29 February 2024

Rural irrigation price review 2025–2029
Queensland Competition Authority
GPO Box 2257
Brisbane QLD 4001

Submission to the Rural Irrigation Price Review process for the 2025-29 pricing period

The Cane industry collective of the Australian Cane Farmers Association Limited (ACFA), Queensland Cane Agriculture and Renewables Limited (QCAR) and with full and endorsed support of the AgForce Cane Board Limited (ACL) (representative to AgForce Queensland Farmers Limited (AgForce) - (together, the Collective) welcome the opportunity to provide this collaborative submission to the Rural Irrigation Price Review process for the 2025-29 pricing period.

Who we are

Our collective member organisations represent approximately 20% of the sugarcane farmers and 15% of the total sugarcane production in Australia.

QCAR (formerly Pioneer Cane Growers Organisation Ltd) has previously made a joint submission as a member of Burdekin District Cane Growers Ltd.

AgForce Queensland Farmers Limited (AgForce) is also a peak organisation representing Queensland's cattle, grain and sheep, wool & goat producers. The cane, beef, broadacre cropping and sheep, wool & goat industries in Queensland generated around $10.4 billion in on-farm value of production in 2021-22. AgForce's purpose is to advance sustainable agribusiness and strives to ensure the long-term growth, viability, competitiveness and profitability of these industries. Over 5,500 farmers, individuals and businesses provide support to AgForce through membership. Our members own and manage around 55 million hectares, or a third of the state's land area.

The sugarcane industry's contribution to the Australian economy is well documented and communicated by Sugar Research Australia Limited (SRA).[1]

Australian sugarcane production is expected to grow at 2.3% and opportunity growth estimated at $3.6 billion over the next 5 years.[2] Our Queensland producers provide high-

[1] Annual-Report-2022-23_Digital-F.pdf (sugarresearch.com.au)

[2] https://www.ibisworld.com/au/industry/sugar-manufacturing/109/#IndustryStatisticsAndTrends

quality food and fibre to Australian and overseas communities, as well as deliver stewardship of the state's natural environment.

Key recommendations

In the remainder of our submission we describe the background and reasons for our key recommendations that the QCA:

1) Fully considers each of the matters specified at section 26 of the *Queensland Competition Authority Act 1997* (Qld) (the QCA Act).
2) Reinstates the 50 per cent community service obligation (CSO) acknowledgement and discount for Giru Benefited Groundwater Area (GBGA) customers;
3) Includes a price review trigger for GBGA irrigators if the Giru weir and Val Bird weir are reclassified as bulk assets before 30 June 2029;
4) Applies a significant reduction in price across all irrigation schemes in Queensland; and
5) Applies price incentives in designated areas to encourage the use of groundwater where its use will have a known positive impact on the rising groundwater problem.

Important context to the 50 per cent discount

For the forty years prior to 1 July 2020, GBGA farmers received a 50 per cent CSO acknowledgement and discount. That discount was consistent with a wide range of the considerations that are specified at section 26 of the QCA Act, which we summarise in our subsequent discussion on recommendation 2.

Prior to the last review period, a controversial reclassification of the Giru and Val Bird Weirs, over which the QCA had no control, together with a controversial conclusion that the GBGA made a minimal contribution to the water needs of GBGA irrigators each year, contributed to a draft decision by the QCA to remove the 50 per cent CSO discount for GBGA farmers.

Following a draft decision by the QCA to remove that discount, the late provision of further information by Sunwater constrained the QCA's ability to fully consider the underlying issues and the significant consequences of removing that discount.

For example:

- **Attachment 1** includes reports from a hydrogeologist (OD Hydrogeology) and a former natural resources engineer that shows that the GBGA aquifer and supplementary Weirs provided a material contribution to the irrigators needs in the GBGA across the year.
- Information provided by Sunwater (**Refer Attachment 2**) shows that such material contribution had been provided during the six (6) month period, 1 April 2019 through to 30 September 2019 (releases 4,530ML versus usage of 13,322ML). The additional information was noted but not taken into account in the final decision.

The QCA's consultant (see **Attachment 3**) at the time advised that:[3]

[3] Water Solutions, *Report to QCA on rural irrigation price review 2020-2024*, 28 January 2020, p v.

