Hughenden Irrigation Project - Detailed Business Case

Round 1 - Land & Water Demand Assessment

1 | c

9 April 2021

HIPCo

Hughenden Irrigation Project - Detailed Business Case

Project No:	IS362200
Document Title:	Round 1 - Land & Water Demand Assessment
Document No.:	1
Revision:	c
Date:	9 April 2021
Client Name:	HIPCo
Project Manager:	Matt Bradbury
Author/s:	Luke Curtain and Angus MacDonald
File Name:	HIPCo Round 1 Demand Assessment Report - 9 April 2021

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
1a	26 March 2021	Draft	Luke Curtain	Annette Sergeant	Matt Bradbury	John Moore
1b	31 March 2021	Draft	Luke Curtain & Angus MacDonald	Chris Hewitt	Matt Bradbury	John Moore
1c	9 April 2021	Draft	Luke Curtain	Chris Hewitt	Matt Bradbury	John Moore

Contents

Appendix A. Round 1 demand assessment

A.1 Key points

Jacobs has been engaged to undertake a detailed business case for the Hughenden Irrigation Project. A fundamental component of this study is a demand assessment.

This 'key points' section summarises the process and results. Further detail is provided in sections A.2 to A.9.

There are three parts to a robust demand assessment process:

1) Round 1: Expression of Interest (EOI) (non-binding), which is the topic of this report

2) Round 2: Letter of Intent (LOI) (non-binding), as part of the detailed business case (DBC) (April/May 2021)

3) Round 3: Water sales (binding), which would occur post-DBC assuming this project proceeds.

For round 1, a range of up-front capital contributions, annual charges and land prices were developed to allow a robust and informed assessment of demand. Without strong demand, it is unlikely that the project will proceed to construction. A range of prices is necessary as initial demand informs the engineering and costs, not the reverse.

The round 1 demand assessment has demonstrated significant demand for reliable water products for irrigation in the Hughenden area. In fact, demand volumes have exceeded all expectations. Based on the high level of raw and risk-adjusted demand, the project should be designed to meet as much of this demand as possible within the constraints of water availability, land suitability, total capital constraints, and the objective of delivering a project with a benefit-cost ratio of greater than 1.0.

The demand assessment process for the DBC is consistent with the Queensland Government's 2020 guidance for project proponents on assessing the demand for water.[1] Some elements of this guidance are addressed elsewhere in the DBC and/or the final round 2 demand assessment.

While the demand assessment process is well developed, the P90 Capex is yet to be confirmed and therefore some informed assumptions have been made. Capital constraints remains a challenge but the overall objective for Jacobs and HIPCo, in consultation with and other key stakeholders, is to determine a viable funding model for the project between private sector and government capital contributions.

A.1.1 Methodology

To assess demand in round 1, potential land and water purchasers were asked to consider three components when expressing their demand for water:

1) Water capital contribution for two water products (medium and high priority water)

2) Annual water charges

3) Land price.

A.1.1.1 Water capital contribution

[1] Queensland Government, *Assessing demand for water: guidance for project proponents*, 2020.

Two water products with a range of possible prices were developed:

- Medium priority (MP) with a targeted monthly reliability of between 77 and 82%
- High priority agriculture (HPA) with a targeted monthly reliability of at least 95%.

Proposed capital contributions by customers / investors for the water products are based on three factors:

- **The project's estimated capital cost from the preliminary business case (PBC)**: The PBC's estimated capital cost of the project is in the order of $500 million and returned a benefit–cost ratio (BCR) of below 1.0. Therefore, an option to improve the project's BCR (and get it close to the investment threshold of greater than 1) was to optimise the capital cost relative to total yield. For round 1, capital costs ranging from $360 million to approximately $660 million were considered in developing the customer capital prices for each product.
- **Level of government funding for capital costs:** It was assumed for Round 1 that customers contribute at least 25% and government fund 75% of capital costs. It was assumed that the Australian Government may contribute up to 50% of the capital cost of a project and that the Queensland Government may contribution approximately 25% of the P90 capital cost of the project. The Australian Government has publicly committed to providing (at least) $180 million of grant funding towards the capital cost of the Project. Private sector contributions assumed for round 1 will change for round 2 based on engineering and the evolving P90 estimate of capital expenditure required to deliver this project.
- **Water values in other schemes:** Consideration was given to the amount paid in other schemes for permanent water, indicative reliabilities and annual water charges for somewhat comparable bulk and distribution irrigation schemes. For example, it was considered that MP water may sell for approximately $1,500/ML in lower risk green and brown field schemes, so while this price was included in the range, the medium capital price payable for MP water was assumed to be $1,250/ML. This was based on a risk assessment that in this region demand could be low. However, very high demand resulted from round 1.

The range of prices paid for water reflects the high-cost uncertainty at this stage of the project. It also reflected the targeted capital budget for the project, which was about $360 million and the possibility that the capital budget may increase to around $660 million as indicated by the early options analysis phase of the DBC. The capital target will change by round 2, based on emerging water plan, engineering and geotechnical analysis.

The range of capital prices for MP and HPA water as outlined in the round 1 expression of interest form and public presentations are presented in Table A.1.

Table A.1: Water capital contribution by customers – range of prices

Capital price for water – options	Medium priority ($/ML)	High priority agriculture ($/ML)
Low	1,000	3,000
Medium	1,250	3,750
High	1,500	4,500
Very high	1,750	5,250

When the round 1 demand assessment was undertaken, the conversion ratio of MP to HPA water was thought to be 3.0, which is why HPA prices provided (above) were three times the corresponding MP price.

However, further hydrological modelling suggests that the conversion ratio is more likely to be in the range of 2.1 to 2.3, for example, 2.3 ML of MP allocation could be converted to 1 ML of HPA product. This will be confirmed prior to the round 2 demand assessment. The project is expected to be able to provide up to 95,000 ML of MP-equivalent water products.

Based on the range of prices outlined in Table A.1, between $95 million and $166 million for the capital cost of the project could be raised from customers via water sales. This is a strong indication of demand for water.

A.1.1.2 Annual charges

Customer charges will need to recover 100% of ongoing operations, maintenance, and asset renewal costs. Part A plus Part C is the total fixed charge and Part B plus Part D is the variable or metered water use charge.

The range of annual charges provided to prospective customers during round 1 for MP and HPA water (outlined in Table A.2 and Table A.3) were noted as (and are) subject to change as engineering design and cost estimates progress. Further refinement is expected prior to the round 2 demand assessment.

Table A.2: Annual water charges for medium priority water ($/ML)

Tariff	Description	Low price ($/ML)	Medium price ($/ML)	High price ($/ML)
A	Fixed bulk costs	15	23	30
B	Variable bulk costs	10	18	25
C	Fixed distribution	35	50	65
D	Variable distribution	10	25	40
	Total	**70**	**115**	**160**

Table A.3: Annual water charges for high priority agriculture water ($/ML)

Tariff	Description	Low price ($/ML)	Medium price ($/ML)	High price ($/ML)
A	Fixed bulk costs	50	70	90
B	Variable bulk costs	10	18	25
C	Fixed distribution	35	50	65
D	Variable distribution	45	68	90
	Total	**140**	**205**	**270**

These annual charges were based on a very high-level operating cost assessment for similar schemes and a high level engineering assessment of the PBC irrigation area, including the probable network size, but the uncertain nature of the annual charges was highlighted as a key area for further work and likely change prior to round 2.

A.1.2 Community engagement

The community engagement for the DBC – including for round 1 – has been substantial and has included:

- Five community meetings in Hughenden – two in January 2021 and three in February 2021. These were attended by at least the 161 people who provided contact details at those meetings. Each person was provided with an EOI form.
- A further 45 participants were engaged who have existing tree cropping businesses operating in Queensland and other states, as well as water and land funds, trader, and investors.
- A briefing of 11 financial institutions in Townsville and Hughenden.
- In total, 217 participants were involved in the round 1 demand assessment process.

Participants were given six weeks to respond in confidence by 26 February 2021. There was a strong groundswell of support evident in the community's response. Jacobs fielded numerous (approx. 50) individual enquiries over

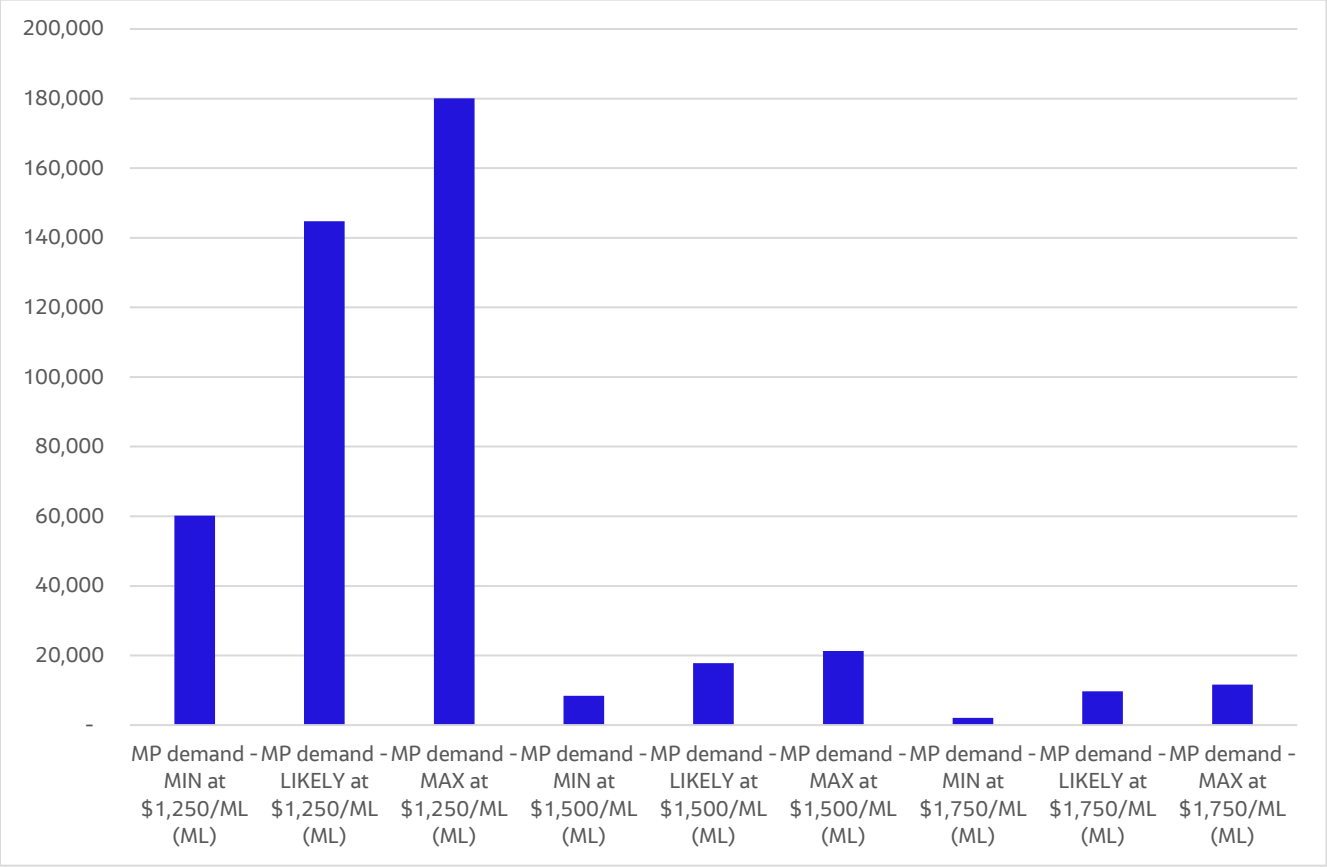
the six-week period to clarify aspects of the project and how to submit an EOI. The general tenor of these interactions was high enthusiasm, significant business drivers requiring reliable water, when will the scheme be constructed and operational, how much will be the deposit during binding water sales and when can we sign-up.

Of the 217 people who were engaged, 45 compliant responses were returned to Jacobs—a response rate of 21%. Final EOIs (including several late responses) were entered into a comprehensive database by 12 March 2021. That process took approximately 400 hours, given the significant level of detail provided by respondents.

