and Natural Resources Nature Maps Interactive Tool
- Government of South Australia, Department of Planning, Transport and Industry Location SA MapViewer
- Applicable State Legislation
- Google Earth and other aerial photography.

2. Findings from the desktop assessment South Australia

The project area occurs entirely within the Flinders Lofty Block Interim Biogeographic Regionalisation for Australia (IBRA) region and Broughton (FLB02) subregion. The area has been highly impacted by development and limited habitat opportunities occurs within the proposed works area within the study area. The study area is within the Northern and Yorke Landscape Management Region.

The following figures provide an overview of the study area on the relevant environment themes to the proposed project.

The South Australia Biological Database was integrated to provide a list of State rated flora and fauna, that could occur with a 10km buffer of the study area. Twenty-four fauna and 56 flora species were returned from the search (Figure 1 and Figure 2 show the location of these species and Attachment A shows the species).

Final alignments will be assessed to ensure impacts to the species and their habitat are avoided.

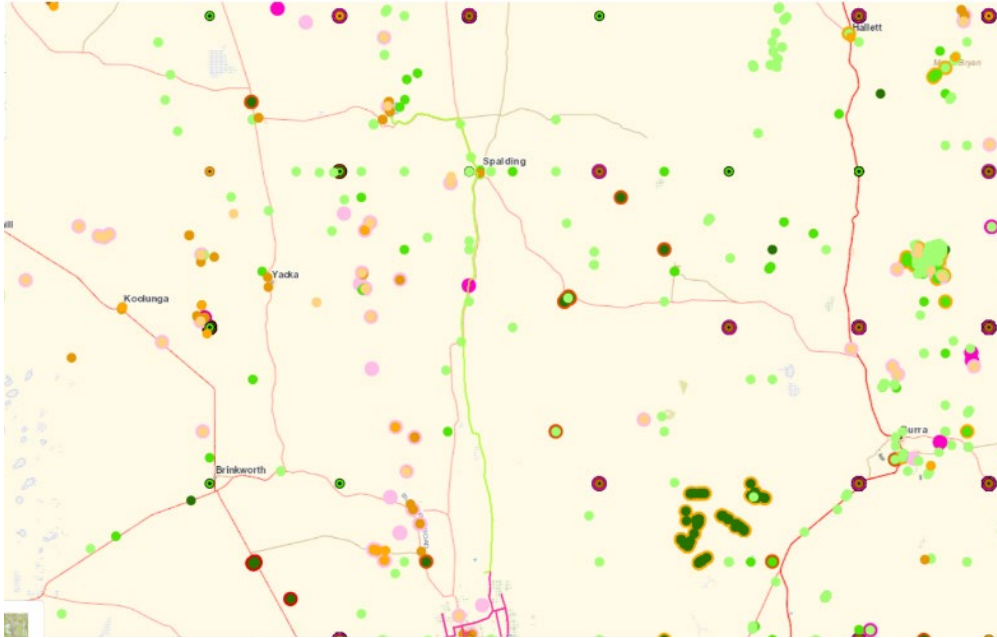


Figure 1: State and National threatened flora and fauna sightings, Blunderer Pipeline

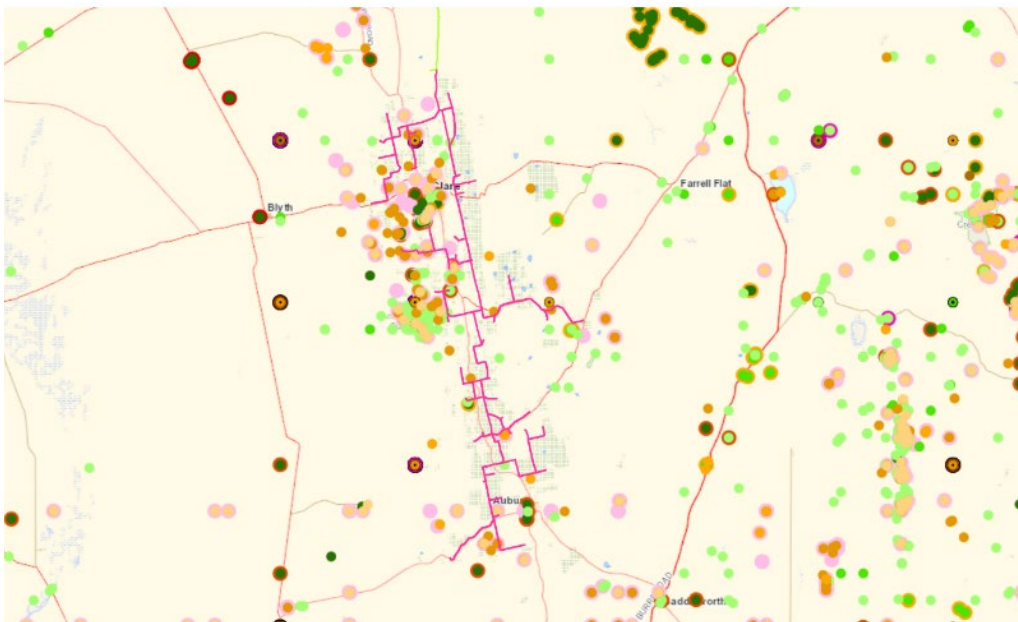
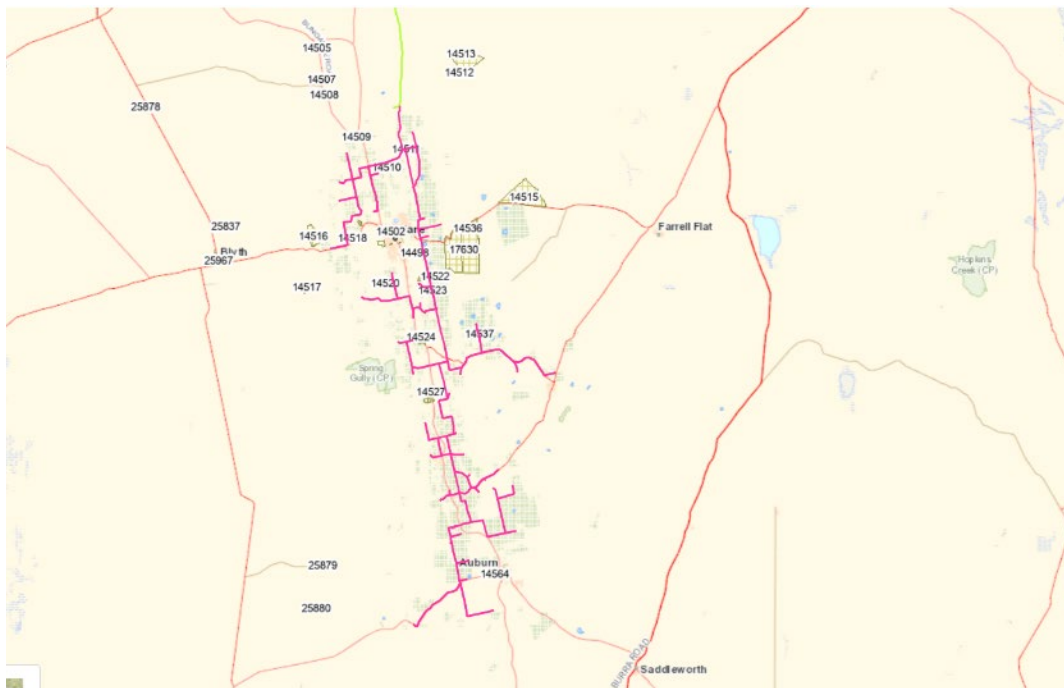


Figure 2: State and National threatened flora and fauna sightings, distribution network

There are several Weeds of National Significance (WoNS) within the study area, **mitigation measures during construction works will ensure these species are not spread further than their current extent.**

There are several local heritage sites within the study area which will need to avoid impact from any new construction work (refer Figure 4).



There are several State heritage sites within the study area which will need to avoid impact from any new construction work (refer Figure 5).

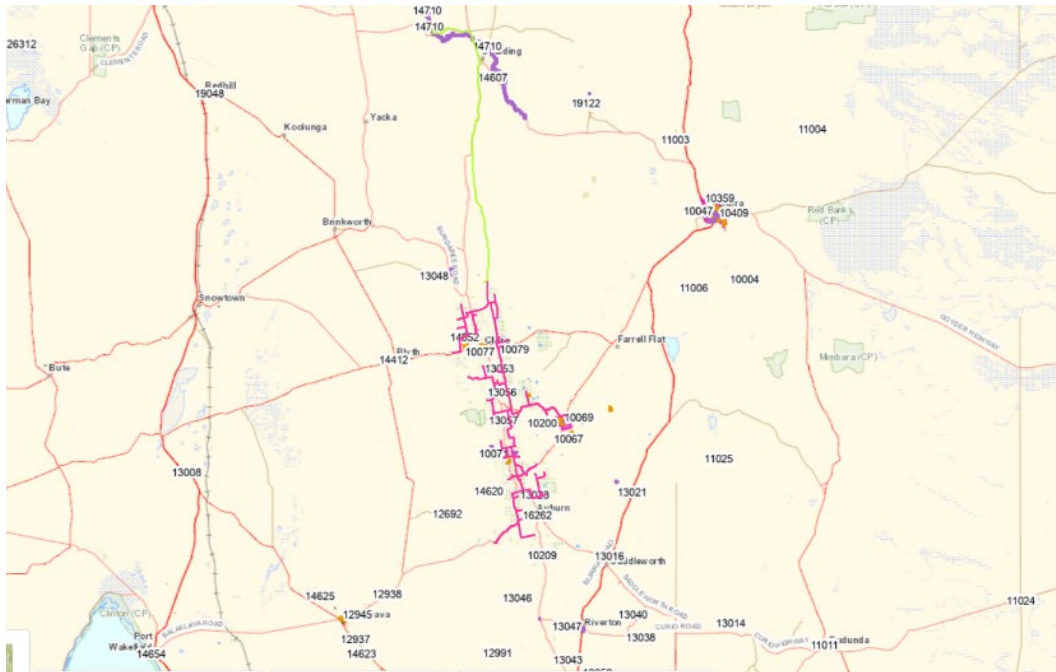


Figure 5: State heritage places in the study area

There is one determined Native Title determination, this will have no impact on the project.