A more detailed assessment may be undertaken to inform deliberations in future price reviews. Such assessment, if undertaken, should consider the issues raised in this report, the WS Sept 2019 report, and the submissions received on the draft QCA report.

This was endorsed by the Ministers Office (see **Attachment 4**).

In this context, and for the reasons described in the discussion of recommendation 2, it is imperative that the QCA fully considers the merit of the 50 per cent discount for GBGA customers in the current review.

Recommendation 1: Fully consider all matters at section 26

In conducting its investigation and recommending prices, consistent with section 24 of the QCA Act, the QCA must consider all matters within sections 26(1) and 26(2) of the QCA Act and the stated matters in the letter of referral, as well as any other matters the QCA considers relevant (QCA Act section 26(3)).

In table 1 below, we set out how each of the matters in section 26(1) is relevant for consideration by the QCA.

Subsection	Summary	Relevance
(a)	Efficient resource allocation	Farmers should be allocated costs with regard to previous investments
(b)	Promote competition	Removing the 50 per cent CSO acknowledgement and discount has the potential to distort competition in the sugarcane farming sector
(d)(i)	Consider efficient cost of providing services	The efficient cost for Sunwater to serve GBGA river farmers is lower than to serve channel farmers.
(d)(ii)	Consider actual cost of providing services	The actual cost for Sunwater to serve GBGA river farmers is lower than to serve channel customers.
(d)(iii)	Consider reliability of services	The reliability of groundwater services is often lower than channel water services.
(g) and (k)	Environmental and ecological effects of prices	Encouraging groundwater consumption avoids negative externalities of flooding and crop loss
(i)	Social welfare and equity	Farmers' capacity to pay should be considered
(j)	Encouraging socially desirable investment	Encouraging investment to promote groundwater consumption avoids negative externalities of flooding and crop loss
(m)	Economic and regional development	Fair pricing will prevent foreclosure, allowing farmers to continue growing and producing sugarcane, for use in many industries, to the benefit of Australian consumers and the broader economy.

The Collective acknowledges that the QCA must apply its judgment in balancing the sometimes conflicting objectives stated in these sources. Nevertheless, we believe the QCA should provide more transparency on the weighting applied to each of the section 26(1) matters considered during the course of its investigation.

Recommendation 2: Reinstate 50 per cent CSO acknowledgement and discount

The Collective sets out below the range of considerations at section 26 of the QCA Act that support the reinstatement of the 50 per cent CSO acknowledgement and discount for GBGA customers.

Level and reliability of service – section 26(d)(iii)

The application of a 50 per cent discount reflects that the level and reliability of service that Sunwater provides to irrigators in the GBGA accessing water via the Haughton River is materially inferior to the service Sunwater provides to Burdekin Channel customers.

This difference in service level is supported by the attached evidence (see **Attachments 1 and 2**) and evidence provided by Sunwater (see **Attachment 5**), which shows that such differences relate to:

- Cost of delivery
- Distribution losses
- Peak flow entitlement
- Monitoring and maintenance costs

Further, the supply of water to additional customers in the Haughton River system further upstream has reduced the reliability of natural water flows, that has historically contributed at least 50% of GBGA customers' irrigation needs, which in turn has required additional balancing storage releases.

The Collective recommends that the QCA undertakes a full assessment of the different level of service received by GBGA customers and the implications of that inferior service for the 50 per cent discount.

The efficient and actual cost of providing services – sections 26(d)(i)-(ii)

The evidence in **Attachments 1 and 2** shows that the costs for irrigators of accessing water from the Haughton River is materially higher (between 100% to 200%) compared to channel irrigators.

By way of brief summary:

- Channel irrigators who gain access to water orders via a direct connection from the water to their farm provided by Sunwater do not require the additional costs of electricity, pipes and equipment to access the water. In contrast, the GBGA irrigators draw their irrigation needs via open water in the river and groundwater in the aquifer requiring more expensive high-pressure pumps, pipes, a lift of up to 8 metres and additional electricity costs. With a consistent tariff between channel and GBGA irrigators, and no 50 per cent discount, river irrigators are at a competitive disadvantage relative to GBGA irrigators.
- **Attachment 5** provides evidence based on actual costing data supplied by Sunwater. The data shows the cost of supply for Sunwater comparing the GBGA and the channel customers over a five (5) year average, demonstrating that the cost of supply to a GBGA customer was $11.32/ML (noting that Sunwater had advised that some shared costs had not been included in the GBGA average) as compared to $42.36/ML for the Channel customers.
- There is a proven existence of a pre-dam, natural yield, water supply via an aquifer and two (2) re-charge weirs in the GBGA totalling 19,700ML, or approximately half the year's irrigation usage estimated at 40,249ML (see **Attachment 1**).