A.1.3 Raw results

Jacobs received 45 compliant round 1 EOI forms. It should be noted that some respondents did not provide a response to the question about a volume at the high or very high capital price for MP and HPA water. For medium priority water, most of the interest was at $1,250/ML. Demand for MP water reduced by 88% at $1,500/ML.

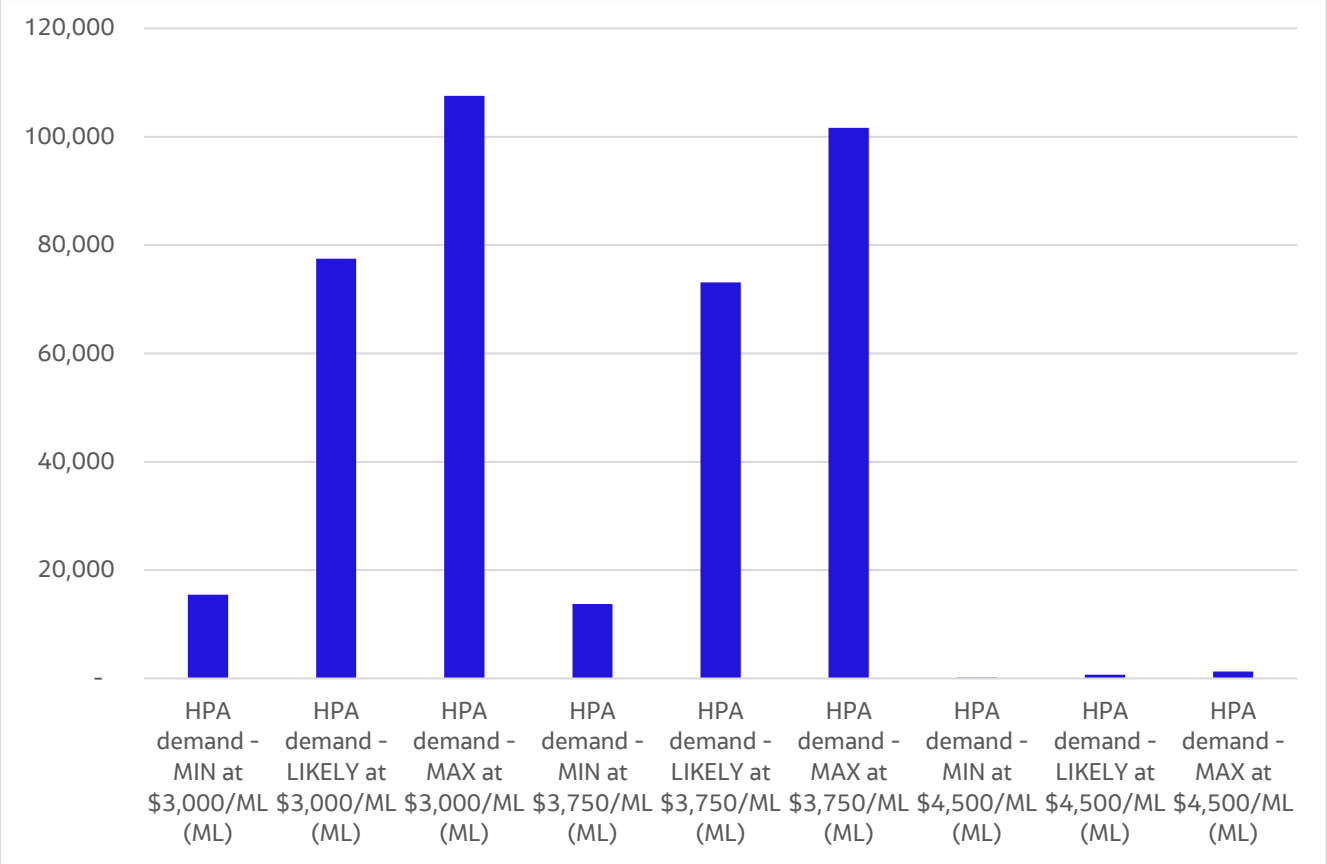
Figure A.1: Change in medium priority price and change in demand



The medium priority customer base indicated a high degree of capital cost sensitivity in terms of its demand. However, there is uncertainty in this result. One reason is that during round 1, prospective customers may indicate low demand for the high and very high prices points to send a message about the need for significant capital grant funding. It cannot be determined with high certainty that round 1 reflects customers' maximum ability to pay. Nevertheless, given the risks of a greenfield scheme, Jacobs assessment is that a price of $1,500/ML for medium priority water may be too high for prospective customers of this scheme, as other schemes with similar prices, present investors with lower risks for agricultural development.

The reduction in HPA demand is outlined in the figure below (for completeness). It reflects a similar story.

Figure A.2: Change in high priority ag price and change in demand



The HPA customer base also indicated a high degree of capital cost sensitivity in terms of its demand. Demand for high priority agricultural water reduced by 99% at $4,500/ML. However, there is also uncertainty in this result, for the reasons noted above regarding medium priority demand price sensitivity.

A.1.3.1 Medium priority results

Jacobs received 41 compliant round 1 EOI forms with demand for MP water (some of these forms also included demand for HPA water). The expressed demand for MP water products is outlined in Table A.4.

Table A.4: Round 1 demand for water – medium priority

Capital price for water	Medium priority ($/ML)	Minimum demand (ML)	Likely demand (ML)	Maximum demand (ML)
Low	1,000	56,355	151,275	199,800
Medium	1,250	60,195	144,800	180,085
High	1,500	8,380	17,816	21,300
Very high	1,750	2,100	9,750	11,650

The *likely* demand ranges from 9,750 ML (very high price) to 151,275 ML (low price). Customers are very price-sensitive between $1,250/ML and $1,500 per ML as noted in Figure A.1 above.

A.1.3.2 High priority agriculture results

Jacobs received 19 compliant round 1 EOI forms with demand for HPA water (some of these forms also included demand for MP water). The expressed demand for HPA water products is outlined in Table A.5.

Table A.5: Round 1 demand for water – high priority agriculture

Capital price for water	High priority agriculture ($/ML)	Minimum demand (ML)	Likely demand (ML)	Maximum demand (ML)
Low	3,000	15,470	77,470	107,570
Medium	3,750	13,760	73,125	101,645
High	4,500	150	700	1,300
Very High	5,250	–	250	500

The *likely* demand ranges from 250 ML (very high price) to 77,470 ML (low price). Customers are very price-sensitive between $3,750/ML and $4,500 per ML as noted in Figure A.2 above.

A.1.4 Risk-adjusted results

The Hughenden Irrigation Project has very strong investor support. Much of the success of the round 1 process can be attributed to the detailed, transparent and extensive engagement of potential customers and the detailed information provided regarding the water products and their associated costs, all of which builds belief and trust. However, a major contributor to this strong demand is the genuine business need for reliable water in the area.

Notwithstanding, as the round 1 EOI is non-binding, there is a strong likelihood that that not all the expressed demand as part of round 1 will progress to a binding water purchase in round 3 (post-DBC). Recognising this potential reduction of demand, the EOI form included a question on a respondent's likelihood of an investment.

This facilitated a risk-adjusted assessment of demand to be completed and provided further confidence in the risk-adjusted level of demand for the project (full details are found in section A.6).

Table A.6: Round 1 risk-adjusted demand for water – combined medium and high priority agriculture water

Water product	Medium capital price ($/ML)	Minimum demand (ML)	Likely demand (ML)	Maximum demand (ML)
Medium priority	1,250	42,484	87,215	113,131
High priority agriculture	3,750	12,596	45,297	53,208
Total		***55,080***	***132,512***	***166,339***
Total (rounded)		**55,000**	**133,000**	**166,000**

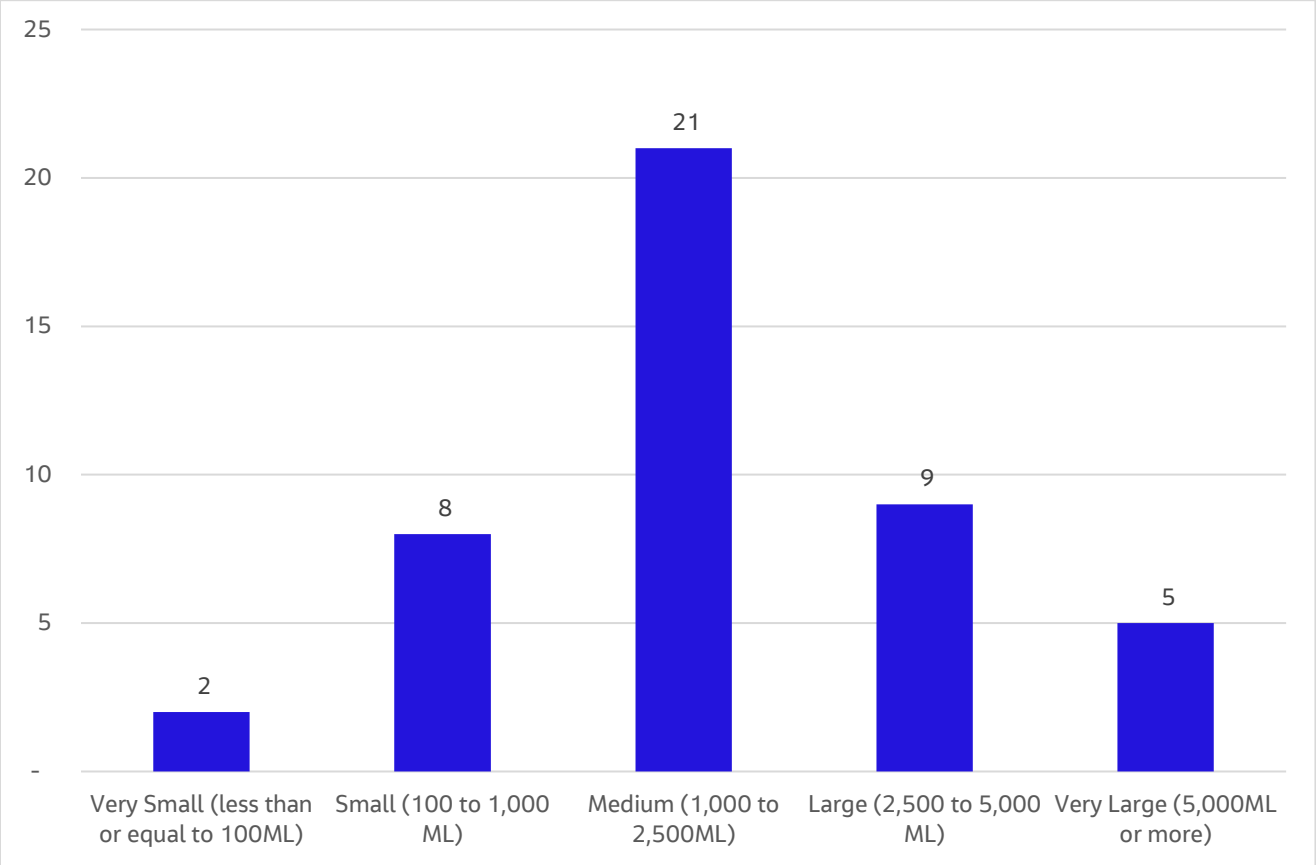
Table A.7 summarises the combined risk-adjusted demand for land for annual cropping and perennial / permanent high value cropping.