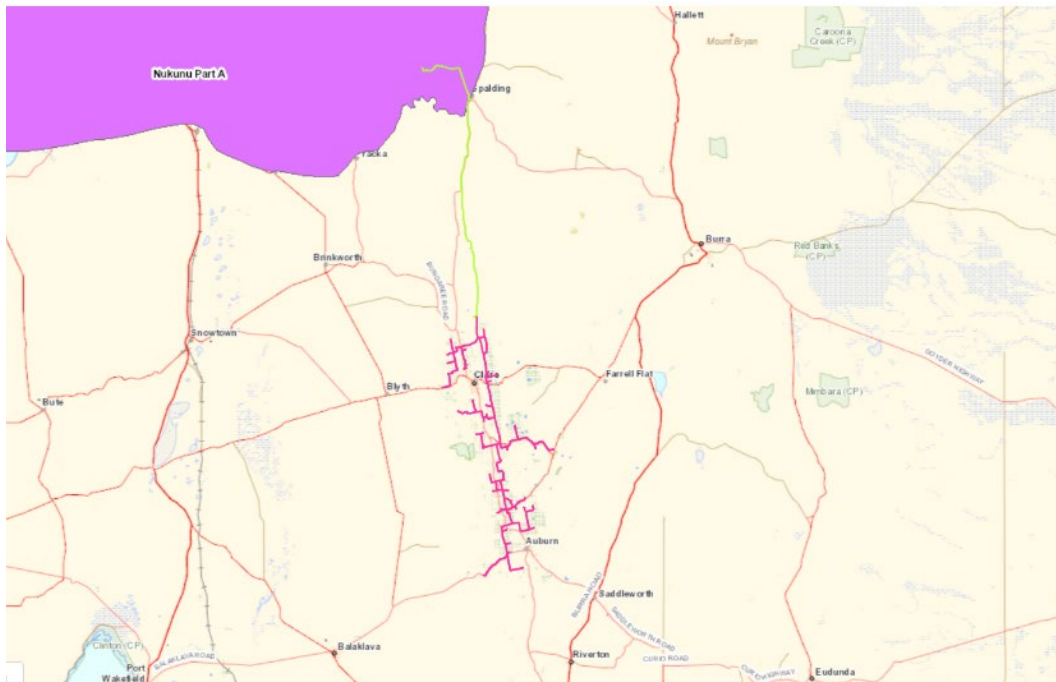


Figure 6: Native title determinations in the study area

There is one undetermined Native Title claim in the study area, impacts from the proposed works will need to be assessed.

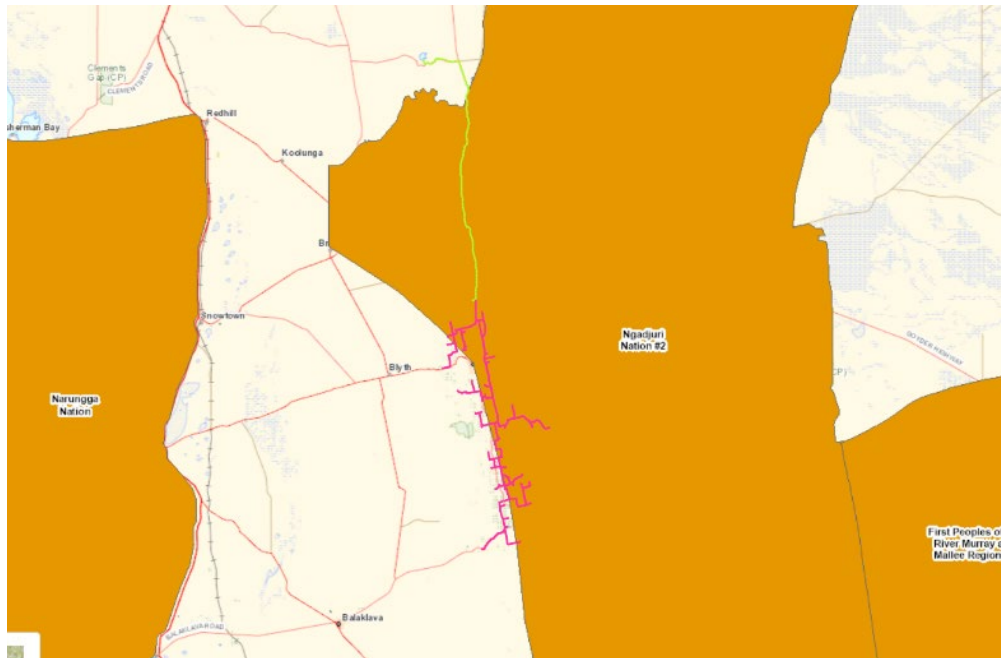


Figure 7: Native title claims in the study area

There is an Indigenous Land Use Agreement (ILUA) over the proposed Bundaleer pipeline, impacts of the proposed development will need to be assessed.

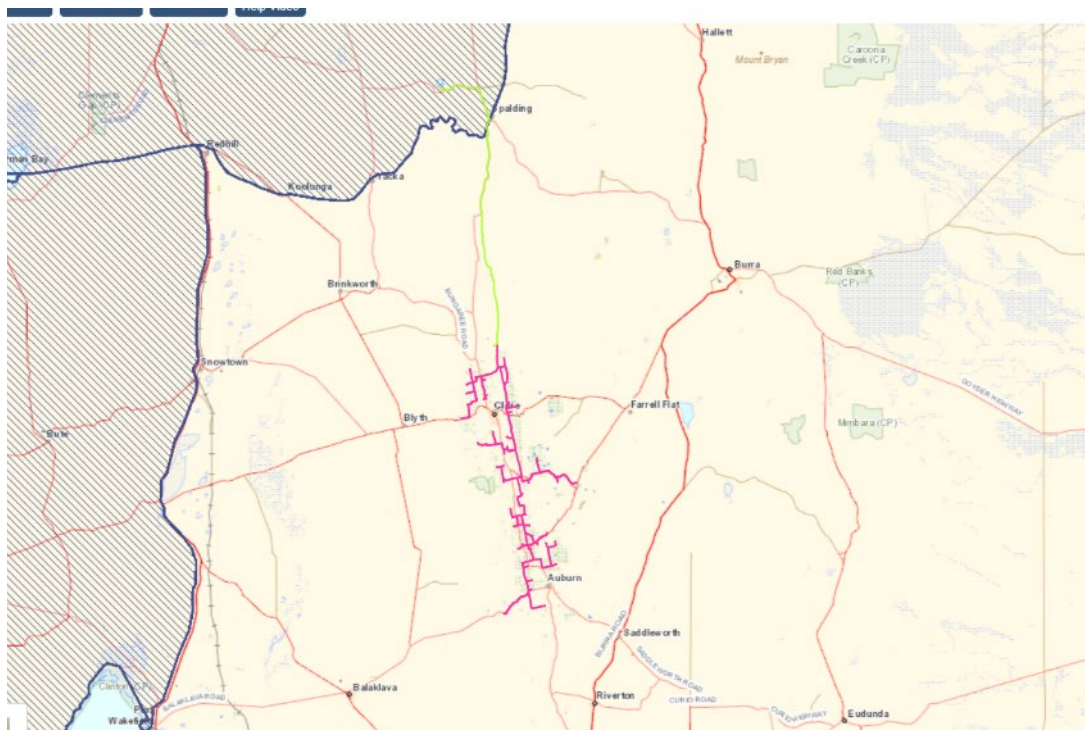


Figure 8: ILUA boundaries

There are several National Parks and Reserves within the study, none will be impacted by the proposed alignment.

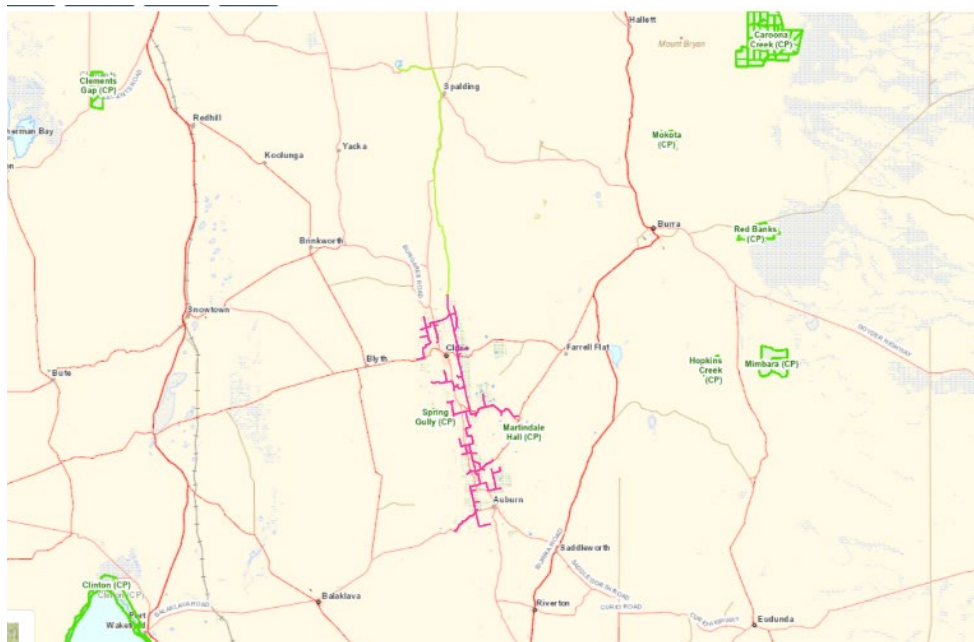


Figure 9: National Parks and Reserves in the study area

The study area contains several water courses that are likely to be crossed from the proposed infrastructure. The **Water Affecting Activity (WAA)** Control Policy is made under Section 102 of the *Landscape South Australia Act 2019* (the Act). Section 104 of the Act specifies the activities that may be regulated by a WAA Permit. This will need to be assessed based on the final proposed final alignment.