The 50 per cent discount therefore aligns the price paid by GBGA with the efficient and actual cost of the service provided by Sunwater.

As recognized in section 26(d)(i)-(ii), it is a fundamental tenet of economic regulation that price reflects the efficient cost of providing a good or service.

Further, prices that reflect the efficient cost of supply replicate competitive market outcomes and promote the efficient allocation of resources (allocative efficiency), while also promoting efficient investment by users of the services. These considerations are identified at sections 26(1)(a), (b) and (j).

Promotes competition – section 26(b)

The lower level of service and cost of supply to GBGA irrigators is reflected in the additional private costs they have invested and incur to access water. As described above, these additional costs need not be incurred by channel irrigators.

Incurring these additional private costs, while paying the same price as channel irrigators, places GBGA irrigators at a competitive disadvantage, which does not promote competition.

In contrast, the application of a 50 per cent discount better aligns the cost of water for GBGA irrigators with the price that would be charged in a competitive market and places them on equal footing with channel irrigators, thereby promoting competition.

Impact on the environment, efficient resource allocation and socially desirable investment – section 26(a),(g) and (j)

The use of groundwater creates positive externalities because it reduces the likelihood that excess groundwater causes crop flooding and puts at risk long-term farmland sustainability.

The 50 per cent discount provides a price incentive for GBGA customers to use more groundwater and, in turn, has a positive effect on the environment. The 50 per cent discount therefore also encourages investment that is socially desirable and contributes to the state government's objectives to encourage groundwater use.

It also decreases the likelihood of foreclosure of GBGA customers, decreasing the likelihood of the negative externality of crop flooding occurring.

Further, the QCA previously acknowledged the scope to use pricing to promote groundwater use.[4]

The benefits of increased groundwater use are also discussed in recommendation six.

Social welfare and equity considerations, economic and regional development – sections 26(i) and 26(m)

The cost of water is a significant component of the input costs for GBGA customers, eg, it makes up between five and ten per cent of their costs.

Further, GBGA customers are located in a region that has very low cane yields and low CCS yields and provides no other commercially viable option for the supply of water.[5]

The application of the 50 per cent discount therefore plays an important role in supporting the long-term commercial viability of GBGA customers. It is therefore consistent with social welfare and equity considerations.

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[4] QCA, *Rural irrigation price review 2025-29 - guidance for stakeholder*, March 2023, p 121.

[5] GBGA customers' outside option for acquiring water is via trucks, which is highly cost prohibitive.

Recommendation 3: Specify price review trigger

Weirs reclassification as distribution assets – section 26(1)(a) inefficient resource allocation

As noted in our background summary, the Giru weir and Val Bird weir were controversially reclassified from bulk assets to distribution assets. The reclassification of these weirs to distribution assets has had a detrimental effect on the viability of GBGA irrigators by creating a rationale for imposing a common charge across all irrigators in the Burdekin Haughton Water Supply Scheme.

The Collective understands from the QCA's 2020-24 price review that this matter is more appropriate for the government to address rather than the QCA. As such, QCAR is currently investigating with the Minister the possibility for this reclassification to be reversed.

In light of this, the Collective **recommends** that the QCA includes a trigger event to re-determine the price paid by GBGA irrigators if the Minister reclassifies the Giru weir and Val Bird weir as bulk assets, to reflect the inherently lower service provided by these weirs.

Similarly, the previous 40-year recognition of the GBGA's pre-dam, natural yield was similar to the current and ongoing recognition of the Burdekin Lower Water Board's (BLWB) recognition of a pre-dam natural yield entitlement of 185,000 ML per annum, considered a Community Service Obligation, due to this water being accessed by irrigators prior to the construction of the BFD. The LBWB's entitlement was gazetted decades ago and is referred to in the Minister's Referral letter. We support the LBWB's current entitlement and intend to apply to have the GBGA's entitlement re-instated and recognised by way of a gazetted CSO entitlement.