Table A.7: Round 1 demand for land – combined medium and high priority agriculture risk adjusted (rounded)

Category	Minimum area (ha)	Likely area (ha)	Maximum area (ha)
Annual cropping (using medium priority water) (ha)	4,800	10,600	13,800
Perennial / permanent high value cropping (using high priority agriculture water)	600	2,100	3,000
Total (rounded)	**5,400**	**12,700**	**16,800**

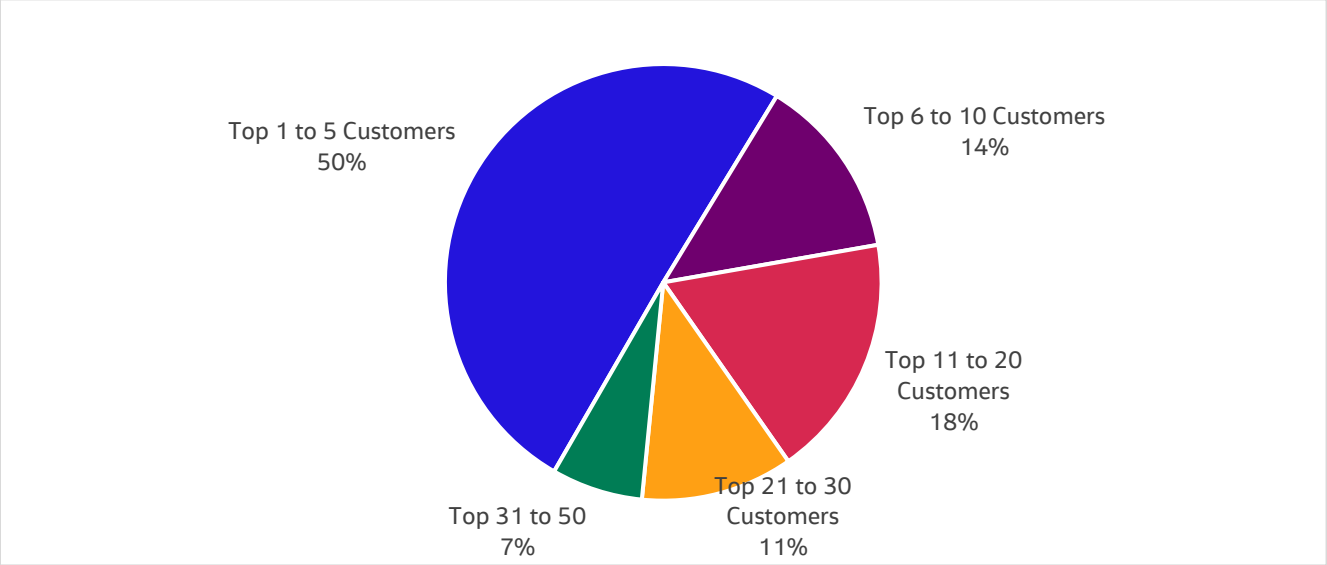
Another input to developing a design and capital cost for the project, as part of the DBC, is the volume of water per customer. Although this data is indicative only, it provides a sense of the distribution of very small to very large customers. The size of the customers is outlined in Figure A.3.

Figure A.3: Number of customers by size of EOI (ML) – likely medium priority and high priority ag – risk-adjusted



The figure below outlines the risk-adjusted likely demand by customer grouped into categories based on volume of water demand (five customers per ranked category).

Figure A.4: Risk-adjusted likely demand by customer group



The figure above highlights that the top five customers by volume have expressed 50% of the risk-adjusted demand received in round 1. It is almost a mathematical certainty that the top five to ten customers (sorted by volume) will hold a large portion of the volume of demand. The key message here is that the distribution of demand – by volume – is standard and 'as expected' for an irrigation scheme.

A.1.5 Illustrative prices for round 2

The P90 capex for this project is not yet known therefore some high range assumptions have been used in the modelling. Medium priority equivalent yield has not been confirmed but ranges from 75 to 95 GL. These assumptions on Capex and yield will inform round 2 capital price options.

Table A.8: Round 2 price assumptions (rounded) (subject to change)

Scenario	Estimated P90 Capex ($M)	Estimated Yield MP Equivalent (ML)	Full capex ($/ML)
Low	750	95,000	7.900

If these assumptions apply and utilising the likely conversion factor from MP to HPA of 2.1, the following customer capital prices may apply (noting that these too are illustrative only and subject to change).

Table A.9: Round 2 customer capital price options (rounded) (subject to change)

Price scenario	Medium priority customer capex price ($/ML)	High priority ag customer capex price ($/ML)
Low price	1,400	3,000
Medium price (20% of capex)	1,600 *	3,400
High price (25% of capex)	2,000 *	4,200

Green shading indicates prices that are likely to attract material demand. Light orange is uncertain.

In round 1, HPA customers had very strong demand at $3,750/ML and a 99% reduction to $4,500 per ML, so $4,200 per is uncertain. The other two price points are considered likely to be affordable for HPA in round 2.

In terms of the MP uncertainty, customers might pay $1,600 per ML for MP water if they knew that the project depended on that to proceed. This cohort of investors does understand that capital appreciation of asset values (including water) can deliver acceptable returns on investment even at higher acquisition prices. The possibility of demand for MP water may even apply at $2,000 per ML.

Whilst obtaining material demand at $1,600 per ML or more is very uncertain, nevertheless, it may be achievable with the right strategy and if the capital costs can be minimised and yields maximised.

These prices are provided for early consideration of their implication for round 2, which include:

- The low prices are likely the best way to avoid catastrophic demand reductions in round 2
- Project goal of a 25% customer funding may be impractical depending on where capex and yield land
- There is a strong incentive, for all parties, to optimise P90 capital costs and yield to afford the project the best opportunity to succeed
- Given that the medium prices (20% customer contribution) will materially reduce demand, a 'two-price' approach (low and 20% of capex) is likely to be recommended for round 2 (not a three-price approach)
- This is because the high price (25% of capex) is likely to yield catastrophic demand reductions, will reveal no more information than the medium prices and would add needless complexity to the letter of intent form
- If the BCR exceeds 1, government may be requested to provide more than 75% capital funding.

A.1.6 Differential MP and HPA pricing that transcends conversion ratios

Typically, the MP and HPA prices (on one row above) reflect the conversion ratio to avoid administrative and fairness issues in the scheme in the medium to long term. This would normally not allow the proponent to select, for example, a low price for MP ($1,400 per ML) and a high price for HPA (say $3,900 to $4,200 per ML).

However, since round 1, further work has been carried out on the provision of a drought-proofing groundwater supply for the benefit of HP customers only in times of extended drought. This additional supply of water, which is unrelated to dam conversion ratios, provides an opportunity in round 2 to develop differential pricing of the nature described at the start of this paragraph. That is, HPA could pay more for the groundwater service.

Given the above analysis, there may be scenarios where customers could contribute 20% or up to 25% towards P90 capital costs, depending where costs and yields land. Moreover, pricing could maintain the assumed conversion factor for dam water, avoiding future problems, but also allow additional capital funds to be raised from HPA customers to reflect the capital cost of providing additional water security via ground water.

A.2 Methodology

Drawing on past experiences, Jacobs worked with HIPCo to develop a methodology for the land and water demand assessments required to advance the Hughenden Irrigation Project. The demand assessment process for the DBC is consistent with the Queensland Government's 2020 guidance on assessing demand for water.

A.2.1 Three phases of demand assessment

Typically for bulk water infrastructure projects of this nature there are three parts to the demand assessment:

1) Round 1: Expression of Interest (EOI) (non-binding), which is the topic of this report

2) Round 2: Letter of Intent (LOI) (non-binding), as part of the DBC (April/May 2021)

3) Round 3: Water sales (binding), which would occur post-DBC assuming this project proceeds.

A.2.2 Setting a price

To assess demand, an EOI form must set out the price/s for water and product characteristics.

The project needed to develop a range of pricing scenarios so that volumes of demand could be assessed, given different up-front capital contributions by customers and a range of associated annual charges.

Proposed capital contributions by customers / investors for the water products are based on customers making a 25% capital contribution to capital costs (incl. payments for land) and government funding 75% of those costs. The range of prices paid for water reflects the high-cost uncertainty at this stage of the project. It also reflects the targeted capital budget for the project, which is about $360 million but may change based on demand. Consideration was also given to capital costs rising as high as $660 million. The capital cost target will change by round 2 as the engineering and other feasibility study analysis progresses. Two water products with a range of possible prices were developed:

- Medium priority (MP), with a targeted monthly reliability of between 77% and 82%
- High priority agriculture (HPA), with a targeted monthly reliability of at least 95%.

Proposed capital contributions by customers / investors for the water products are based on three factors:

- **The project's estimated capital cost from the preliminary business case (PBC)**: The PBC's estimated capital cost is in the order of $500 million and returned a benefit–cost ratio (BCR) of below 1.0. Therefore, an option to improve the project's BCR (and get it close to the investment threshold of greater than 1) was to optimise the capital cost relative to total yield. For round 1, capital costs ranging from $360 million to approximately $660 million were considered in developing the customer capital prices for each product.
- **Level of government funding for capital costs:** It was assumed for Round 1 that customers contribute at least 25% and government fund 75% of capital costs. It was assumed that the Australian Government may contribute up to 50% of the capital cost of a project and that the Queensland Government may contribution approximately 25% of the P90 capital cost of the project. The Australian Government has publicly committed to providing (at least) $180 million of grant funding towards the capital cost of the Project. Private sector contributions assumed for round 1 will change for round 2 based on engineering and the evolving P90 estimate of capital expenditure required to deliver this project.
- **Water values in other schemes:** Consideration was given to the amount paid in other schemes for permanent water, indicative reliabilities and annual water charges for somewhat comparable bulk and distribution irrigation schemes (Table A.16). It was considered that MP water may sell for approximately $1,500/ML in lower risk green and brown field schemes, so while this price was included in the range, the medium capital price payable for MP water was assumed to be $1,250/ML. This was based on a risk assessment that in this region demand could be low. However, very high demand resulted from round 1.

The range of capital prices for MP and HPA water is outlined in Table A.10.

Table A.10: Water capital contribution by customers – range of prices

Capital price for water – options	Medium priority ($/ML)	High priority agriculture ($/ML)
Low	1,000	3,000
Medium	1,250	3,750
High	1,500	4,500
Very high	1,750	5,250

When the round 1 demand assessment was undertaken, the conversion ratio of MP to HPA water was thought to be 3.0, which is why HPA prices provided (above) were three times the corresponding MP price.

However, further hydrological modelling suggests that the conversion ratio is more likely to be in the range of 2.1 to 2.3, for example, 2.3 ML of MP allocation could be converted to 1 ML of HPA product. This will be confirmed prior to the round 2 demand assessment. The project is expected to be able to provide up to 95,000 ML of MP-equivalent water products.

Based on the range of prices outlined in Table A.11, between $95 million and $166 million for the capital cost of the project could be raised through water sales. This is a strong indication of demand for water. For example, a $1,500 per ML price for MP water and $3,750 per ML for HPA water based on a 2.5 conversion factor would raise $142.5 million towards the capital cost of the project.

Consistent with NWI water pricing principles, annual charges must cover all ongoing costs with no ongoing subsidy. Part A plus Part C is the fixed charge and Part B plus Part D is the variable or metered water use charge.

The range of annual charges for MP and HPA water, outlined in Table A.11 and Table A.12, are subject to change as engineering design and cost estimates progress.

Table A.11: Annual water charges for medium priority water ($/ML)

Tariff	Description	Low price ($/ML)	Medium price ($/ML)	High price ($/ML)
A	Fixed bulk costs	15	23	30
B	Variable bulk costs	10	18	25
C	Fixed distribution	35	50	65
D	Variable distribution	10	25	40
	Total	**70**	**115**	**160**

Table A.12: Annual water charges for high priority agriculture water ($/ML)

Tariff	Description	Low price ($/ML)	Medium price ($/ML)	High price ($/ML)
A	Fixed bulk costs	50	70	90
B	Variable bulk costs	10	18	25
C	Fixed distribution	35	50	65
D	Variable distribution	45	68	90
	Total	**140**	**205**	**270**

A.2.3 Benchmarking of water values in other schemes

Table A.13 through to Table A.16 provide a comparison with other schemes of the prices estimated for the Hughenden Irrigation Project and the permanent water trading values, indicative reliabilities and annual water charges for somewhat comparable bulk and distribution irrigation schemes. This allows prospective customers to assess the value proposition being offered by the project in round 1.

Table A.13: Comparison of Hughenden Irrigation Project prices and average water values in other schemes – medium priority

Capital price for MP water	HIP medium priority * ($/ML)	Average of other schemes MP ($/ML)	Difference ($/ML)	Savings in Hughenden (%)
Low	1,000	1,100	–100	–9
Medium	1,250	1,600	–350	–22
High	1,500	2,100	–600	–29

Note: * HIP prices are illustrative only and are subject to change.