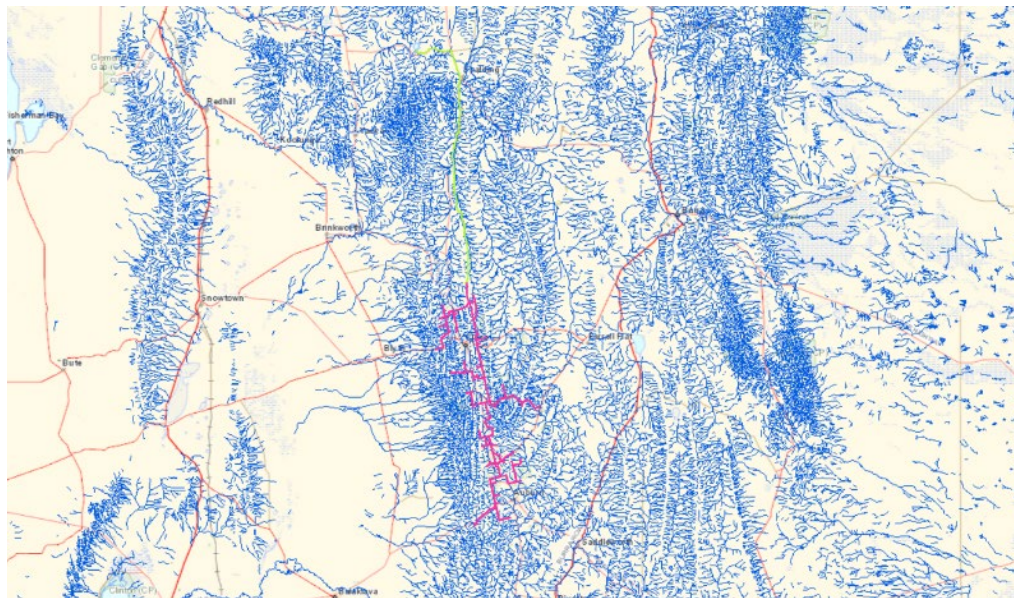


Figure 10: Water courses in the study area

3. South Australia Native Vegetation Act and Regulations

Native vegetation in this part of South Australia is protected by the *Native Vegetation Act 1991*. Under the Act if a proponent wants to clear native vegetation for any reason, they need to:

- check whether your proposed clearance is listed in the Native Vegetation Regulations 2017; if it is, clearance is permitted but conditions usually apply
- check whether the native vegetation you are proposing to clear is protected under the *Native Vegetation Act 1991*.

The Native Vegetation Regulations 2017 outline the circumstances where clearing native vegetation are permitted, outside of the clearance controls in the *Native Vegetation Act 1991*. The Regulations allow clearance for activities that are routinely carried out by South Australians, including building new homes, managing farms, upgrading or establishing infrastructure or making recreational trails.

The Regulations seek to balance the requirements of South Australians to clear for everyday activities with the need to protect and restore the remaining native vegetation in South Australia.

4.1 Native Vegetation Clearance Approval Pathway

There are four approval pathways for native vegetation clearance in South Australia, these include:

Pathway 1: Permitted Clearance Without Conditions (self-assessed by proponent, notification to the NVC sometimes required)

Pathway 2: Fire Hazard Reduction (requires CFS approval)

Pathway 3: Vegetation Management (requires a Management Plan approved by the NVC)

Pathway 4: Risk Assessment (requires NVC approval and a Significant Environmental Benefit (SEB) offset):

- a. Major developments (section 48 *Development Act 1993 now the PDI Act 2016*)
- b. Mining, petroleum and exploration activities
- c. Other activities where the level of risk associated with the activity is not yet known.

4.2 Mitigation Hierarchy

The Regulations place a great emphasis on the proponent applying the Mitigation Hierarchy, a fundamental principle which encourages proponents to consider all possible ways to avoid and minimise clearance to reduce the level of clearance required. Reducing the level of clearance also reduces the SEB offset (where required)

and associated cost to the proponent. The Native Vegetation Council (NVC) assesses whether proponents have adequately applied the Mitigation Hierarchy.

The most appropriate pathway for the proposed project to undertake native vegetation clearance is under Pathway 4 C - Other activities where the level of risk associated with the activity is not yet known, and is summarised in Table 1.

Table 1 - Pathway 4 C - Other activities requirements

Regulation (Schedule 1 activity)	Description of activity	Proponent must comply with the following additional requirements
Regulation 12(34) - Infrastructure	To allow clearance of vegetation incidental to the construction or expansion of a building or infrastructure (and associated services) where the Minister has declared that the clearance is in the public interest. 'Infrastructure' is defined in the definitions of the regulations (see Appendix 1) and additionally in regulation 12(34).	1. Clearance incidental to the construction or expansion of a building or infrastructure where it is deemed the clearance is in the public interest; and/or 2. Clearance is required in connection with the provision of infrastructure or services to a building or place provided that consent under the <i>Development Act 1993</i> has been obtained; and/or 3. Clearance is undertaken in accordance with an NVC approved Standard Operating Procedure.

4.3 Significant Environmental benefit

Significant Environmental Benefit (SEB) – Regulation 20.

If clearance of native vegetation is permitted under the Regulations as a risk-assessed activity and is subject to the achievement of an SEB offset, the SEB is to be achieved by:

- establishing and managing native vegetation on land as specified by the NVC
- managing and protecting native vegetation that is growing or is situated on land as specified by the NVC
- entering into a Heritage Agreement for the management of specified native vegetation
- taking action in accordance with credit, assignment and/or third-party establishment of environmental benefits (Part 4A of the Act).

Table 2 –Process to undertake Clearance for 4C ‘Other activities’

General process	Requirements of proponent
Application to NVC	Application to the NVC via email nvc@sa.gov.au, or in accordance with an NVC-approved Standard Operating Procedure (SOP). Note, you must submit the written permission of the landowner if you are acting on behalf of the landowner for any clearance activity.
Assessment	When making a decision for these activities in relation to the information to be provided by an applicant to inform whether approval should be granted, the NVC will assess the level of risk to biodiversity presented by the clearance proposal. The NVC will also assess the proposed clearance against whether there are any other alternatives that involve no clearance, less clearance or clearance of vegetation that is less significant (or has been degraded to a greater extent than the vegetation proposed to be cleared). If an NVC-approved SOP exists, the assessment approach will occur in accordance with the SOP
Approval	NVC approval required, or in accordance with the approval process outlined in the NVC-approved SOP. Proponent is required to develop an SEB Management Plan that will be approved by the NVC for implementation. Clearance is only permitted for these activities if any conditions (including the SEB) that apply to the approval are complied with. Conditions imposed in connection with an approval are binding and enforceable against the person to whom the approval is granted as well as subsequent owners and occupiers of the land. Permitted clearance must be undertaken 2 years within approval being granted, unless otherwise specified.
Significant Environmental Benefit	SEB required in accordance with the Management Plan (or payment into the Native Vegetation Fund). If an NVC-approved SOP exists, the approval of the SEB will occur in accordance with the SOP.

4. Environmental Protection and Biodiversity Conservation Act

A protected matters search was undertaken to determine if there were any Matters of National Environmental Significance (MNES) in the study area. There is potential for

two listed ecological communities, 25 listed threatened species and 12 listed migratory species (refer to Table 3).

Table 3: Matters of National Environmental Significance in the study area

Matters of National Environment Significance	Count
World Heritage Properties	0
National Heritage Places	0
Wetlands of International Importance (Ramsar Wetlands)	0
Great Barrier Reef Marine Park	0
Commonwealth Marine Area	0
Listed Threatened Ecological Communities	2
Listed Threatened Species	25
Listed Migratory Species	12

Summary

The following was identified through this high-level study:

1. Final alignments will be assessed to ensure impacts to the species and their habitat are avoided
2. Mitigation measures during construction works will ensure these species are not spread further than their current extent
3. Water Affecting Activity (WAA) under the *Landscape South Australia Act 2019* are likely to be required for works in waterways
4. Local and State heritage sites should be avoided where possible in the final design
5. Significant Environmental Benefit (SEB) are likely to be required for native vegetation removal

We trust this information is sufficient for your purposes; however, should you require any further details or clarification, please do not hesitate to contact me on 0438 345109.

Yours sincerely



Chris Alderton
Director and Principal Environmental Consultant

Enc:

Attachment A – Biological Databases of South Australia (BDBSA) search

Attachment B – Protected Matters Search Tool

Attachment A – Biological Databases of South Australia (BDBSA) search

Biological Databases of South Australia (BDBSA) Threatened Fauna

NSXCODE+	CLASS NAME	SPECIES	COMMON NAME	NATIVE	NAT RATING	STATE RATING	No. OF RECORDS	DATE OF LAST RECORD
Z09835	ACTINOPTERI	Maccullochella peelii	Murray Cod	Y	VU		1	27-Jan-2002
C03117	AMPHIBIA	Pseudophryne bibronii	Brown Toadlet	Y		R	7	26-Oct-2003
A00176	AVES	Ardeotis australis	Australian Bustard	Y		V	1	17-Apr-1994
Q21136	AVES	Biziura lobata menziesi	Musk Duck	Y		R	4	03-Jun-2020
S00693	AVES	Corcorax melanorhamphos	White-winged Chough	Y		R	98	28-Jan-2021
Y09304	AVES	Coturnix ypsilophora australis	Brown Quail	Y		V	1	31-Aug-1975
S00237	AVES	Falco peregrinus macropus	Peregrine Falcon	Y		R	7	08-Jul-2007
U00238	AVES	Falco subniger	Black Falcon	Y		R	5	25-Jul-2007
K04181	AVES	Falcunculus frontatus frontatus	Eastern Shrike-tit	Y		R	28	07-Sep-2008
K04077	AVES	Hieraaetus morphnoides	Little Eagle	Y		V	2	21-Mar-2004
K04385	AVES	Melanodryas cucullata cucullata	Hooded Robin	Y		R	9	21-Mar-2004
K04173	AVES	Myiagra inquieta	Restless Flycatcher	Y		R	2	29-Jun-1984
M00306	AVES	Neophema chrysostoma	Blue-winged Parrot	Y		V	1	30-Oct-2007
Z00307	AVES	Neophema elegans elegans	Elegant Parrot	Y		R	4	30-Oct-2007
Y00216	AVES	Oxyura australis	Blue-billed Duck	Y		R	9	03-Jun-2020
Z00403	AVES	Pachycephala inornata	Gilbert's Whistler	Y		R	3	13-Jul-1985
K00241	AVES	Pandion haliaetus cristatus	Eastern Osprey	Y		E	1	10-Jan-2005
Y00380	AVES	Petroica boodang boodang	Scarlet Robin	Y		R	18	08-Jul-2007
M00382	AVES	Petroica phoenicea	Flame Robin	Y		V	2	19-May-2001
A00060	AVES	Podiceps cristatus australis	Great Crested Grebe	Y		R	3	18-Oct-2019
M04182	AVES	Spatula rhynchotis	Australasian Shoveler	Y		R	3	03-Jun-2020
A00652	AVES	Stagonopleura guttata	Diamond Firetail	Y		V	27	20-Jan-2016
U04178	AVES	Turnix varius varius	Painted Buttonquail	Y		R	19	28-Jul-2007
K01113	MAMMALIA	Trichosurus vulpecula	Common Brushtail Possum	Y		R	18	03-Jun-2020
Y02572	REPTILIA	Tiliqua adelaidensis	Pygmy Bluetongue	Y	EN	E	319	08-Jan-2020