Recommendation 4: Provide significant price reductions on water prices to all farmers

In this section, the Collective recommends the QCA provides significant price reductions on water prices, to all farmers to:

- account for increased costs of farming;
- reflect increased costs of legislative compliance;
- support socially desirable investment, economic and regional development objectives.

Increased costs of farming are outpacing sugar price increases, reducing capacity to pay

Section 26(1)(i) of the QCA Act requires the QCA to consider social welfare and equity considerations of pricing. It is well-documented that inflation and the costs of living since the previous review have grown exponentially, which translates directly to the costs of farming. While sugarcane farmers have seen a spike in the world price of sugar over the last 12 months, such price spikes historically have always corrected and often back to a breakeven point for farmers.

Australian sugarcane farmers are price takers of the world sugar price, which means they cannot necessarily adjust their Cane Supply Agreement (CSA) selling prices to account for supply cost increases.

The prior pricing period submission demonstrated that a small proportion of farmers were making a profit, the majority were breaking even and a small proportion were making a loss.

For those farmers making a loss, geographical location, soil type, water and electricity costs were major contributing factors. For many sugarcane farmers, electricity costs in the Burdekin can represent up to 10% of total farming costs.[6]

To account for the effect of low profit margins and world sugar price uncertainty and volatility on farmers' capacity to pay, we believe that irrigation prices should be reduced across the board.

Impact of funding new legislative obligations since last pricing review on capacity to pay

Section 26(1)(k) of the QCA Act requires the QCA to give consideration to legislation and government policies relating to ecologically sustainable development. Since the previous pricing path review for irrigation, new legislative obligations have been introduced in respect of expanded cropping and the requirement to develop and maintain N&P (Nitrogen and Potassium) Plans and Budgets.

While the expanded cropping regulations only affect farms where additional or new cropping is being undertaken and therefore do not affect existing farming operations, the N&P laws are new requirements are mandatory for all farmers, who incur an establishment cost and an annual maintenance cost. This additional cost further reduces farmers' capacity to pay for water price increases.

Support socially desirable investment, economic and regional development objectives

Sections 26(1)(j) and 26(1)(m) of the QCA Act require the QCA to give consideration to whether the pricing practices may discourage socially desirable investment or innovation by persons carrying on non-government business, and to have regard to economic and regional development issues, including employment and investment growth.

The aforementioned increasing cost of living pressures in addition to high water costs are contributing towards reduced succession planning rates, decreased or deferred investment in new farm equipment or improved farm management practices, and increased farm foreclosure rates.

This is also threatening the sugarcane industry's participation as a major player in the renewables and bio-economy spaces, as farmers could only contribute to these industries if they stay operational.

Recommendation 5: Introduce price incentives for groundwater use

Pricing incentives can address serious Rising Groundwater environmental issues

It has been established that there is a rising groundwater problem in the Burdekin which is attributed to the construction of the Burdekin Falls Dam (BFD). The rising groundwater occurs when water distributed into the river or channel areas for use as irrigation water on crops, has seeped into underground water supplies and has risen to the surface and killed existing crops and made farmland unable to be used for growing crops, especially sugarcane.

[6] This cost is exacerbated for GBGA river irrigators who require significant electricity to pump and lift water up to 8 metres.

Consequently, use of groundwater can help to avoid the negative externality of crop flooding and long-term farmland sustainability.

Government has known about this problem for some time and has been developing strategies and funding to address the problem in the Channel part of the Scheme. For example, the Government has been funding a de-watering program on farms as part of a strategy to reduce rising groundwater in known problem areas.

Designing a pricing strategy to provide incentives to irrigators who choose to use groundwater instead of channel/open water could further encourage the use of groundwater, avoiding negative environmental externalities, in line with section 26(1)(g) of the QCA Act.

We therefore **recommend** that incentives be introduced into pricing in designated areas where the use of groundwater will have a known positive impact on the rising groundwater problem.