Table A.14: Comparison of Hughenden Irrigation Project prices and average water values in other schemes – high priority

Capital price for HPA water	HIP high priority agr ($/ML)	Average of other schemes HP ($/ML)	Difference ($/ML)	Difference (%)
Low	3,000	3,700	-700	–19
Medium	3,750	4,800	-1,050	–22
High	4,500	6,000	-1,500	–25

Table A.15: Comparison of Hughenden Irrigation Project and other schemes' monthly reliability and annual charges

Comparison of HIP and other schemes	HIP monthly reliability (subject to change) (%)	Monthly reliability in other schemes (%)	HIP annual charges – medium ($/ML) (subject to change)	Average annual charges in other old and new schemes ($/ML)
Medium priority	77–82	87	115	120
High priority	95	96	205	180

Table A.16: Summary of medium priority values

Medium priority water values in selected schemes	Low price ($/ML)	Medium ($/ML)	High price ($/ML)	Monthly reliability (%)	Annual charge ($/ML)
Proposed new schemes					
Lockyer Valley Distribution System	1,500	1,500	1,600	78	365
Rookwood Weir	1,500	1,500	1,500	85	
Existing schemes					
Bundaberg WSS (Distribution)	538	632	1,100	90	108
Burdekin-Haughton WSS (Distribution)	250	427	1,200	95	66
Mareeba Dimbulah WSS (Distribution), Atherton Tablelands	1,849	3,414	4,356	90	62
Nogoa Mackenzie WSS / Fairbairn Irrigation Network, Emerald	1,600	2,200	2,800	82	39
St George WSS (Distribution) – Mallawa Irrigation Network	684	1,549	2,225	88	56
Average – rounded	**1,100**	**1,600**	**2,100**	**87**	**120**

Detailed HP values are not presented here, due to a lack of reliable data in most schemes / jurisdictions.

A.3 Documentation for round 1 EOI

For a round 1 EOI process to succeed, experience has shown that two documents need to be provided.

A.3.1 Information document

An information document should provide detail on the EOI and demand assessment process and the opportunities presented from an increase in reliable water to a region. Due to the greenfield nature of the project, the potential interest from outside the region and the limited irrigation experience within the region, a detailed information document was prepared. The document included detailed information on:

a) background and key project information

b) rainfall, temperature, climate, and soils in study area

c) opportunities with annual cropping

d) opportunities for perennial horticulture and tree crops

e) benchmarking against water values in other schemes.

A.3.1 Form

A two- to five-page EOI form that is easy to fill out and return to a secure email address or equivalent (in this case one page of summary price and reliability information and three pages to fill out), providing:

a) minimum, likely, and maximum volumes of demand at different prices for the two water products

b) reasons for responses

c) current water sources if any

d) current enterprises / cropping

e) intended use for new water (if it eventuates)

f) water use per ML, farmgate revenue and farmgate costs for those intended uses / enterprises

g) views on whether houses should be included in the irrigation area

h) the likelihood that a participant will invest in the project (driving the risk adjusted demand)

i) willingness to participate in future demand assessment rounds.

The documents were refined to encourage honest participation, outline the process, clearly set out the prices and product characteristics and clarify that individual / commercial data will be confidential.

The documents stated that expressions of interest are not legally binding, but accuracy is important.

Customers were informed that the summary of demand will be reported in aggregate for each price point and customer category. The intention was for individual data not to be identifiable from the reported summaries.

A.4 Engagement with the community and potential customers

A.4.1 Round 1 – EOI timelines

The round 1 process progressed during the following months:

- Jacobs and HIPCo developed the plan and documents in December 2020 and January 2021.

- Community meetings and workshops took place from 20 and 21 January 2021 and 16 to 18 February 2021.
- Potential customers had approximately six weeks to complete and submit EOIs.
- Round 1 EOIs were due by Friday, 26 February 2021 – however, EOIs were accepted and entered in the database for an additional week.

This report reflects the results of data entry up to and including 19 March 2021.

A.4.2 Formal program of five meetings and workshops

Jacobs and HIPCo facilitated five public meetings and workshops – about the project, irrigated agriculture opportunities in the study and the round 1 demand assessment process– to which interested potential customers and the community were invited. Local media and local networks were used to distribute the information, and the meetings were well attended.

The details of the public meeting and workshop details are outlined below:

- Public information and round 1 demand assessment, 20 January 2021, Royal Hotel, Hughenden
- Public information and round 1 demand assessment, 21 January 2021, Royal Hotel, Hughenden
- 'Building Blocks for Irrigation' workshop, 16 February 2021, Hughenden RSL, Hughenden
- 'Building Blocks for Irrigation' workshop, 17 February 2021, Diggers Entertainment Centre, Hughenden
- Community meeting, 8 February 2021, Diggers Entertainment Centre, Hughenden.

Table A.17: Round 1 demand assessment – stakeholder participation

Round 1 – Stakeholder participation	No. of participants
Phase 1 – Two public meetings in Hughenden (Jan 2021). Advertised in local papers and social media. Strong community interest.	43
Phase 2 – Presented to tree cropping businesses operating in Queensland and nationally.	31
Phase 3 – Presented to water and land funds, traders, and other investors.	14
Phase 4 – Three public meetings in Hughenden (mid-Feb 2021). Advertised on local television, media, and social media. Very strong community interest.	118
Phase 5 – Brief financial institution representatives in Townsville and Hughenden	11
Total	**217**

A.4.3 Content of the meetings

The meetings incorporated the following elements – each meeting was similar in content:

- Introduction to the project by the HIPCo Chairman, Shane McCarthy
- Overview of the round 1 demand assessment process by Angus MacDonald, Jacobs
- Provision of hard copies of the round 1 EOI to attendees
- Question time and discussion as part of the public meeting.

The 'Building Blocks for Irrigation' workshops covered irrigation fundamentals, from establishing an irrigation block, to the opportunity that producing irrigated feed locally can offer grazing businesses. The aim of the workshops was to provide further information to potential customers on the potential for irrigated agriculture in

the region and the complementary benefits to their existing enterprises. Specific topics were presented by industry experts, and the topics included:

- A local grazier's perspective on supplementary feeding cattle
- Animal nutrition, hay-grain feed mixes and estimating your demand for feed, land, and water
- Land levelling costs, and flood irrigation and overhead irrigation options (e.g., center pivot)
- Agronomic support / growing irrigated feed crops
- Cost of land development and gross margins for likely crops in the region.

Both workshops were streamed online (via Zoom), which allowed attendance for those who were unable to attend in person.

A.4.4 Additional consultation with potential customers

Activities to engage with potential customers in addition to the public meetings and workshops included:

- Individual briefing sessions with large local enterprises with a strong interest in purchasing water
- Presenting to tree cropping businesses operating in Queensland and nationally that may be suited to diversify and/or expand their operations to Hughenden with the supply of reliable water.
- Presenting to water and land funds, traders and other investors who have similar investments in water and land to those to be offered with the Hughenden Irrigation Project.

In addition, Jacobs briefed 11 financial institutional representatives in two three-hour workshops held in Townsville on 15 March 2021. A further briefing was provided by HIPCo to bankers in Hughenden in March.

In total, at least 217 participants were involved in the round 1 demand assessment process.

Participants were given six weeks to respond in confidence by 26 February 2021. There was a strong groundswell of support evident in the community's response. Jacobs fielded numerous (approx. 50) individual enquiries over the six-week period to clarify aspects of the project and how to submit an EOI. The general tenor of these interactions was high enthusiasm, significant business drivers requiring reliable water, when will the scheme be constructed and operational, how much will be the deposit during binding water sales and when can we sign-up.

Final EOIs (including several late responses) were entered into a confidential and comprehensive database by 12 March 2021. That process took approximately 400 hours, given the significant level of detail provided by respondents.

A.5 Demand for new water

The following are the results of the round 1 EOI process.

A.5.1 Participation

Jacobs developed a database of 217 participants, of whom 45 submitted an EOI – a response rate of 21%.

Table A.18: Participation numbers

Round 1 – Stakeholder participation	Result
Participants in round 1 including interviews, meetings, and workshops	217
Potential customers of Hughenden Irrigation Project – submitted round 1 EOI	45
Portion of participants who submitted EOI	21%

Figure A.5 outlines the types of enterprises that submitted an EOI response. Twenty-eight response received were from beef enterprises, 8 from mixed farming businesses and 3 from water and agriculture investment funds. The six remaining EOIs were received from local businesses (2) and other enterprises (4).

Figure A.5: Types of enterprises that submitted an EOI

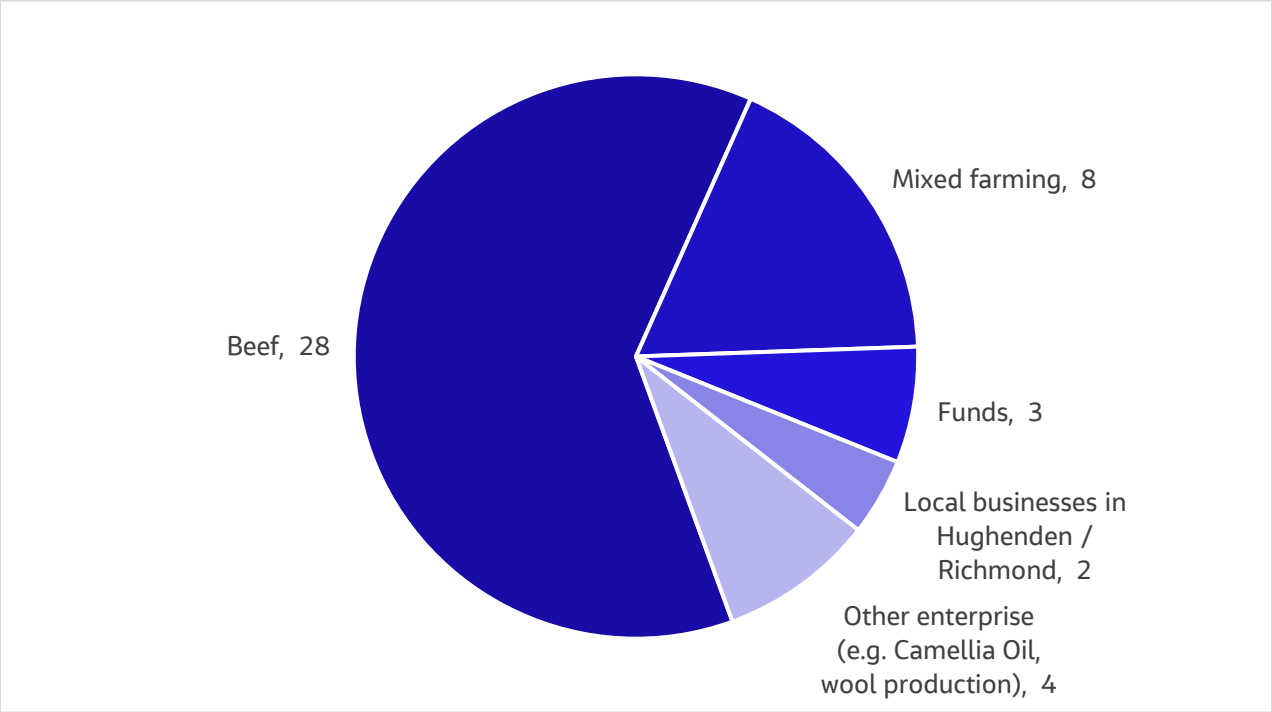
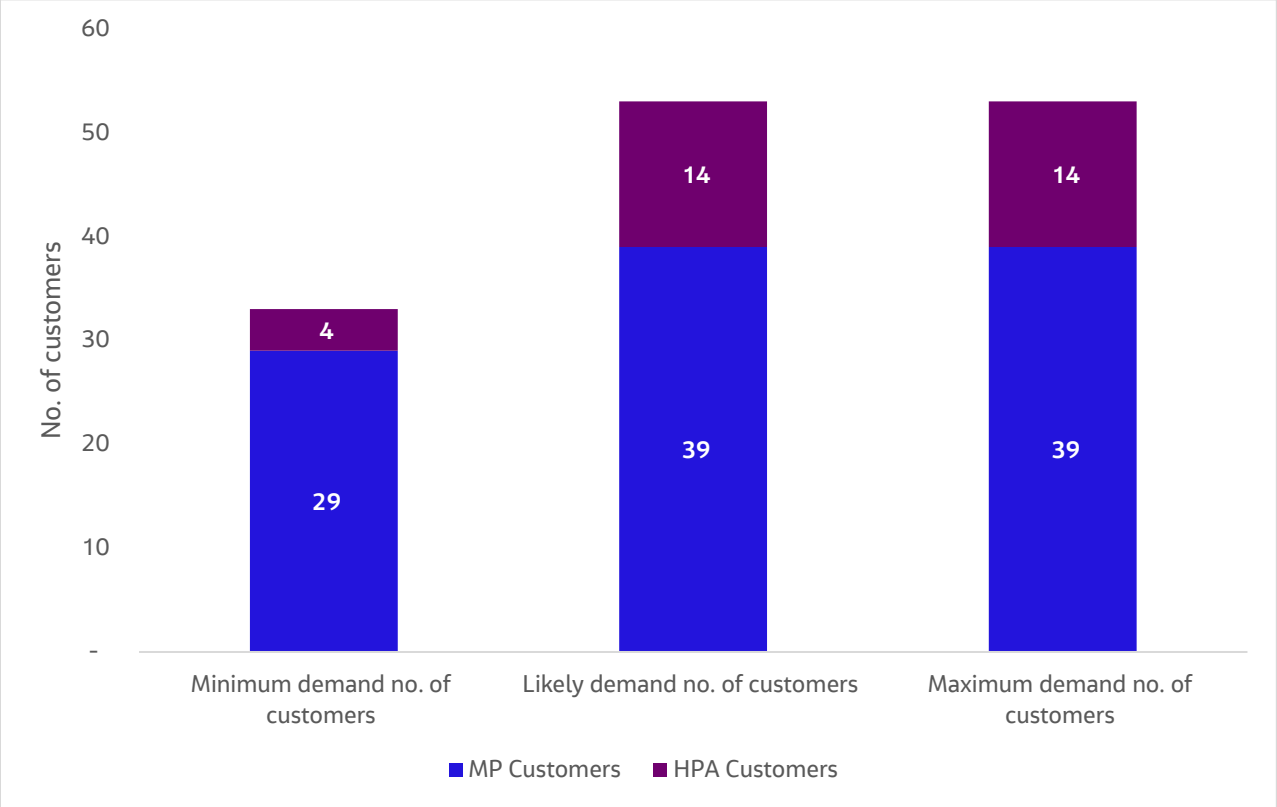