Biological Databases of South Australia (BDBSA) Threatened Flora

NSXCODE	FAMILY NAME	SPECIES	COMMON NAME	NATIVE	NAT RATING	STATE RATING	No OF RECORDS	DATE OF LAST RECORD
C00037	ADIANTACEAE	Anogramma leptophylla	Annual Fern	Y		R	1	07-Oct-2020
K01297	AMARANTHACEAE	Ptilotus erubescens	Hairy-tails	Y		R	3	16-Oct-1991
Z00607	CENTROLEPIDACEAE	Centrolepis glabra	Smooth Centrolepis	Y		R	1	27-Dec-1999
U01222	CHENOPODIACEAE	Atriplex australasica		Y		R	1	12-Apr-1998
Q01192	CHENOPODIACEAE	Maireana excavata	Bottle Fissure-plant	Y		V	6	27-Sep-2016
U01206	CHENOPODIACEAE	Maireana rohrlachii	Rohrlach's Bluebush	Y		R	1	01-Jun-1923
A03212	COMPOSITAE	Leptorhynchos elongatus	Lanky Buttons	Y		E	3	01-Sep-2000
Z32639	COMPOSITAE	Podolepis decipiens		Y		R*	2	19-Sep-1994
E03282	COMPOSITAE	Podolepis muelleri	Button Podolepis	Y		V	2	16-Aug-1992
C03089	COMPOSITAE	Senecio macrocarpus	Large-fruit Groundsel	Y	VU	V	1	20-Oct-1961
M01490	CRASSULACEAE	Crassula peduncularis	Purple Crassula	Y		R	2	09-Oct-1999
W00555	CYPERACEAE	Schoenus latelaminatus	Medusa Bog-rush	Y		V	1	01-Nov-2000
Y02184	ELATINACEAE	Elatine gratioloides	Waterwort	Y		R	1	01-Nov-2003
E00142	GRAMINEAE	Austrostipa gibbosa	Swollen Spear-grass	Y		R	14	04-Dec-1999
G00143	GRAMINEAE	Austrostipa multispiculis	Many-flowered Spear-grass	Y		R	1	26-Oct-1992
G00443	GRAMINEAE	Bothriochloa macra	Red-leg Grass	Y		R	6	25-Mar-2003
U00350	GRAMINEAE	Eragrostis infecunda	Barren Cane-grass	Y		R	9	01-Nov-2005
Y00232	GRAMINEAE	Festuca benthamiana	Bentham's Fescue	Y		R	4	24-Oct-1992
Z00295	GRAMINEAE	Lachnagrostis limitanea	Spalding Blown-grass	Y	EN	E	26	07-Jun-2007
Y03700	GRAMINEAE	Lachnagrostis robusta	Tall Blown-grass	Y		R	4	17-Jan-2008
W00247	GRAMINEAE	Poa drummondiana	Knotted Poa	Y		R	2	01-Oct-1992
Z00171	GRAMINEAE	Rytidosperma laeve	Smooth Wallaby-grass	Y		R	2	07-Oct-1992
E00178	GRAMINEAE	Rytidosperma tenuius	Short-awn Wallaby-grass	Y		R	2	01-Nov-2013
C04729	HALORAGACEAE	Myriophyllum glomeratum	Clustered Milfoil	Y		E	1	25-Oct-1992
K02345	HALORAGACEAE	Myriophyllum integrifolium	Tiny Milfoil	Y		R	1	01-Dec-1992
S05293	ISOETACEAE	Isoetes drummondii ssp. drummondii	Plain Quillwort	Y		R	2	10-Nov-2000
C01569	LEGUMINOSAE	Acacia glandulicarpa	Hairy-pod Wattle	Y	VU	E	2	19-Jun-2020
W01575	LEGUMINOSAE	Acacia iteaphylla	Flinders Ranges Wattle	Y		R	1	11-Nov-1998
K01589	LEGUMINOSAE	Acacia montana	Mallee Wattle	Y		R	2	12-Sep-1980
Z03915	LEGUMINOSAE	Acacia spilleriana	Spiller's Wattle	Y	EN	E	9	09-Jan-2003
A01744	LEGUMINOSAE	Cullen parvum	Small Scurf-pea	Y		V	1	22-Nov-1925
Q05320	LEGUMINOSAE	Swainsona behriana	Behr's Swainson-pea	Y		V	4	01-Sep-1933
K01801	LEGUMINOSAE	Swainsona procumbens	Broughton Pea	Y		V	2	27-Sep-2016
W04751	LILIACEAE	Dianella longifolia var. grandis	Pale Flax-lily	Y		R	10	07-Oct-2020
A00708	LILIACEAE	Thysanotus tenellus	Grassy Fringe-lily	Y		R	5	15-Oct-2007
Y05476	LILIACEAE	Wurmbea latifolia ssp. latifolia	Broad-leaf Nancy	Y		V	4	30-Aug-1992
A00432	LOGANIACEAE	Logania saxatilis	Rock Logania	Y		R	3	21-Oct-1992
S05585	LOGANIACEAE	Phyllangium sulcatum		Y		V	2	22-Oct-1992

Z02807	MYOPORACEAE	Myoporum parvifolium	Creeping Boobialla	Y		R	2	07-Nov-2000
G02247	MYRTACEAE	Eucalyptus macrorhyncha ssp. macrorhyncha	Red Stringybark	Y		R	3582	08-Oct-2021
Y05108	MYRTACEAE	Eucalyptus percostata	Ribbed White Mallee	Y		R	2	23-Nov-1925
U05146	ORCHIDACEAE	Caladenia argocalla	White Beauty Spider-orchid	Y	EN	E	146	06-Oct-2021
A05384	ORCHIDACEAE	Caladenia tensa	Inland Green-comb Spider-orchid	Y	EN		4	01-Sep-1999
G04391	ORCHIDACEAE	Diuris behrii	Behr's Cowslip Orchid	Y		V	4	20-Sep-2004
Z00827	ORCHIDACEAE	Prasophyllum pallidum	Pale Leek-orchid	Y	VU	R	3	01-Oct-2001
W00855	ORCHIDACEAE	Thelymitra aristata	Great Sun-orchid	Y		E*	1	07-Oct-2020
E06038	ORCHIDACEAE	Thelymitra batesii		Y		R	1	16-Oct-2002
U05198	ORCHIDACEAE	Thelymitra grandiflora	Great Sun-orchid	Y		R	4	07-Oct-2020
Z32207	ORCHIDACEAE	Thelymitra holmesii	Blue Star Sun-orchid	Y		V	2	09-Oct-2001
S32209	ORCHIDACEAE	Thelymitra peniculata	Blue Star Sun-orchid	Y		V	1	01-Oct-2005
Q05840	POLYGONACEAE	Rumex dumosus	Wiry Dock	Y		R	3	01-Sep-1992
E04006	RHAMNACEAE	Cryptandra campanulata	Long-flower Cryptandra	Y		R	12	05-Nov-2004
Y04780	RUTACEAE	Phebalium glandulosum ssp. macrocalyx	Glandular Phebalium	Y		E*	1	01-Jul-1884
Q00940	SANTALACEAE	Choretrum chrysanthum	Yellow Sour-bush	Y		R	3	11-Sep-1999
W02015	SAPINDACEAE	Dodonaea procumbens	Trailing Hop-bush	Y	VU	V	5	17-Dec-2008
C03697	SCROPHULARIACEAE	Euphrasia collina ssp. osbornii	Osborn's Eyebright	Y	EN	E	22	07-Oct-2020
M02362	UMBELLIFERAE	Eryngium ovium	Blue Devil	Y		V	2	26-Dec-1997

Attachment B – Protected Maters Search Tool



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 18-Jul-2022

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	25
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	6
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	2
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities

[Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Iron-grass Natural Temperate Grassland of South Australia	Critically Endangered	Community likely to occur within area
Peppermint Box (Eucalyptus odorata) Grassy Woodland of South Australia	Critically Endangered	Community likely to occur within area

Listed Threatened Species

[Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.

Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
MAMMAL		
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
PLANT		
Acacia glandulicarpa Hairy-pod Wattle [8838]	Vulnerable	Species or species habitat may occur within area
Acacia spilleriana Spiller's Wattle [34123]	Endangered	Species or species habitat known to occur within area
Acanthocladium dockeri Spiny Everlasting, Spiny Daisy [17632]	Critically Endangered	Species or species habitat may occur within area
Caladenia argocalla White-beauty Spider-orchid [54991]	Endangered	Species or species habitat known to occur within area
Caladenia tensa Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat known to occur within area
Codonocarpus pyramidalis Slender Bell-fruit, Camel Poison [19507]	Vulnerable	Species or species habitat may occur within area
Dodonaea procumbens Trailing Hop-bush [12149]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Dodonaea subglandulifera Peep Hill Hop-bush [11956]	Endangered	Species or species habitat may occur within area
Euphrasia collina subsp. osbornii Osborn's Eyebright [3684]	Endangered	Species or species habitat known to occur within area
Olearia pannosa subsp. pannosa Silver Daisy-bush, Silver-leaved Daisy, Velvet Daisy-bush [12348]	Vulnerable	Species or species habitat known to occur within area
Prasophyllum pallidum Pale Leek-orchid [20351]	Vulnerable	Species or species habitat known to occur within area
Prasophyllum validum Sturdy Leek-orchid, Mount Remarkable Leek-orchid [10268]	Vulnerable	Species or species habitat may occur within area
Senecio macrocarpus Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat may occur within area
Swainsona pyrophila Yellow Swainson-pea [56344]	Vulnerable	Species or species habitat may occur within area
REPTILE		
Aprasia pseudopulchella Flinders Ranges Worm-lizard [1666]	Vulnerable	Species or species habitat likely to occur within area
Tiliqua adelaidensis Pygmy Blue-tongue Lizard, Adelaide Blue-tongue Lizard [1270]	Endangered	Species or species habitat known to occur within area
Listed Migratory Species [Resource Information]		
Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		

Scientific Name	Threatened Category	Presence Text
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands

[Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Unknown	
Commonwealth Land - [41041]	SA

Listed Marine Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		

Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Spring Gully	Conservation Park	SA
Unnamed (No.HA1389)	Heritage Agreement	SA
Unnamed (No.HA1474)	Heritage Agreement	SA
Unnamed (No.HA1534)	Heritage Agreement	SA
Unnamed (No.HA244)	Heritage Agreement	SA
Unnamed (No.HA355)	Heritage Agreement	SA