Other matters

Insurance Costs

It was noted that approximately one-third of Sunwater and SEQwater's operating costs were committed to Insurance and that this represents over a 30% increase in such costs since the last irrigation pricing review. There are many strategies being developed in business to reduce the level of insurance cost including, consideration of higher deductibles, reviewing insured cost bases and consideration of self-insurance opportunities

We **recommend** that this estimated cost be scrutinized more closely and re-assessed following a further consideration of cost reduction strategies including higher deductibles, review of cost bases and potentially opportunities where some events can be self-insured by Sunwater or Government.

We look forward to your consideration of the matters raised in our submission.

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Charles Quagliata

QCAR

Chairman

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Don Murday

ACFA

Chairman

.....

Russell Hall

ACL

AgForce Cane President

List of attachments

Attachment 1	2019 Full submission to QCA dated 4/11/2019
Attachment 2	2019 Additional Submission dated 12/12/2019
Attachment 3	Water Solutions Report dated 30 January 2020
Attachment 4	Minister's Chief of Staff Letter, on behalf of the Minister, dated 19 May 2021
Attachment 5	GBGA Irrigators Committee submission to QCA dated August 2023

BURDEKIN DISTRICT CANE GROWERS LIMITED

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AYR QLD 4807
Phone: 07 47832111
Email: manager@pcgo.com.au
ABN 30 168 732 269

4 November 2019

Professor Flavio Menezes
Chairman
Queensland Competition Authority
Level 27
145 Ann Street
Brisbane Queensland 4000

Dear Chair,

Attached is a submission (Refer Attachment A) in response to the Queensland Competition Authority's draft Report "Rural Irrigation Price Review 2020-24 Part B: Sunwater, dated August 2019.

The Burdekin District Cane Growers Limited represents the interests of all of the members of the Invicta Cane Growers Organisation Limited (ICGO), the Pioneer Cane Growers Organisation Limited (PCGO) and the Kalamia Cane Growers Organisation Limited (KCGO) who are rural irrigators in the Burdekin-Haughton Distribution System which incorporates the Burdekin Channel, Burdekin-Giru Groundwater and Burdekin-Gladys Lagoon Tariff Groups.

In addition, we advise that the attached signed authority (refer Attachment B) means that we also represent the interests, through ICGO, the rural irrigators found on the signed authority who are not members of three Cane Grower organisations listed above.

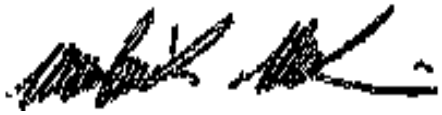
The attached submission does not support any proposed price increases for Parts A, B, C or D as set out in *Table 126 – Draft recommended Prices – distribution systems ($$/ML, Nominal)* and nor does it support any irrigator contribution toward a dam safety upgrade being considered for a subsequent pricing path period.

With regard to the Giru Benefitted Area Tariff Group, our submission provides strong grounds and evidence for continuing the existing price path arrangements in the 2020-24 pricing period, noting that these arrangements have been established since pricing was introduced in the 1990s. The submission also provides clear evidence of service, supply and cost differences and that, in the absence of sufficient and reliable hydrogeological evidence to support a conclusion that there is no material natural flow contribution generated by an aquifer and the Val Bird and Giru weirs situated in the *Giru Benefitted Groundwater Area* (as defined under the *Water Plan (Burdekin Basin) 2007*), there is a strong basis for differential pricing of the medium priority users in the Giru Benefitted Area Tariff Group.

We would also draw the QCA's attention to its statutory obligation under the Queensland Competition Authority Act in Sec 26 "Matters to be considered by authority for investigation" and specifically subsection (1) which requires the QCA "In conducting an investigation under this division, the authority must have regard to the following matters: (g) the impact on the environment of prices charged by the government agency or other person carrying on the monopoly business activity". We

bring to the attention of the QCA, the existence of a serious environmental issue in the Burdekin - Haughton region concerning “Rising Groundwater”. In this regard, we had hoped to have been able to raise issues brought to our attention by the Department of Natural Resources, Mines and Energy, but a Report that has been long in the making is still yet to be finalised. We are recommending in this submission that consideration be given to the QCA recommending to Government a pricing reduction to serve as an incentive to encourage irrigators in the affected regions to increase the amount of groundwater being used as part of a strategy to address this issue and to recognise that one of the perverse consequences of increasing prices may be a reduction in cane growing activity and therefore use of groundwater irrigation leading to a worsening rising groundwater issue and threat to the environment.