Figure A.6 shows the number of EOI response received from potential customers for the two water products. Note, some respondents requested a volume of MP and HPA water.

Figure A.6: Number of customers by water product



A.5.2 Round 1 demand – medium priority

Table A.19 and Figure A.7 present the demand for a MP water product from the Project. It should be noted that some respondent did not provide a response to a volume at the high or very high capital price for water. The focus for demand response was the low and medium prices of $1,000/ML and $1,250/ML for MP water.

Table A.19: Round 1 demand for water – medium priority

Capital price for water	Medium priority ($/ML)	Minimum demand (ML)	Likely demand (ML)	Maximum demand (ML)
Low	1,000	56,355	151,275	199,800
Medium	1,250	60,195	144,800	180,085
High	1,500	8,380	17,816	21,300
Very high	1,750	2,100	9,750	11,650

Figure A.7: Round 1 demand for water – medium priority

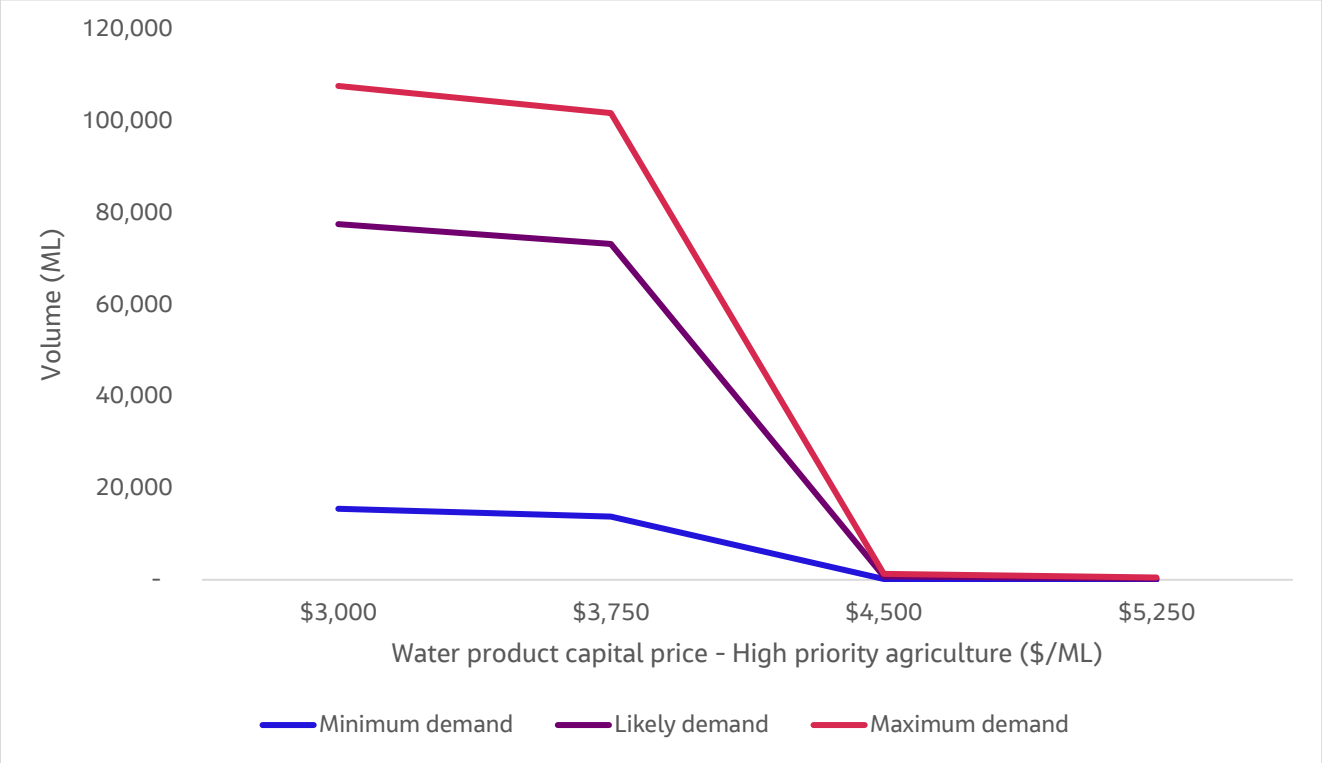
A.5.3 Round 1 demand – high priority agriculture

Table A.20 and Figure A.8 present the demand for a HPA water product from the Project. As was the case for MP water, some respondent did not provide a response to a volume at the high or very high capital price for water. The focus for demand responses was the low and medium price of $3,000/ML and $3,750/ML for HPA.

Table A.20: Round 1 raw demand for water – high priority agriculture

Capital price for water	High priority agriculture ($/ML)	Minimum demand (ML)	Likely demand (ML)	Maximum demand (ML)
Low	3,000	15,470	77,470	107,570
Medium	3,750	13,760	73,125	101,645
High	4,500	150	700	1,300
Very high	5,250	–	250	500

Figure A.8: Round 1 raw demand for water – high priority agriculture



A.5.4 Round 1 raw demand – combined medium and high priority agriculture

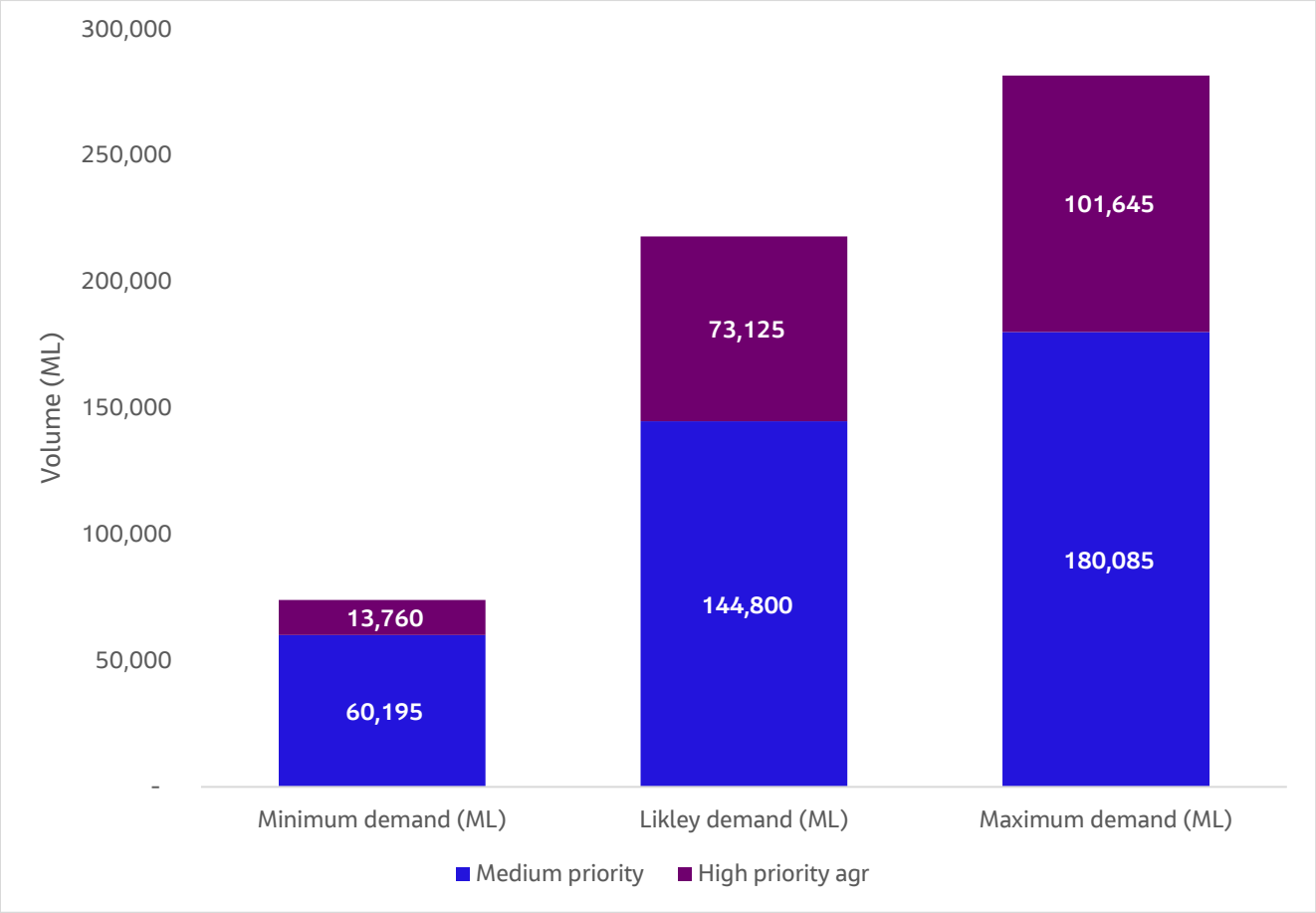
Table A.21 and Figure A.9 summarise the combined demand MP and HPA water products.

Table A.21: Round 1 demand for water – combined medium and high priority agriculture

Water product	Medium capital price ($/ML)	Minimum demand (ML)	Likely demand (ML)	Maximum demand (ML)
Medium priority	1,250	60,195	144,800	180,085
High priority agriculture	3,750	13,760	73,125	101,645

Total		***73,955***	***217,925***	***281,730***
Total (rounded)		**74,000**	**218,000**	**282,000**

Figure A.9: Round 1 raw demand for water – combined medium and high priority agriculture



A.5.5 Round 1 demand – demand for land

A medium priority water product is suited to annual cropping, such as sorghum, Rhodes grass hay, barley, wheat and mungbeans.