EPBC Act Referrals		[Resource Information]	
Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Clare Valley water supply scheme	2003/996	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

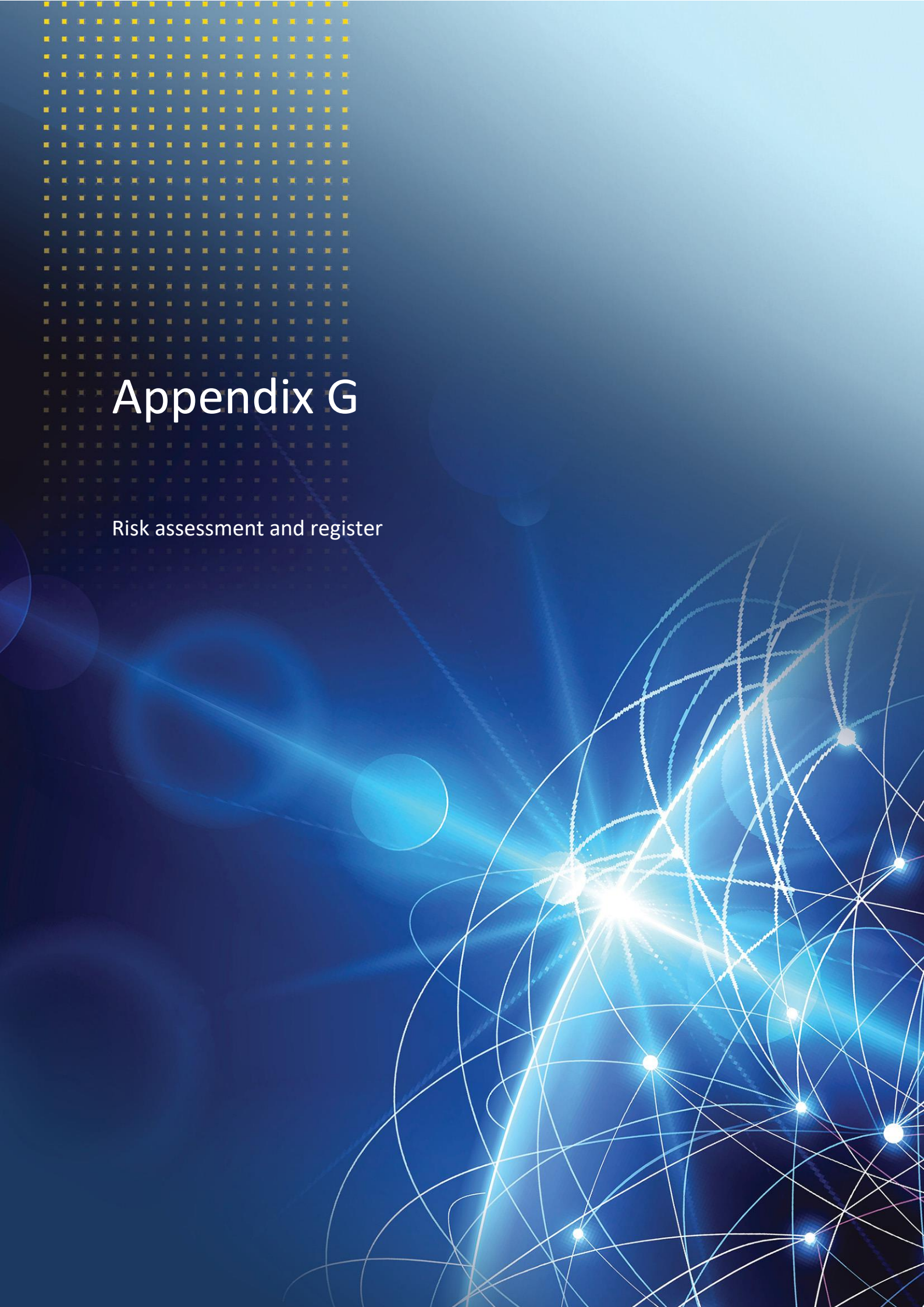
[© Commonwealth of Australia](#)

Department of Agriculture Water and the Environment

GPO Box 858

Canberra City ACT 2601 Australia

+61 2 6274 1111



Appendix G

Risk assessment and register



Clare Valley Water Preliminary Case

Appendix G – Risk assessment

Contents

Section	Page
1 INTRODUCTION	1
2 PURPOSE	8
2.1 Risks during the detailed business case (PBC Risks)	8
2.2 Risks after completion of the detailed business case (Project Risks)	8
3 DETAILED BUSINESS CASE RISKS	9
3.1 Summary	9
3.2 Overall performance of risk management	9
3.3 PBC Risk Register	9
4 PROJECT RISKS	10
4.1 Summary	10
4.2 Risk management process	10
4.3 Consultations with stakeholders	10
4.4 Risk Workshops	10
4.5 Risk management framework	12
4.6 Risk Planning and Implementation	14
5 PROJECT RISK PLANNING CATALOGUE	15
5.1 Category 1: Demand	15
5.2 Category 2: Benefits realisation	15
5.3 Category 2: Benefits realisation (Cont.)	16
5.4 Category 2: Benefits realisation (Cont.)	16
5.5 Category 3: Funding	17
5.6 Category 4: Approvals and land access	17
5.7 Category 5: Environment and sustainability	18
5.8 Category 6: Social and community	18
5.9 Category 7: Cultural heritage and Traditional Owner opportunities	18
5.10 Category 8: Strategic	19
5.11 Category 8: Strategic	19
5.12 Category 8: Strategic	20
5.13 Category 9: Construction and tendering	20
5.14 Category 9: Construction and tendering (Cont.)	21
5.15 Category 9: Construction and tendering (Cont.)	21
5.16 Category 10: Operations	22

1 Introduction

The risk management process and procedures used throughout the preliminary business case (PBC) aligned with the requirements of the relevant business case frameworks and best practice in water infrastructure feasibility assessments.

This appendix addresses the risk management activities related to the project in two ways: management of risks related to the successful completion of the PBC (PBC Risks); and risks related to the development, construction, and operation of the project (Project Risks).

The PBC Risks were managed through a systematic process that utilises extensive consultation, stakeholder engagement and analysis by KBR. The risk management process was confirmed through the approved Risk Management Plan and the risk register for PBC Risks (PBC Risk Register).

Risk planning and management functioned well during the development of the PBC, including during the period of identifying potential options and confirming the shortlisted options. The effective risk mitigation activities during the PBC have lowered the overall risk profile and almost all risk management activities have been measured as adequate. All extreme and high-risk ratings have been effectively lowered during the PBC.

The Project Risks required significant consultation, planning, and preparation to mitigate and manage the risks to the medium- and long-term success of the project. The Project Risks include, among other things, the development, funding, construction, and operation of the project.

The Project Risk management process and resulting actions will be a critical factor in the successful delivery and operation of the project, including the development of a detailed business case for the preferred option/s.

The risk management framework is aligned with Australian Standard AS ISO 31000:2018 Risk Management—Guidelines summarises 39 of 42 project risks identified as either as high or extreme prior to mitigation measures being considered.