Yours faithfully
BURDEKIN DISTRICT CANE GROWERS LTD



MR MICHAEL KERN

Response Paper

Queensland Competition Authority – Rural Irrigation Price Review 2020–24 Draft Report

Burdekin District Cane Growers Ltd

4 November 2019

Contents

1 Executive Summary

Burdekin District Cane Growers Ltd (BDCG) represents jointly the interests of irrigators who are member of the Invicta Cane Growers Organisation, Pioneer Cane Growers Organisation and Kalamia Cane Growers Organisation.

Based on the evidence put forward as part of this proposal and a comprehensive analysis of all reports and consultation including the draft reports provided by the Queensland Competition Authority (QCA) we make the following recommendations:

1. Current data and analysis on which pricing changes have been based be reviewed and critically analysed in light of demonstrated inconsistencies and inaccurate reports
2. Current pricing for all BDCG irrigators in the Burdekin Channel, Burdekin-Giru Groundwater and Burdekin-Gladys Lagoon Tariff Groups be assessed in relation to the capacity to pay and absorb additional costs
3. Current arrangement for Giru Benefitted Groundwater Area (GBGA) irrigators be retained recognising the use of natural yield and encouraging the utilisation of groundwater
4. Arrangements for the GBGA be recognised in regulatory instruments to prevent ongoing and continual assessment by the QCA during each price pathway
5. Recognition that different water supply products are provided to GBGA irrigators and channel irrigators with different infrastructure and maintenance costs
6. Independent and appropriate analysis be undertaken by a hydrogeologist in relation to the presence of aquifer and rising groundwater
7. Costs associated with the dam safety upgrade should not be placed upon irrigators

BDCG welcomes and encourages more assessment of this response and other vital instruments utilised to make determinations for the QCA draft report. GBGA has identified significant concerns, data inconsistencies and inaccurate conclusions put forward by the QCA in relation to the management of pricing for rural irrigation. While these issues have been highlighted during various consultation processes this paper seeks to document the relevant evidence and put forward a case for further review and analysis prior to final decision-making and recommendation to Government.

BDCG holds the view that the current draft report is not based on factual, verifiable data and therefore does not accurately indicate the critical, local issues in this region that impact on potential changes to pricing.

2 Key Issue Areas

The Burdekin District Cane Growers Ltd (BDCG) is responding to a number of conclusions that have been reached by the Queensland Competition Authority (QCA) in its assessment of the pricing path arrangements for irrigators in the Burdekin Channel, Burdekin-Giru Groundwater and Burdekin-Gladys Lagoon Tariff Groups. The attached submission does not support any proposed price increases for Parts A, B, C or D as set out in Table 126 – Draft recommended Prices – distribution systems ($$/ML, Nominal) and nor does it support any irrigator contribution toward a dam safety upgrade being considered for a subsequent pricing path period.

The QCA draft report also includes conclusions (6.5.2. Part B, Burdekin – Haughton Distribution System – Giru Benefitted Area) contained in the draft include:

- "Given that the Water Solutions hydrological advice indicates that the natural yields in the GBA are immaterial, we consider that it is not appropriate to continue the 2006 – 2011 pricing path arrangements in the 2020 – 2024 pricing period
- "As the costs of supplying the GBA tariff group customers are not materially different to the costs of supplying Burdekin Channel tariff group customers, we consider that the cost-reflective prices should be the same for both tariff group customers"
- "We note the difference between the revenue and costs of supply to the GBA tariff group will not be recovered from other tariff groups and will instead be covered by the Government's CSO"

The BDCG puts forward this response to specifically address the above conclusions and ensure the QCA has a clear understanding and awareness of the historical, local and practical operational issues that impact on water supply in this region and the GBGA.

The BDCG believes that the advice provided by Water Solutions is incorrect and has been based on data that is incorrect, incomplete and inappropriate for pricing purposes. It is our view that this was a limited scope review conducted on a desktop basis from Brisbane without the consultant ever visiting the designated GBGA region. The conclusions drawn from the review and the advice given to the QCA should not be relied upon and regarded as not appropriate as a basis to set aside current pricing path arrangements which have been established for decades on sound hydrogeological principles.