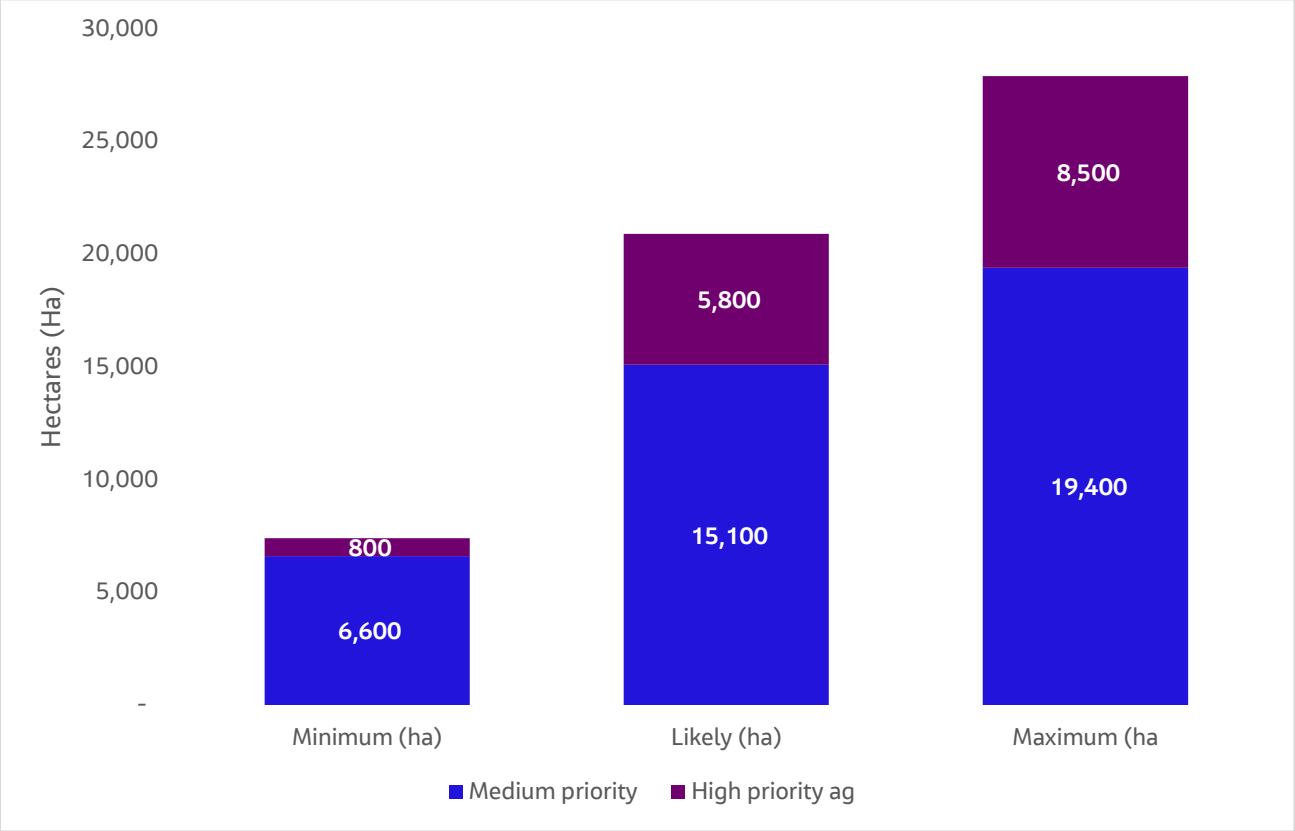
A HPA water product will be suited to perennial and permanent high value cropping annual cropping, such as avocados, lemons, mandarins, mangoes, and nuts.

Table A.22 and Figure A.10 summarises the combined demand for land for annual cropping and perennial / permanent high value cropping as provided in the EOI responses.

Table A.22: Round 1 demand for land – combined medium and high priority agriculture (rounded)

Category	Minimum area (ha)	Likely area (ha)	Maximum area (ha)
Annual cropping (using medium priority water) (ha)	6,600	15,100	19,400
Perennial / permanent high value cropping (using high priority agriculture water)	800	5,800	8,500
Total (rounded)	**7,400**	**20,900**	**27,900**

Figure A.10: Round 1 demand for land – combined medium and high priority agriculture (rounded)



A.6 Demand for new water – risk-adjusted

Typically, when undertaking a demand assessment for a new water project, there are challenges around encouraging businesses to fill in an EOI. Some of the challenges include:

- Uncertainty about whether the project has a high probability of being constructed
- Some previous project proceeding under the direction of governments, whether a strong demand was previously expressed or not
- Uncertainty of the volume of water to nominate, due to limited experience with irrigated agriculture
- Lack of engagement of potential customers
- Insufficient information on the project to make an informed decision (e.g., reliability of water product, water price estimates, implementation timeframes).

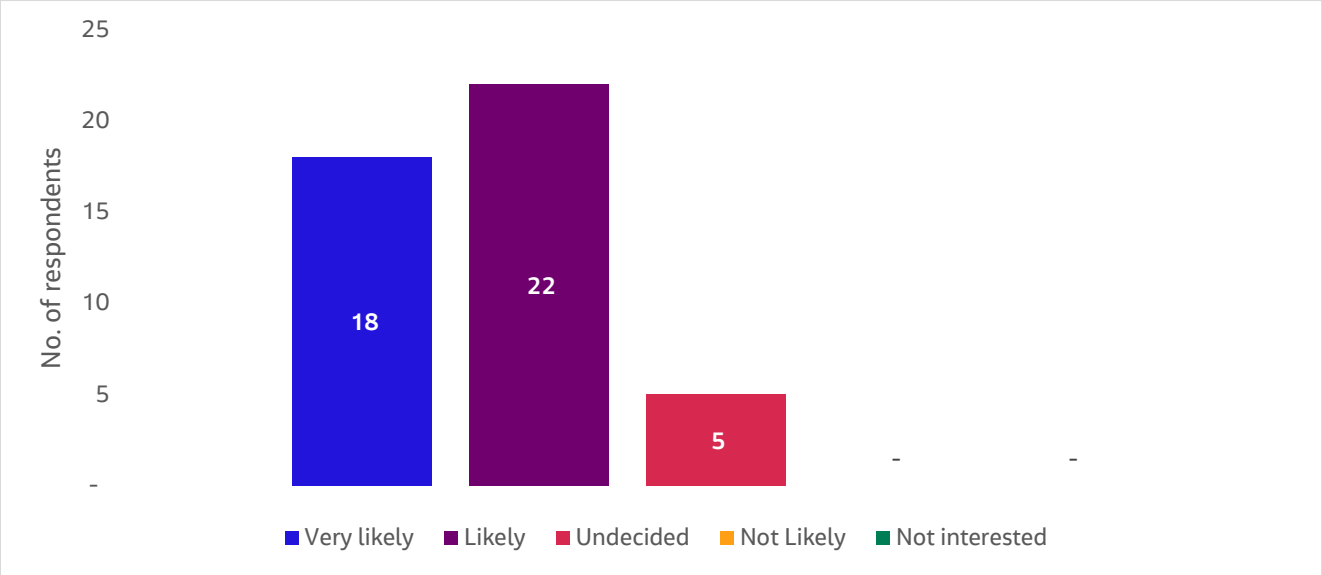
However, the Hughenden Irrigation Project has surprisingly strong investor support. Most of the success of the round 1 process can be attributed to the detailed engagement of potential customers and the detailed information provided regarding the water products and their associated costs.

Notwithstanding, as the round 1 EOI is non-binding, there is a strong likelihood that that not all the expressed demand as part of round 1 will progress to a binding water purchase in round 3 (post-DBC). Recognising this reduction of demand, the EOI form included a question on a respondent's likelihood of an investment. Options to choose from were:

- Very likely
- Likely
- Undecided
- Not likely
- Not interested.

Forty respondents noted on their EOI form that they were either very likely (18) or likely (22) to purchase their nominated water volume. Five were undecided. No responses were 'not likely' or 'not interested'. Figure A.11 outlines these responses.

Figure A.11: Respondent's likelihood of investment in the Hughenden Irrigation Project



We have used each respondent's likelihood of investment in the project to develop a risk-adjusted round 1 demand assessment. Each likelihood response was provided a score from 0 (not interested) to 4 (very likely). A conservative approach was adopted, with each score expressed as out of 5 (e.g., a response of very likely would result in a water purchase of 80% of their EOI volume).

This risk-adjusted approach is outlined in Table A.23.

Table A.23: Round 1 demand for water – likelihood and risk-adjusted demand framework

Likelihood	Very likely	Likely	Undecided	Not likely	Not interested
Score	4	3	2	1	0
Response converted from X/4 to X/5	4/5	3/5	2/5	1/5	0/5
Risk adjustment applied to demand for land (ha) and water (ML)	80%	60%	40%	`20%	0%

A.6.1 Round 1 risk adjusted demand – combined medium and high priority agriculture

The following Table A.24 summarises the risk-adjusted combined demand medium and high priority agriculture water products.

Table A.24: Round 1 risk adjusted demand for water – Combined medium and high priority agricultural water

Water product	Medium capital price ($/ML)	Minimum demand (ML)	Likely demand (ML)	Maximum demand (ML)
Medium priority	1,250	42,484	87,215	113,131
High priority agriculture	3,750	12,596	45,297	53,208
Total		55,080	132,512	166,339
Total risk adjusted demand (rounded)		**55,000**	**133,000**	**166,000**
Risk adjusted demand as a portion of raw demand		70%	60%	60%
Reduction to raw demand to achieve risk-adjusted demand		30%	40%	40%

The following two figures present aspects of the risk-adjusted combined demand medium and high priority agriculture water products in different graphic formats.

Figure A.12: Round 1 risk adjusted demand for water – combined medium and high priority agriculture water