Table 1 Extreme and High Project risks pre-control measure

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
1	Demand	Demand is lower than projected	Extreme (25)	Comprehensive engagement process to confirm demand during a Round 2 demand assessment. A robust Round 2 demand process will provide greater confidence for a successful pre-construction binding water sales. Explore additional area/customers for Round 2 demand assessment and binding water sales. Ensure annual charge is affordable for growing grapes/making wine. Water agreements backed by long-term agreement with SA Water to provide supply certainty and price guidance.	High (18)
3	Benefits realisation	BCR lower than 1	High (21)	Consultation with decision makers regarding other project benefits. Include commentary of other economic, social and environmental benefits outside the BCR calculation in the PBC. More detailed analysis as part of the DBC.	High (18)
4	Benefits realisation	Operating costs are too high	High (21)	Strategic design approach to improve efficiency and reduce operating costs. Further discussions and guidance from SA Water regarding bulk water price.	High (18)
5	Benefits realisation	Capital costs are too high	High (21)	Consider strategic approach to timing of delivery and construction. Strategic tendering model and delivery model strategy. Explore options for synergies with other SA Water assets.	High (18)
8	Benefits realisation	Percentage of substituting existing water is underestimated	High (18)	Information gathered from Round 1 and other customer engagement including in analysis.	Medium (14)
9	Benefits realisation	Net margins are materially different to model	High (18)	Information gathered from Round 1 and other customer engagement including in analysis. Most recent data from industry (e.g., Wine Australia) included in the analysis.	Medium (14)
10	Benefits realisation	Yield is materially different to model	High (18)	Information gathered from Round 1 and other customer engagement including in analysis.	Medium (13)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
				Most recent data from industry (e.g., Wine Australia) included in the analysis. Continued on-farm industry assistance to support optimum yields.	
11	Benefits realisation	Infrastructure is insufficient to meet water needs (120-day delivery period too long)	High (18)	Clear water trading framework to allow trading/sharing of unused capacity. Support in customers exploring on-farm water storage options. Potential for additional delivery capacity to be purchased to allow water to be delivered over a shorter period. Potential to consider reduced irrigation period (e.g., 100 days) during post-PBC stakeholder engagement in preparation for pre-construction, binding water sales.	Medium (13)
12	Funding	Affordability for government/s (PBC estimates require significant government support)	Extreme (24)	Clear assessment of the wider economic benefits of the project to justify contribution. Demonstrate on-going viability of the project from the customers.	High (18)
13	Funding	Affordability for government/s (binding water sales fall materially short)	Extreme (24)	Comprehensive engagement process to confirm demand during a Round 2 demand assessment. Pre-construction binding water sales process. Comprehensive engagement process to convert Round 2 into binding water sales. Explore additional area / customers for binding water sales. Ensure annual charge is affordable for growing grapes/making wine.	High (18)
14	Funding	Substantive difference between PBC and design cost	Extreme (24)	Detailed analysis during the development of a DBC, including P90 estimates. Independent technical review of DBC P90 cost estimate. Commence design process early to allow additional time for solutions to identified and implemented. Regular review of market conditions to understand price movements, including impacts of COVID-19.	High (18)
15	Approvals and land access	Failure to secure planning approval from Local, State and Federal Governments	High (18)	Close engagement of Local, State and Federal Government. Continued advocacy for project.	Medium (14)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
16	Approvals and land access	Failure to gain access to land	Extreme (24)	Frequent and genuine engagement with potential landholders, including potential storage locations. Consideration of route selection - favour alignments where dealing with landholders receiving water. Alternative alignments considered (e.g., road reserves).	High (18)
17	Environment and sustainability	Failure to achieve approvals	Extreme (24)	Detailed analysis during the development of a DBC. Development of the best strategic approvals pathway and process. Engagement with Government.	High (18)
18	Environment and sustainability	Environmental perception of the project is negative	High (21)	Detailed analysis during the development of a DBC, including further stakeholder engagement. EIS consider and analyse these impacts and management strategy.	Medium (14)
19	Environment and sustainability	Reliance for the scheme on the availability of River Murray water	High (21)	Detailed analysis during the development of a DBC, including update consideration of the reliability of River Murray. Investigate the outright purchase, leasing and short-term trading of water entitlements and allocations from the River Murray to underpin reliability.	Medium (14)
20	Social and community	Protest group(s) oppose the project	High (21)	Detailed analysis during the development of a DBC, including further stakeholder engagement. Implement a sustainability strategy for the project. Seek out green credentials for the project.	Medium (13)
21	Social and community	Unable to get people for construction	High (18)	Strategic planning involving state and local government for workforce planning.	Medium (13)
22	Cultural heritage and Traditional Owner opportunities	Project does not meet aspirations of Traditional Owners	High (21)	Consider Traditional Owner allocations. Explore Traditional Owner enterprises. Develop Cultural Heritage Management Plan. Close engagement with Traditional Owners.	High (18)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
23	Cultural heritage and Traditional Owner opportunities	Unable to get the Cultural Heritage Management Plan agreed	High (21)	Close engagement with Traditional Owners. Consider Traditional Owner allocations. Explore Traditional Owner enterprises.	High (18)
24	Cultural heritage and Traditional Owner opportunities	Conflict between traditional owner groups	High (21)	Develop high level understanding of boundaries of the project and impacted Traditional Owner groups. Consider engagement with broader Traditional Owner groups that are impacted by the project	High (18)
25	Strategic	Project does not proceed to a DBC	Extreme (24)	Government and stakeholder support of project. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.	High (22)
26	Strategic	DBC lack engagement and leadership from local stakeholders	Extreme (24)	CVWGA is recommended to be a key stakeholder in the delivery of the DBC. CVWGA is supported by other stakeholders, incl. government and SA Water.	High (18)
27	Strategic	Inadequate funding of a DBC	Extreme (24)	Government and stakeholder support of project. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.	High (18)
28	Strategic	Project proceeds to implementation without an appropriate DBC	Extreme (24)	Government and stakeholder support of project. Recognition of the importance of the DBC process. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.	High (18)
29	Strategic	Federal – change of government	High (21)	Early engagement with new Commonwealth Minister and at Commonwealth officer-level. Advocacy for the project across party lines to keep the project apolitical.	Medium (13)
30	Strategic	State – lack of bipartisan support	High (21)	Advocacy for the project across party lines to keep the project apolitical.	Medium (13)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
31	Strategic	Project is delayed and tied up in Government processes	High (21)	Adopt strategic apolitical approach to project advocacy. Commence DBC activities to keep momentum.	Medium (13)
32	Construction and tendering	Seasonal variations / weather	High (21)	Develop a strategic procurement plan that incorporates constructor into project planning. Consider alternative procurement models. Implement strategic works plan.	Medium (13)
33	Construction and tendering	Unexpected ground conditions	High (21)	Strategic staging of project to identify and manage risks. Provide for uncertainty and allow for innovation in contract model. Undertake geotechnical investigations during DBC. Provide geotechnical information to contractors and provide access to site during tendering.	Medium (14)
34	Construction and tendering	Market does not have the capacity to deliver the project	Extreme (24)	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market.	High (18)
35	Construction and tendering	Cost estimate is too low	High (22)	Detailed analysis during the development of a DBC, including P90 estimates. Implement procurement model that make project attractive to Tier 1 developers (such as an alliance model). Consider strategic approach to risk and liability ownership for construction.	Medium (14)
36	Construction and tendering	Market prices are high (hot market)	High (22)	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market.	High (18)
37	Construction and tendering	Late changes in works (e.g., demand is lower than projected resulting in smaller project)	High (21)	Comprehensive engagement process to confirm Round 2 demand. Strong conversion of demand into binding water sales. Explore additional area / customers for binding water sales. Ensure annual charge is affordable for growing grapes/making wine.	Medium (14)

Ref	Risk category	Risk	Pre-control rating	Mitigation	Post-control rating
38	Construction and tendering	Suitable materials are not available and affordable	High (18)	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Consider strategic approach to risk and liability ownership for construction.	Medium (14)
39	Construction and tendering	Market prices are high (cost escalation and inflation)	Extreme (24)	Detailed analysis during the development of a DBC, including P90 estimates. Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market. Continued to be informed of market conditions and current pricing and potential impacts on project estimates. Consider strategic approach to risk and liability ownership for construction.	High (18)
40	Construction and tendering	Dam safety issues at Bundaleer Dam reduces the capacity of the scheme	High (18)	Further investigations in the dam safety of Bundaleer Dam and the potential operating levels during the additional design work in the DBC.	Medium (14)
41	Operations	Water pricing strategies are unsuitable	High (21)	Clear transparency with price setting, policies and strategy. Preference for capital investment which reduces operating costs.	Medium (13)
42	Operations	Insufficient scale unable to provide an affordable and sustainable operating model	High (21)	Engagement with SA Water during DBC to determine most effective and efficient operating model, including consideration of SA Water operating the scheme as part of the CVWSS. Develop strong delivery model for best practice operations. Strategic approach to scheme rules to provide structure and necessary flexibility.	High (18)

2 Purpose

The purpose of this appendix is to provide a comprehensive record of the risk management activities undertaken throughout the PBC, and to outline the risk management recommendations for the future of the Project. Accordingly, there are two sections in this chapter:

- Reporting on the risk assessment and management activities undertaken during PBC (PBC Risks).
- Assessing and analysing the risks to the successful implementation of the Project following completion of the PBC (Project Risks).

2.1 RISKS DURING THE DETAILED BUSINESS CASE (PBC RISKS)

The risks during the development of the detailed business case are managed through the Business Case Advisor.

Section 3 of this report summarises the risk management protocols and activities and provides a description of the performance to date of risk management under the PBC.

2.2 RISKS AFTER COMPLETION OF THE DETAILED BUSINESS CASE (PROJECT RISKS)

One of the functions of the PBC is to prepare for the implementation of the irrigation project, including pre-construction activities, construction of the infrastructure and operation of the irrigation scheme. These activities involve considerable risk, and the management of those risks through risk assessment and the development of control strategies (with mitigation actions) is critical to the success of the project.

Section 4 outlines the outcome of the project risk assessment and risk management activities and analysis. Section 5 includes recommendations in relation to the management of project risk into the future.

3 Detailed business case risks

3.1 SUMMARY

- This section relates to the PBC Risks.
- Risk planning and management functioned well during the PBC, including during the period of identifying and confirming the reference project.
- A rolling risk assessment was conducted throughout the development of the PBC.
- A risk register was maintained during the PBC and updated based on project team interviews and review of project performance and outcomes.

3.2 OVERALL PERFORMANCE OF RISK MANAGEMENT

The risk identification, assessment and management process operated successfully throughout the PBC. The focus on wide consultation, analysis and timeliness produced a PBC Risk Register that was actively utilised in the management of the PBC.

The risk management process was successful in reducing the risk score of some of the most significant PBC risks. Through an effective, multi-disciplinary approach the likelihood and impact of PBC risks was effectively managed and lowered.

3.3 PBC RISK REGISTER

The risk assessments were all recorded and maintained in the PBC Risk Register, which was actively used by the project team during the management of the PBC.

KBR is responsible for monitoring risk management issues, consideration of risk mitigation strategies and reporting risk status to the Project Reference Group.

4 Project risks

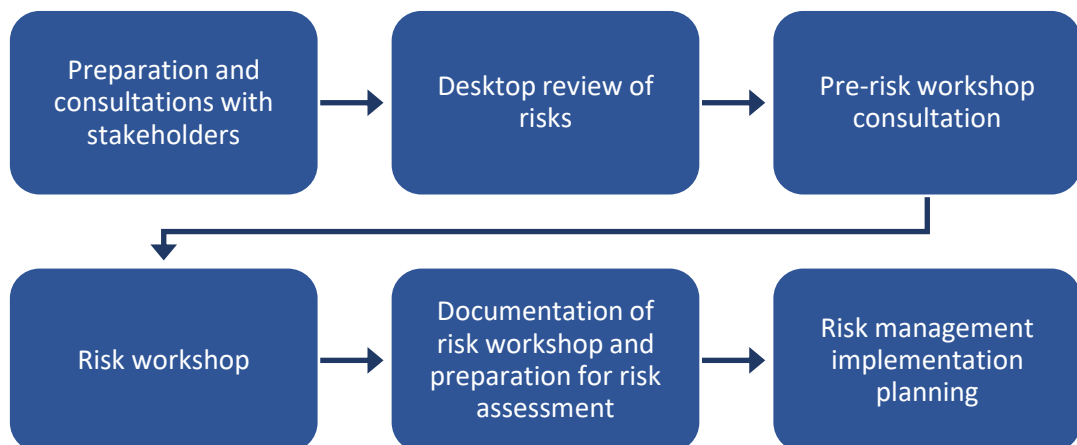
4.1 SUMMARY

- This section relates to the risks impacting the project in the periods after the end of the detailed business case.
- The identification, assessment and management of risks that will threaten the successful construction and operation of the project and irrigation scheme was a critical function of the detailed business case.
- Risk planning considers each of the disciplines and study areas included in the detailed business case.
- A detailed process for risk identification and assessment process was implemented for this project, including stakeholder consultation, strategic planning, workshops with technical and commercial leaders and detailed analysis.
- A project risk workshops was held by business case advisor KBR in June 2022.
- A risk assessment on 42 project risks have been undertaken and recommendations identified for each risk.

4.2 RISK MANAGEMENT PROCESS

Planning for the medium- and long-term project risks requires a systematic process that incorporates stakeholder consultation, strategic planning, workshops, and implementation planning. Figure 1 shows the six-stage process for the preparation of the risk analysis and final version of the risk chapter.

Figure 1 Project risk planning process



4.3 CONSULTATIONS WITH STAKEHOLDERS

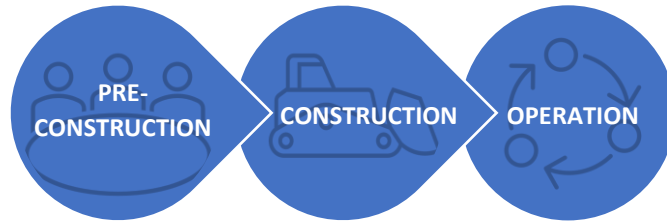
Formal and informal consultation has been undertaken with multiple project stakeholders to understand their respective views on the project risks and emerging issues that may require management.