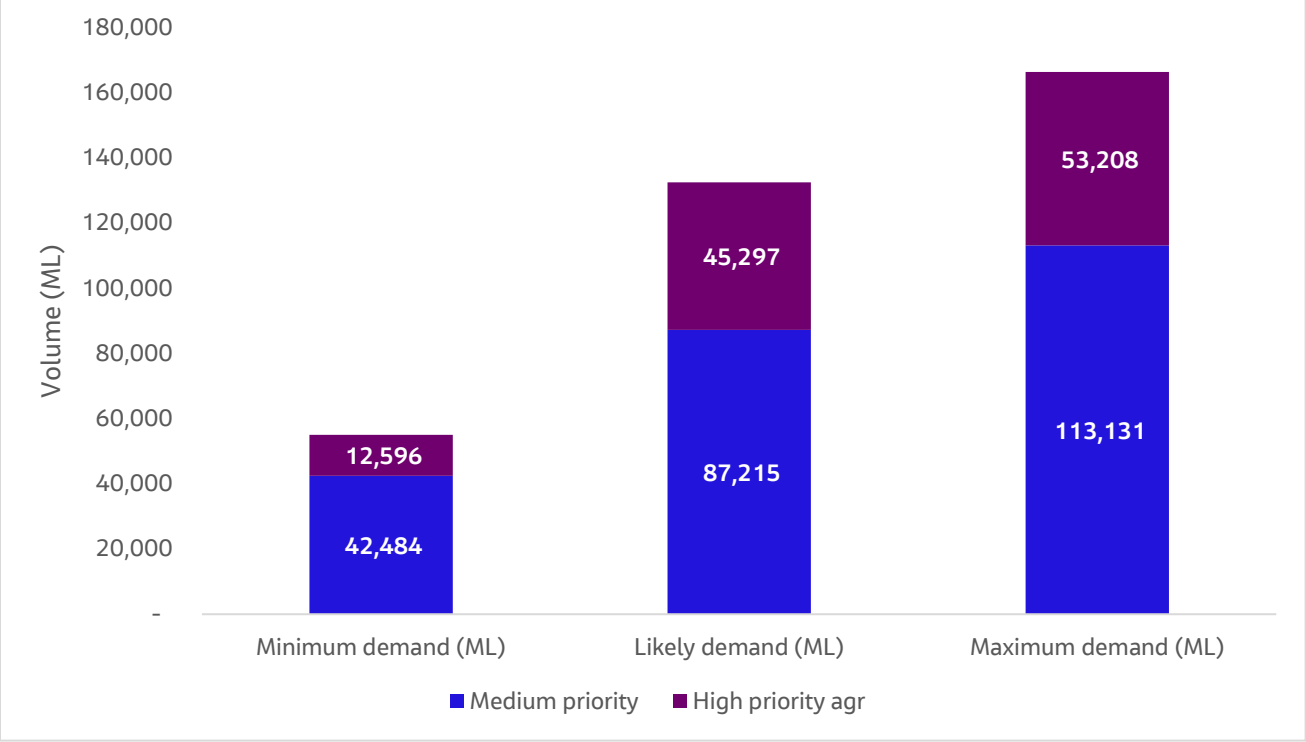
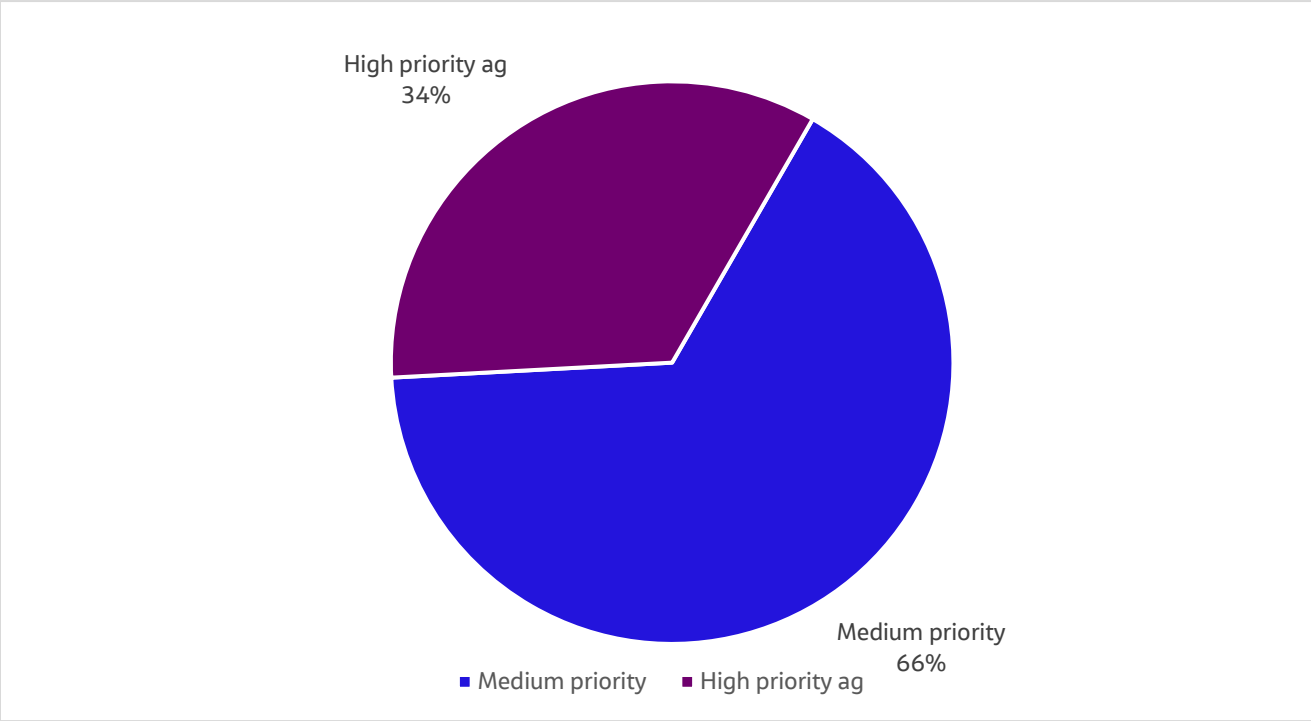


Figure A.13: Round 1 risk adjusted demand for water – ratio of medium and high priority agriculture



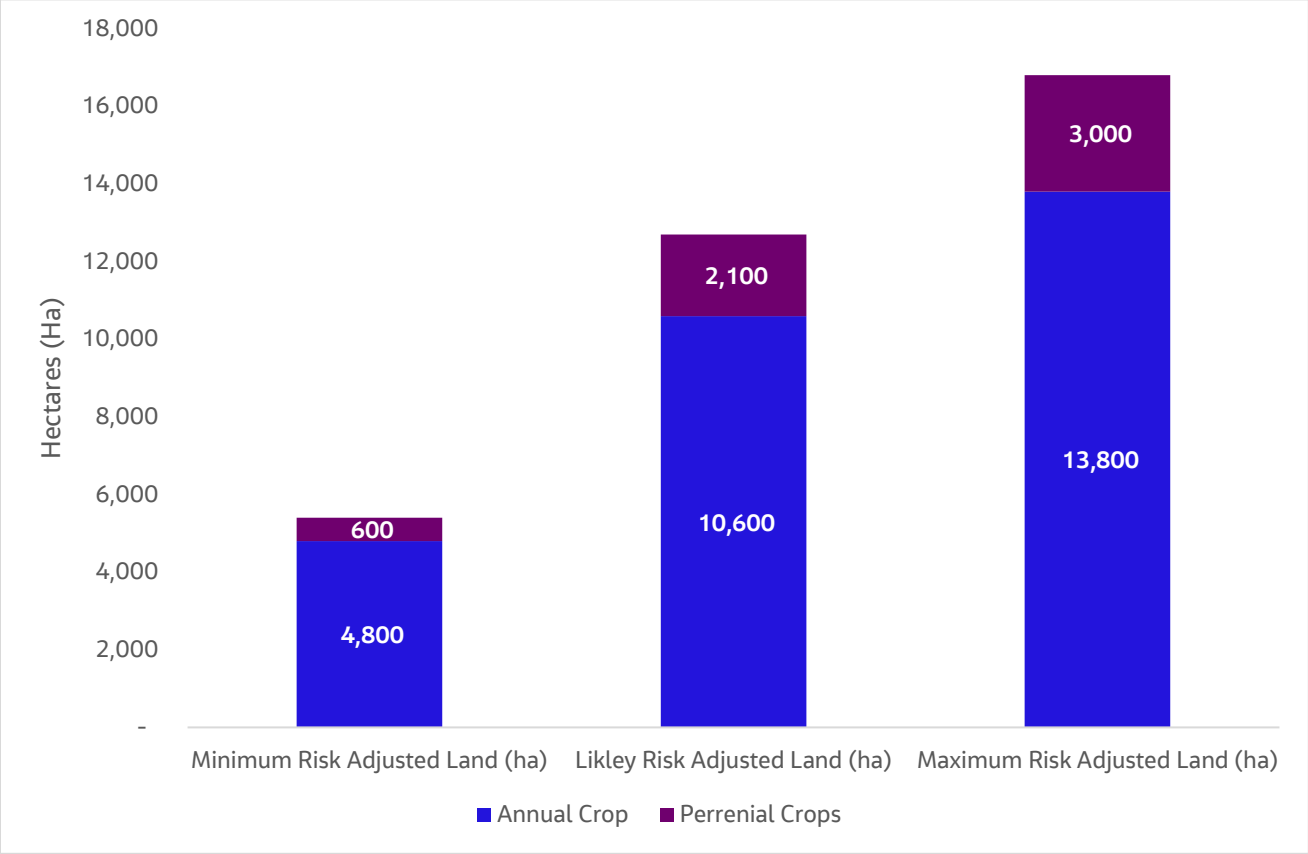
A.6.2 Round 1 risk-adjusted demand for land

Table A.25 and Figure A.14 summarise the combined risk-adjusted demand for land for annual cropping and perennial / permanent high value cropping.

Table A.25: Round 1 risk adjusted demand for land – combined medium and high priority agriculture (rounded)

Category	Minimum area (ha)	Likely area (ha)	Maximum area (ha)
Annual cropping (using medium priority water) (ha)	4,800	10,600	13,800
Perennial / permanent high value cropping (using high priority ag water)	600	2,100	3,000
Total (rounded)	**5,400**	**12,700**	**16,800**

Figure A.14: Round 1 risk-adjusted demand for land – combined medium and high priority agriculture (rounded)



A.6.3 Size of customer demand

Another input to developing a design and capital cost for the project, as part of the DBC, is the volume of water per customer. Although this data is indicative only, it provides a sense of the distribution of very small to very large customers. The size of the customers is outlined in Table A.26 and Figure A.15.

Table A.26: Number of customers by size (ML) – likely medium priority and high priority agriculture, risk-adjusted

Category	No. of EOIs	Portion by no.
Very small (less than or equal to 100ML)	2	4%
Small (100 to 1,000 ML)	8	18%
Medium (1,000 to 2,500ML)	21	47%
Large (2,500 to 5,000 ML)	9	20%
Very large (5,000ML or more)	5	11%
Total no. of customers	**45**	**100%**

Figure A.15: Number of customers by size of EOI (ML) – likely medium priority and high priority ag – risk-adjusted

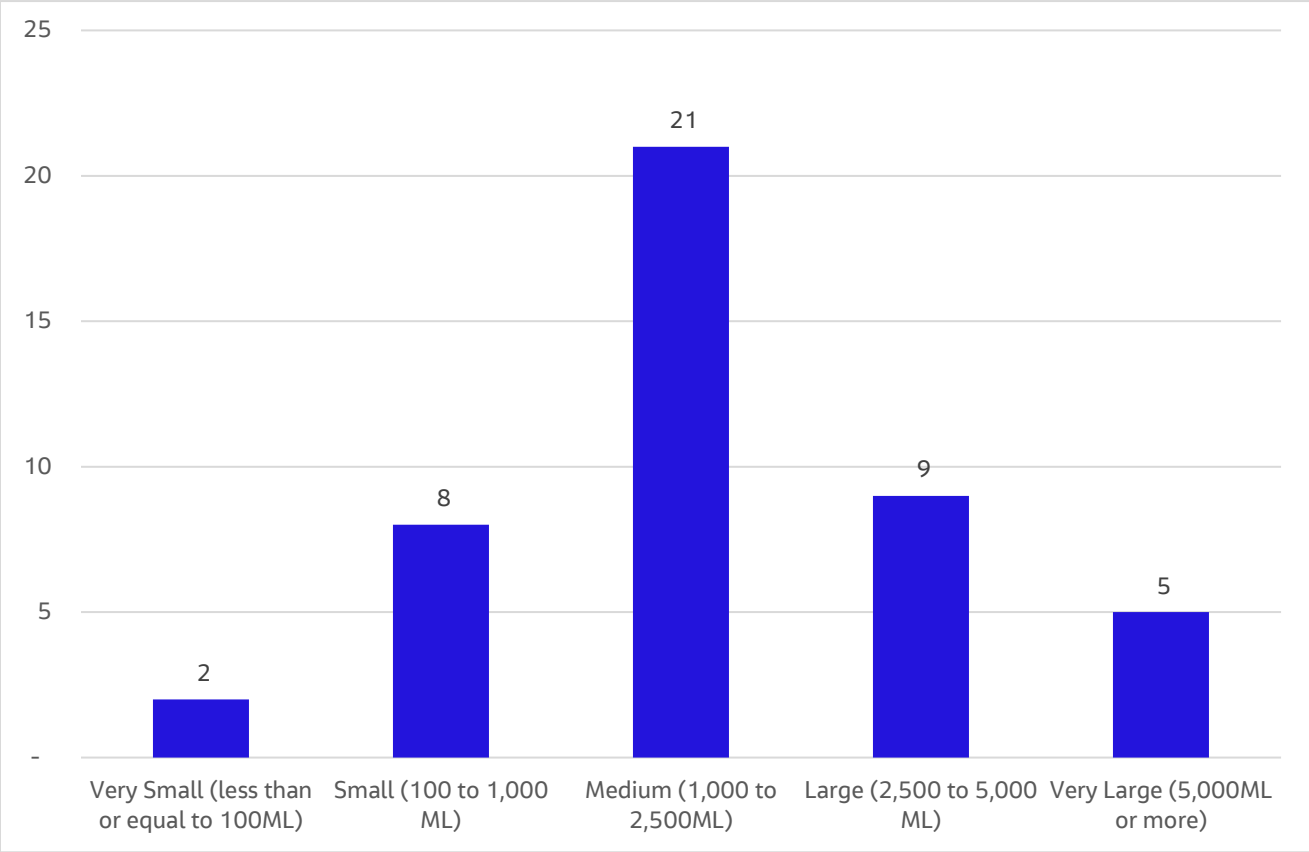
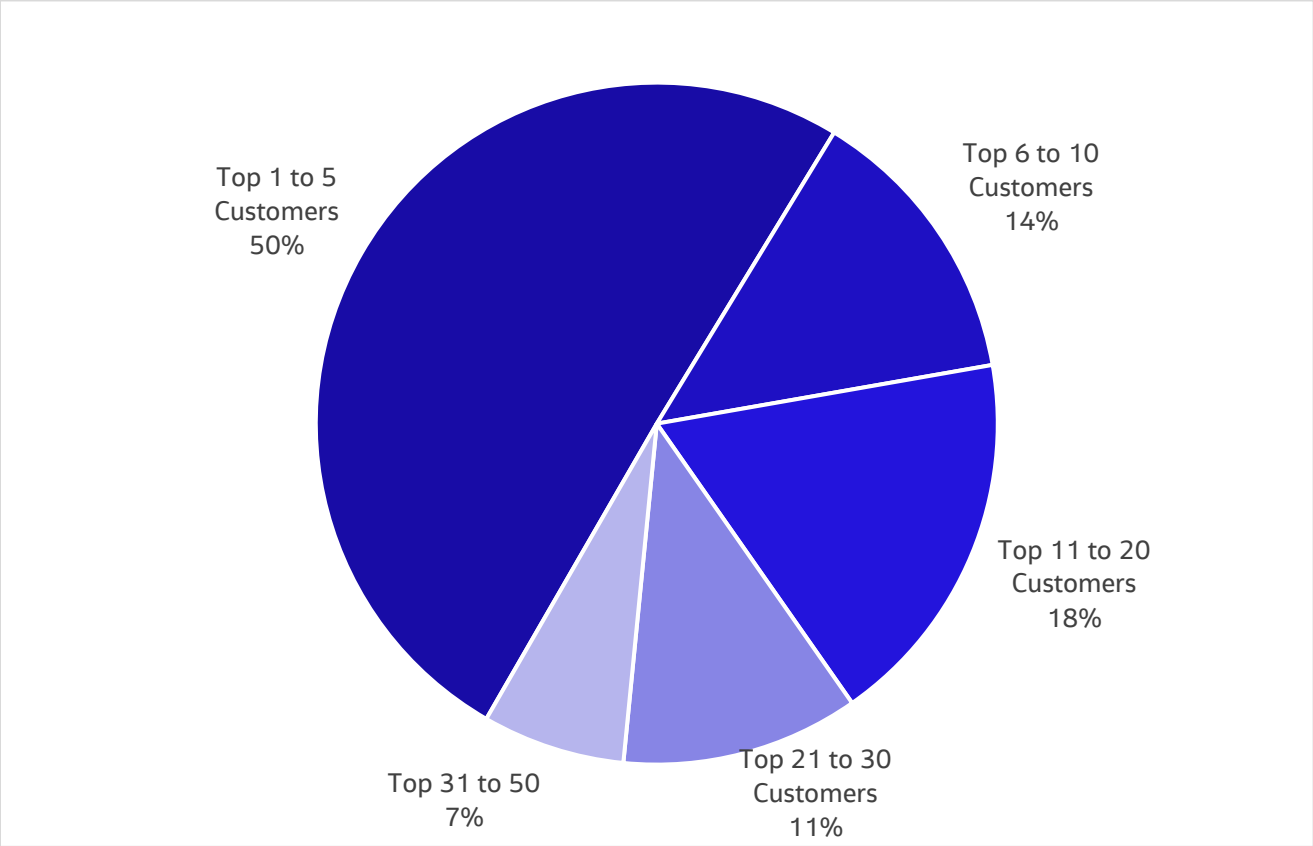


Figure A.16 below outlines the risk-adjusted likely demand by customer grouped based on water volumes (i.e. five customers per ranked category).

Figure A.16: Risk-adjusted likely demand by customer group



The figure above highlights that the top five customers by volume have expressed 50% of the risk-adjusted demand received in round 1. It is almost a mathematical certainty that the top five to ten customers (sorted by volume) will hold a large portion of the volume of demand. The key message here is that the distribution of demand – by volume – is standard and 'as expected' for an irrigation scheme.

A.7 Price elasticity of demand

An indicator of how motivated a cohort of potential customers / investors are for water is its demand change to a change in price. This is sometimes referred to as the price elasticity of demand –or simply, the concept explores the reduction of demand in response to a price increase:

- ***Inelastic demand:*** Least demand reduction as prices rises, it indicates a stronger desire for water and the possibility – all things being equal – of paying more for water or maintaining demand levels if prices increase, for example, to $1,000 or $1,250 per ML for MP and $3,000 or $3,750 for HPA water products.
- ***Elastic demand:*** Highest demand reduction in response to an increase in price, it indicates that as a group, potential customers are less likely to maintain demand as prices rise. This has been demonstrated where demand 'falls off the cliff' between the price points for:
  - Medium priority water of $1,250 to $1,500 per ML (reducing 88%), or
  - High priority ag water of $3,750 to $4,500 per ML (reducing 99%).

Ideally, for round 2, a single set of prices would be adopted based on the likely engineering design and costings developed using round 1 data. A best estimate of costs scenario would seek to test demand at the most likely price, with an assumed capex certainty of P90 (required by governments for a DBC) and a confirmed capital funding scenario, for example, private sector capital contribution (25%) and combined government grant funding (75%).

However, several factors may make a single set of prices not suitable for round 2, including:

- The capital funding structure has not been confirmed.
- The capital budget has increased to significantly higher than the original $360 million estimate. This may result in a higher absolute capital contribution from water purchasers, but a lower portion than 25% of total capital costs (which at time of writing is yet to be determined as the revised P90 capital cost is not known)
- There is a risk of demand drop-off at the one price presented in round 2 – if the price chosen is retrospectively erroneous – which would require further demand assessment work and potentially erode confidence in the project and delay the finalisation of the detailed business case.

An option for round 2 is to provide two or three capital purchase prices for both water products to ensure a robust assessment of demand under various funding models.

A 'three-price' approach – low, medium, and high – could be based on:

- round 1 information, a price where demand does not fall materially below the capacity of the scheme, for example, above $1,250 per ML for medium priority but below $1,500 per ML. Similarly, above $3,000 per ML for high priority ag water but below $4,500 per ML. The aim of this price is to match or exceed $1,250 per ML but avoid a catastrophic reduction in demand (88%) at $1,500 per ML. The options are basically in the range $1,250 per ML to $1,450 per ML. This would be the 'low price'.
- a 20% contribution to the P90 capital cost of the project from the sale of water products ('medium price')
- a 25% contribution to the P90 capital cost of the project from the sale of water products ('high price').

A 'two-price' approach would apply if the third price (the highest / 25%) scenario was impractical.

Refer to the following section for illustrative price implications for round 2 demand assessment.

A.8 Indicative customer capital prices for round 2 (subject to change)

The key purpose of the Round 2 demand assessment is to test demand at a tighter range of prices. Once demand is better understood, the design of the infrastructure is done based on the identified demand. This will allow for the capital costs to be finalised and for a P90 estimate established.

As the demand assessment process is necessarily iterative, the Round 2 demand assessment is done based on a price range which has regard to a number of factors, including the possible capital cost. In advance of knowing the capital costs, some high range assumptions have been used in the modelling. Medium priority equivalent yield has also not been confirmed but ranges from 75 to 95 GL. These assumptions on capex and yield will inform round 2 capital price options.

Assuming a $750 million P90 capex and an MP equivalent yield of 95GL, the following prices may apply.

Table A.27: Round 2 price assumptions (rounded) (subject to change)

Scenario	Estimated P90 Capex ($M)	Estimated Yield MP Equivalent (ML)	Full capex ($/ML)
Low	750	95,000	7,900

If these assumptions apply and utilising the likely conversion factor from MP to HPA of 2.1, the following customer capital prices may apply (noting that these too are illustrative only and subject to change).

Table A.28: Round 2 customer capital price options (rounded) (subject to change)

Price scenario	Medium priority customer capex price ($/ML)	High priority ag customer capex price ($/ML)
Low price	1,400	3,000
Medium price (20% of capex)	1,600	3,400
High price (25% of capex)	2,000	4,200

Green shading indicates prices that are likely to attract material demand. Light orange is uncertain. Customers may have – during round 1 – reduced demand at $1,500 (MP) and $4,500 (HPA) per ML (by 88% and 99% respectively) to send a signal about government funding. It may not have been a true indication of maximum capacity or willingness to pay for the water assets.

Customers might be convinced to pay $1,600 per ML for MP water if they understood that the project depended on that level of support to proceed. This may also apply at $2,000 per ML – although that is less likely given the risks of investing in a greenfield scheme. Investors understand that capital appreciation of asset values (including water) can deliver acceptable returns on investment even at higher acquisition prices. While obtaining material demand at $1,600 per ML or up to $2,000 per ML is uncertain, it may be achievable with the right strategy.

In round 1, HPA customers had very strong demand at $3,750/ML and a 99% reduction to $4,500 per ML, so for HPA a price of $4,200 per is similarly uncertain. The other two price points are considered likely to be affordable for HPA in round 2.

Further work will be done prior to round 2 to assess prices for MP and HPA that are likely to succeed in obtaining / retaining meaningful demand whilst maximising the private sector contribution to the project's capital costs.

A.8.1 Differential pricing for MP and HPA (that does not adhere to the conversion ratio)

Typically, the prices on one row (in the tables above) – which reflect adherence to the MP / HPA conversion ratio for pricing purposes – must be maintained in linked pairs to avoid future administrative and fairness issues. This means the service provider normally would not be able to select, for example, a low price for MP ($1,400 per ML)

and a high price for HPA (say $3,900 to $4,200 per ML). Doing so subjectively, enables water asset owners to convert from MP to HPA (or the reverse) to exploit arbitrage opportunities. In the long term this creates pricing and revenue challenges and may introduce intergenerational equity issues in the medium and long-term.

However, since round 1, further work has been carried out on the provision of a drought-proofing groundwater supply to be made available exclusively to HP customers in times of extended drought, when MP customer volumes may be reduced to zero and HPA customer allocations from the dam are low or zero. This additional supply of groundwater, which is likely to be unrelated to dam conversion ratios, provides an opportunity for round 2 to develop differential pricing of the nature described above (e.g. MP $1,400 and HPA $3,900 per ML).

The price difference would reflect the P90 capital cost of providing groundwater to HPA customers only (net of government grant funding). So, dam water pricing would maintain the relationship suggested by the MP / HPA conversion ratio and HPA customers would pay an additional groundwater capital costs component upfront, raising more revenue to achieve a higher portion of the scheme being funded by customers.

Given the above analysis, there may be scenarios where:

- Customers could contribute 20% or even up to 25% towards P90 capital costs, depending where capital costs and yields land prior to round 2
- Pricing MP and HPA dam water could maintain the conversion factor, avoiding future problems
- However, HPA prices could also reflect additional capital costs associated with providing groundwater to HPA customers, allowing additional funds to be raised from HPA customers.

A.9 Next steps

While the demand assessment process is well developed, the P90 Capex is yet to be confirmed and therefore some informed assumptions have been made. Capital constraints remains a challenge but the overall objective for Jacobs and HIPCo, in consultation with and other key stakeholders, is to determine a viable funding model for the project between private sector and government capital contributions.

With above considered, the following key steps are recommended:

1) Jacobs' engineers further develop the preliminary design, P90 capital and operating costs and available water products.

2) Jacobs' economic and commercial advisors confirm a preliminary assessment of the economic benefits from the project to provide information on the parameters needed to deliver a project with a BRC of 1 or greater.

3) Prior to round 2, it is recommended that the provision of groundwater be costed and priced separately as a transparent component of HPA capital pricing (net of government funding)

4) Prior to round 2, it is recommended that targeted market testing be conducted by Jacobs – with the top 10 customers – to refine the pricing strategy to be adopted for round 2.

5) Jacobs' project leaders work with HIPCo and other key stakeholders to consider viable funding options for the project between private sector and government capital contributions.

6) Prior to round 2, Jacobs finalise round 2 documentation, including confirming water prices and water product characteristics through detailed analysis and ongoing engagement with HIPCo and other key stakeholders.

7) Jacobs and HIPCo to develop and distribute the round 2 documentation / conduct round 2 community engagement in a manner similar to the exceptionally thorough round 1 process.

8) Jacobs analyse round 2 data and refine the engineering design and costs to reflect demand.

9) Jacobs to prepare and finalise all other chapters and assessments required for the DBC and the requirements of the Queensland Government's 2020 guidance on assessing demand for water.