4.4 RISK WORKSHOPS

An internal risk workshop with the business case advisor included facilitated discussion on a range of risks, including the identification of risks, assessment of consequences and analysis of available

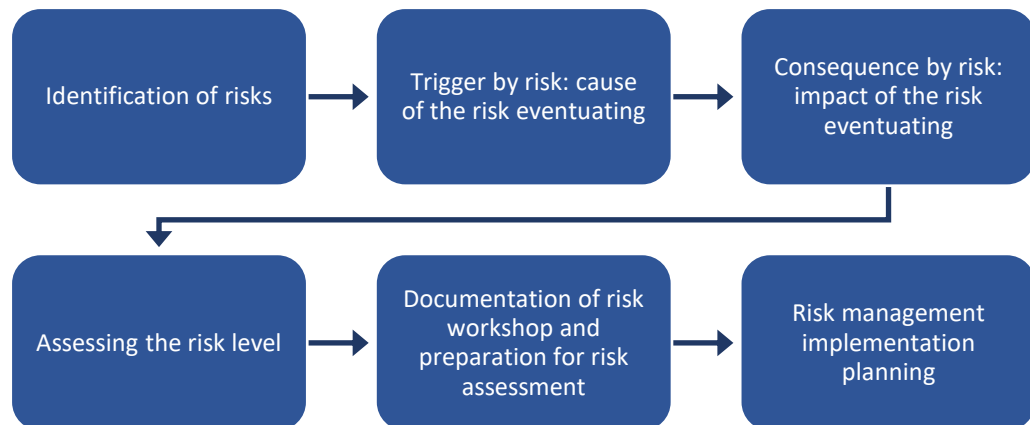
mitigation activities. The risk workshops covered three key periods of the project following the completion of the PBC, being:

Figure 2 Key project periods



The risk assessment and analysis process utilised during the risk workshop is shown in Figure 3.

Figure 3 Risk workshop process



Summary of workshop outcomes

The risk planning process consider risks across 10 broad areas:

Figure 4 Risk categories

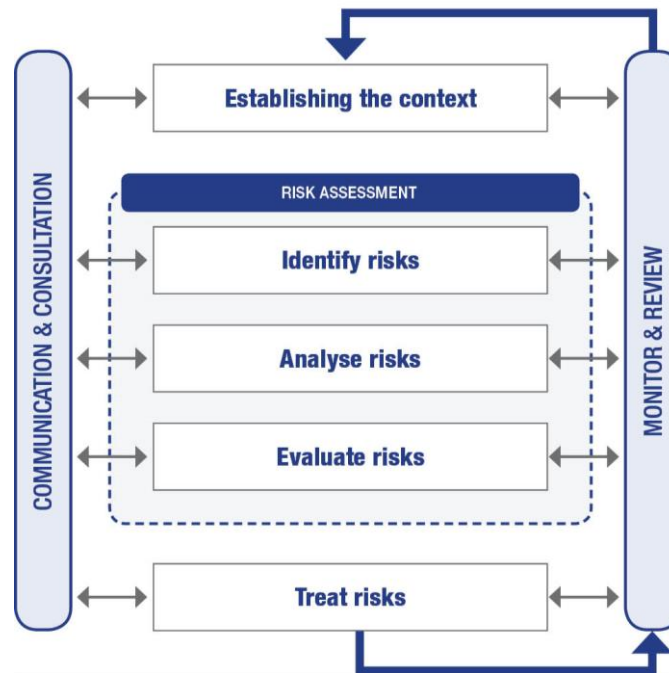


A risk catalogue was developed to identify, summarise, and assess all 38 project risks. The catalogue is designed to be a living document that can be updated by the project proponent throughout the development, construction, and operation of the project.

4.5 RISK MANAGEMENT FRAMEWORK

The risk management framework for this project is aligned with Australian Standard AS ISO 31000:2018 Risk Management—Guidelines (Figure 5).

Figure 5 Risk management framework



Source: Australian Standard AS/NZS ISO 31000:2009 Risk Management—Principles and Guidelines.

The risk analysis process will include following elements:

- Risk description.
- Impacts of the risk arising/materialising.
- Impact assessment (likelihood and consequence).
- Risk treatment classification.
- Mitigation and controls.
- Risk allocation and management reporting.
- Residual risk rating (post mitigation).

The risk criteria are composed of three parts: Likelihood; Consequence; and Analysis/Scoring.

4.5.1 Risk likelihood

The risk criteria establish and assess the probability of a particular risk materialising. The following table provides the risk likelihood categories with examples to assist stakeholders to understand the application of this measurement. Industry considers that the range from 'yearly' to 'every 100 years' is appropriate for water infrastructure related risks.

Table 2 Risk likelihood categories

Likelihood	Description	Example to assist stakeholders
Almost certain	The event is expected to occur in most circumstances	May occur once a year or more
Likely	The event will probably occur in many circumstances	May occur once every 3 years
Possible	Identified factors indicate the event could occur at some time	May occur once every 10 years
Unlikely	The event could occur at some time but is not expected	May occur once every 30 years
Rare	The event may occur only in exceptional circumstances	May occur once every 100 years

4.5.2 Risk consequences

The risk consequences measure the impact of the occurrence of the risk on the success of the delivery of the PBC or the success of the option in the project environment.

Table 3 Risk consequences—impact on realisation of benefits

Insignificant	Minor	Moderate	Major	Catastrophic
Negligible impact on realisation of project benefits	Minor impact on realisation of project benefits	Moderate impact on realisation of project benefits	Major impact on realisation of project benefits	Catastrophic impact on realisation of project benefits—cannot be realised

4.5.3 Risk analysis and scoring

Table 4 shows the risk analysis and scoring matrix, which provides a score for each risk based on the likelihood of occurring and the consequence if it does occur. During the PBC, project stakeholders will be engaged to understand and assess risk environment and adapt the scoring strategy to meet the needs of the project.

Table 4 Risk analysis and scoring matrix

Likelihood / consequence	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium (11)	Medium (16)	High (20)	Extreme (23)	Extreme (25)
Likely	Low (7)	Medium (12)	High (17)	High (21)	Extreme (24)
Possible	Low (4)	Medium (8)	Medium (13)	High (18)	High (22)
Unlikely	Low (2)	Low (5)	Medium (9)	Medium (14)	High (19)
Rare	Low (1)	Low (3)	Low (6)	Medium (10)	Medium (15)

4.5.4 Risk treatment

Risk treatment occurs after an initial assessment of the project risk and mitigation measures will be considered separately for each risk identified. These measures will include tolerating the risk, avoiding the risk, sharing the risk, reducing or controlling the likelihood of the risk, or reducing or controlling the consequences of the risk.

Following the application of mitigation measures, each risk will be assessed again using the risk analysis and scoring matrix.

If high or extreme risks remain after all practical mitigation measures have been applied, such risks will be continuously monitored, and additional mitigation strategies will be developed during the project.

4.6 RISK PLANNING AND IMPLEMENTATION

Each of the 42 risks identified and assessed have been considered as part of the implementation planning process. These risks directly fed into the implementation planning and assessment in Chapter 7.

5 Project Risk Planning Catalogue

5.1 CATEGORY 1: DEMAND

	Project Risk 1	Project Risk 2
Risk	Demand is lower than projected	Demand is higher than projected
Trigger	Binding water sales	Binding water sales
Consequence	Small difference – minimal impact Large difference – unviable project	Significant design re-work
Risk level	High (18)	Low (6)
Proposed mitigation activities	Comprehensive engagement process to confirm demand during a Round 2 demand assessment. A robust Round 2 demand process will provide greater confidence for a successful pre-construction binding water sales. Explore additional area/customers for Round 2 demand assessment and binding water sales. Ensure annual charge is affordable for growing grapes/making wine. Water agreements backed by long-term agreement with SA Water to provide supply certainty and price guidance.	Comprehensive engagement process to confirm demand during a Round 2 demand assessment. Develop a water oversubscription policy prior to binding water sales.

5.2 CATEGORY 2: BENEFITS REALISATION

	Project Risk 3	Project Risk 4	Project Risk 5
Risk	BCR lower than 1	Operating costs are too high	Capital costs are too high
Trigger	Final economic calculations	Final economic calculations	Final economic calculations
Consequence	Project may not be approved	Lack of investment in round 3	Lack of investment in water sales (private sector and/or government)
Risk level	High (18)	High (18)	High (18)
Proposed mitigation activities	Consultation with decision makers regarding other project benefits. Include commentary of other economic, social and environmental benefits outside the BCR calculation in the PBC. More detailed analysis as part of the DBC.	Strategic design approach to improve efficiency and reduce operating costs. Further discussions and guidance from SA Water regarding bulk water price.	Consider strategic approach to timing of delivery and construction. Strategic tendering model and delivery model strategy. Explore options for synergies with other SA Water assets.

5.3 CATEGORY 2: BENEFITS REALISATION (CONT.)

	Project Risk 6	Project Risk 7	Project Risk 8
Risk	BCR is too high (above 1.3)	Independent review finds fault with benefit assumptions	Percentage of substituting existing water is underestimated
Trigger	Final economic calculations	Review of PBC following being published	Operation of the scheme
Consequence	Lack of credibility	Lack of credibility Lower chances of government support	The benefits of the project are not realised
Risk level	Low (5)	Low (6)	Medium (14)
Proposed mitigation activities	Consultation with decision makers regarding calculation of project benefits. Ensure realist (if not conservative) assumptions are considered as part of the analysis.	Engagement with reviewers. Briefing to State Government following development of final PBC.	Information gathered from Round 2 and other customer engagement including in analysis.

5.4 CATEGORY 2: BENEFITS REALISATION (CONT.)

	Project Risk 9	Project Risk 10	Project Risk 11
Risk	Net margins are materially different to model	Yield is materially different to model	Infrastructure is insufficient to meet water needs (120-day delivery period too long)
Trigger	Operation of the scheme	Operation of the scheme	Operation of the scheme
Consequence	The benefits of the project are not realised	The benefits of the project are not realised	Customer's service need not fully met
Risk level	Medium (14)	Medium (13)	Medium (13)
Proposed mitigation activities	Information gathered from Round 1 and other customer engagement including in analysis. Most recent data from industry (e.g., Wine Australia) included in the analysis.	Information gathered from Round 1 and other customer engagement including in analysis. Most recent data from industry (e.g., Wine Australia) included in the analysis. Continued on-farm industry assistance to support optimum yields.	Clear water trading framework to allow trading/sharing of unused capacity. Support in customers exploring on-farm water storage options. Potential for additional delivery capacity to be purchased to allow water to be delivered over a shorter period. Potential to consider reduced irrigation period (e.g., 100 days) during post-PBC stakeholder engagement in preparation for Round 2 demand assessment and pre-construction, binding water sales.

5.5

CATEGORY 3: FUNDING

	Project Risk 12	Project Risk 13	Project Risk 14
Risk	Affordability for government/s (PBC estimates require significant government support)	Affordability for government/s (binding water sales fall materially short)	Substantive difference between PBC and design cost
Trigger	Conditional funding approval	Binding water sales	Final project design and costing
Consequence	Unable to fill gap in funding	Funding shortfall from unsold water entitlements	Unable to fill gap in funding
Risk level	High (18)	High (18)	High (18)
Proposed mitigation activities	Clear assessment of the wider economic benefits of the project to justify contribution. Demonstrate on-going viability of the project from the customers.	Comprehensive engagement process to confirm demand during a Round 2 demand assessment. Pre-construction binding water sales process. Comprehensive engagement process to convert Round 2 into binding water sales. Explore additional area/customers for binding water sales. Ensure annual charge is affordable for growing grapes/making wine.	Detailed analysis during the development of a DBC, including P90 estimates. Independent technical review of DBC P90 cost estimate. Commence design process early to allow additional time for solutions to identified and implemented. Regular review of market conditions to understand price movements, including impacts of COVID-19.

5.6

CATEGORY 4: APPROVALS AND LAND ACCESS

	Project Risk 15	Project Risk 16
Risk	Failure to secure planning approval from Local, State and Federal Governments	Failure to gain access to land
Trigger	Application process	Project approvals
Consequence	Project cannot proceed	Additional cost and/or time delays.
Risk level	Medium (14)	High (18)
Proposed mitigation activities	Close engagement of Local, State and Federal Government. Continued advocacy for project.	Frequent and genuine engagement with potential landholders, including potential storage locations. Consideration of route selection - favour alignments where dealing with landholders receiving water. Alternative alignments considered (e.g., road reserves).

5.7

CATEGORY 5: ENVIRONMENT AND SUSTAINABILITY

	Project Risk 17	Project Risk 18	Project Risk 19
Risk	Failure to achieve approvals	Environmental perception of the project is negative	Reliance for the scheme on the availability of River Murray water
Trigger	Application for approval	Project development	Project development
Consequence	Project unable to proceed	Loss of political, industry and community support	Lack of reliability of water
Risk level	High (18)	Medium (14)	Medium (14)
Proposed mitigation activities	Detailed analysis during the development of a DBC. Development of the best strategic approvals pathway and process. Engagement with Government.	Detailed analysis during the development of a DBC, including further stakeholder engagement. EIS consider and analyse these impacts and management strategy.	Detailed analysis during the development of a DBC, including update consideration of the reliability of River Murray. Investigate the outright purchase, leasing and short-term trading of water entitlements and allocations from the River Murray to underpin reliability.

5.8

CATEGORY 6: SOCIAL AND COMMUNITY

	Project Risk 20	Project Risk 21
Risk	Protest group(s) oppose the project	Unable to get people for construction
Trigger	Public announcement of project progression	Construction
Consequence	Loss of political, industry and community support	Project delays
Risk level	Medium (13)	Medium (13)
Proposed mitigation activities	Detailed analysis during the development of a DBC, including further stakeholder engagement. Implement a sustainability strategy for the project. Seek out green credentials for the project.	Strategic planning involving state and local government for workforce planning.

5.9

CATEGORY 7: CULTURAL HERITAGE AND TRADITIONAL OWNER OPPORTUNITIES

	Project Risk 22	Project Risk 23	Project Risk 24
Risk	Project does not meet aspirations of Traditional Owners	Unable to get the Cultural Heritage Management Plan agreed	Conflict between traditional owner groups
Trigger	Operation of the scheme	Negotiation with Traditional Owners	Development of the project
Consequence	Project fails to provide social and economic outcomes	Loss of support from Traditional Owners	Loss of support from Traditional Owners
Risk level	High (18)	High (18)	High (18)

	Project Risk 22	Project Risk 23	Project Risk 24
Proposed mitigation activities	Consider Traditional Owner allocations. Explore Traditional Owner enterprises. Develop Cultural Heritage Management Plan. Close engagement with Traditional Owners.	Close engagement with Traditional Owners. Consider Traditional Owner allocations. Explore Traditional Owner enterprises.	Develop high level understanding of boundaries of the project and impacted Traditional Owner groups. Consider engagement with broader Traditional Owner groups that are impacted by the project

5.10

CATEGORY 8: STRATEGIC

	Project Risk 25	Project Risk 26	Project Risk 27
Risk	Project does not proceed to a DBC	DBC lack engagement and leadership from local stakeholders	Inadequate funding of a DBC
Trigger	Completion of PBC	Commencement of DBC	Completion of PBC
Consequence	Project does not proceed	DBC does not meet needs of stakeholders, the preferred option is not optimal, and the implementation plan is inadequate.	DBC does not meet needs of stakeholders, the preferred option is not optimal, and the implementation plan is inadequate.
Risk level	High (22)	High (18)	High (18)
Proposed mitigation activities	Government and stakeholder support of project. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.	CVWGA is recommended to be the proponent of the DBC. CVWGA is supported by other stakeholders, incl. government and SA Water.	Government and stakeholder support of project. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.

5.11

CATEGORY 8: STRATEGIC

	Project Risk 28	Project Risk 29
Risk	Project proceeds to implementation without an appropriate DBC	Federal – change of government
Trigger	Completion of PBC	Federal election
Consequence	Project does not proceed with a complete picture of the needs of stakeholders, may not deliver an optional outcome and the implementation plan is inadequate.	Loss of project support for next steps (implementation)
Risk level	High (18)	Medium (13)

	Project Risk 28	Project Risk 29
Proposed mitigation activities	Government and stakeholder support of project. Recognition of the importance of the DBC process. Strong case presented to the NWGA for adequate funding of DBC. Highlight urgency and impact of inaction if the project does not proceed.	Early engagement with new Commonwealth Minister and also at Commonwealth officer-level. Advocacy for the project across party lines to keep the project apolitical.

5.12

CATEGORY 8: STRATEGIC

	Project Risk 30	Project Risk 31
Risk	State – lack of bipartisan support	Project is delayed and tied up in Government processes
Trigger	Funding approval process	Funding approval process
Consequence	State Government may not support project next steps (implementation)	Project delays
Risk level	Medium (13)	Medium (13)
Proposed mitigation activities	Advocacy for the project across party lines to keep the project apolitical.	Adopt strategic apolitical approach to project advocacy. Commence DBC activities to keep momentum.

5.13

CATEGORY 9: CONSTRUCTION AND TENDERING

	Project Risk 32	Project Risk 33	Project Risk 34
Risk	Seasonal variations / weather	Unexpected ground conditions	Market does not have the capacity to deliver the project
Trigger	Throughout construction of the project	Throughout construction of the project	Tendering process
Consequence	Construction delays	Increased construction and delivery costs	Delays and cost increases in procurement
Risk level	Medium (13)	Medium (14)	Medium (14)
Proposed mitigation activities	Develop a strategic procurement plan that incorporates constructor into project planning. Consider alternative procurement models. Implement strategic works plan.	Strategic staging of project to identify and manage risks. Provide for uncertainty and allow for innovation in contract model. Provide geotechnical information and access to site during tendering.	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market.

5.14 CATEGORY 9: CONSTRUCTION AND TENDERING (CONT.)

	Project Risk 35	Project Risk 36	Project Risk 37
Risk	Cost estimate is too low	Market prices are high (hot market)	Late changes in works (e.g., demand is lower than projected resulting in smaller project)
Trigger	Tendering process	Tendering process	Water sales
Consequence	Insufficient funding for project construction	Delays and cost increases in procurement costs	Delays and cost increases in procurement
Risk level	Medium (14)	High (18)	Medium (14)
Proposed mitigation activities	Detailed analysis during the development of a DBC, including P90 estimates. Implement procurement model that make project attractive to Tier 1 developers (such as an alliance model). Consider strategic approach to risk and liability ownership for construction.	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market.	Comprehensive engagement process to confirm Round 2 demand. Strong conversion of demand into binding water sales. Explore additional area/customers for binding water sales. Ensure annual charge is affordable for growing grapes/making wine.

5.15 CATEGORY 9: CONSTRUCTION AND TENDERING (CONT.)

	Project Risk 38	Project Risk 39	Project Risk 40
Risk	Suitable materials are not available and affordable	Market prices are high (cost escalation and inflation)	Dam safety issues at Bundaleer Dam reduces the capacity of the scheme
Trigger	Construction	Tendering process	Construction
Consequence	Construction delayed and/or cost increase	Cost increases above budgeted allocations in PBC and pre-construction funding	Increased construction costs (relating to improved dam safety)
Risk level	Medium (14)	High (18)	Medium (14)
Proposed mitigation activities	Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Consider strategic approach to risk and liability ownership for construction.	Detailed analysis during the development of a DBC, including P90 estimates. Strategic decision-making regarding timing of project and flexibility (i.e., the project is not time critical and can go to market at a suitable time). Ensure market is briefed on expected timing of the project coming to market. Continued to be informed of market conditions and current pricing and potential impacts on project estimates.	Further investigations in the dam safety of Bundaleer Dam and the potential operating levels during the additional design work in the DBC.

	Project Risk 38	Project Risk 39	Project Risk 40
		Consider strategic approach to risk and liability ownership for construction.	

5.16

CATEGORY 10: OPERATIONS

	Project Risk 41	Project Risk 42
Risk	Water pricing strategies are unsuitable	Insufficient scale unable to provide an affordable and sustainable operating model
Trigger	Development of operational policies for the scheme	Operation of the scheme
Consequence	Inefficiencies in the operation of the scheme	Increases in water charges for the scheme
Risk level	Medium (13)	High (18)
Proposed mitigation activities	Clear transparency with price setting, policies and strategy. Preference for capital investment which reduces operating costs.	Engagement with SA Water during DBC to determine most effective and efficient operating model, including consideration of SA Water operating the scheme as part of the CVWSS. Develop strong delivery model for best practice operations. Strategic approach to scheme rules to provide structure and necessary flexibility.