Of deeper concern is the approach that has been taken to arrive at the current conclusions, in particular the use of and heavy reliance on data contained in the 2017 Kavanagh Report and also the OD Hydrology Report. SunWater has confirmed that the data in the Kavanagh Report was never intended to be used for pricing purposes. Coupled with that is the discovery that both the SunWater engaged Hydrologist and the QCA engaged Hydrologist relied on analysis of data from bores that were located outside of the defined GBGA in Schedule 3 of the Water Plan (Burdekin Basin) 2007, a subordinate legislative instrument gazetted under the Water Act 2000, to arrive at the conclusions that we believe are in error.

As the existence and assessment of the aquifer and the two Weirs (Val Bird Weir and Giru Weir) that were designed and constructed as bulk water assets to enhance the availability of groundwater located within the GBGA, it is important that we revisit the historical context and subsequent relevant information that provides compelling evidence in support of a conclusion that the GBGA is appropriately defined under the relevant Water Plan and that the longstanding assessment that the groundwater aquifer supply

augmented by the Val Bird Weir and the Giru Weir has available on average 19700 ML to contribute towards the GBGA's annual allocation of 40,242ML.

In addition, this submission seeks to challenge the apparent misconception that costs of supplying the GBGA tariff group customers are not materially different to the costs of supplying Burdekin Channel tariff group customers. It is our view that there are significant differences in costs borne between a GBGA irrigator and a channel irrigator in supplying water.

Finally, we believe that the 19,700ML, expressed in terms of a 49% free water allocation should continue to be recognised as a free water allocation and as such does not represent a discount that other irrigators are required to subsidize.

The following critical issues have been determined through an in-depth analysis of available reports including the Olzard hydrogeologist report (commissioned by the GBGA irrigators to assess the veracity of conclusions drawn by Water Solutions) and participation in consultations offered by the QCA and where relevant discussions/communication with other stakeholders. These issues are viewed by BDCG as significant and contributing to the potential for inaccurate assessments by the QCA in the determination of pricing for irrigators in this region. BDCG has also provided relevant evidence to support these claims.

BDCG encourages the QCA to conduct a comprehensive and thorough assessment of these issues before making a final determination moving forward to Government.

2.1 Existence and extent of the Giru Benefited Area Groundwater Area

2.1.1 Relevant History

In 1920, the Invicta Mill was transferred from Bundaberg to commence operations in Giru. In 2020 it will celebrate its centenary year of operation. Cane was already growing in the GBGA and it is understood that the decision to establish the Mill in the Giru area was largely based on the potential for cane to be grown in the region and the known existence of an underground water supply close by.

In 1967, the Water Resources Commission report on groundwater investigations described the aquifer within the Haughton River and Mount Elliott and recommended it be declared a sub artesian supply under the Water Act. It was further recommended that surface storage be established to provide an additional 10,000 acre feet. The original intention of this process was to provide a temporary solution supported by surface water storage from various weirs. In 1971 61 farms using aquifer groundwater and surface water needed approximately 19,736 ML. However, the aquifer only had capacity for 13,568 ML. The weirs increased capacity to 19,700 ML. From 1982 to 1986 the average volume pumped was 13,896 ML with a maximum of 17,914 ML.

The acknowledgement and quantification of the volume of the aquifer in the GBGA has been ongoing since 1967 and more so following the infrastructure works carried out to augment the groundwater storages.

An example which recognises the existence and significance of the GBGA groundwater benefitted supply is found in the letter below which recognises the GBGA contribution, at the time of the introduction of the Water Act in 1990 required to be paid when benefiting from the Haughton River supplementation:

Water Resources Commission

Your reference
In reply please quote
Our reference
When enquiring
please ask for:

Quay Road, Ayr
P.O. Box 1158, Ayr, Q. 4807
Facsimile (077) 83 4186
Telephone (077) 83 4577, 83 4341

I have enclosed with this letter a leaflet outlining changes to the operation and management of the Irrigation Area following commencement of the Water Resources Act on 1st February 1990.

The new Act provides for the issue of a licence to a landowner who has a holding in the Irrigation Area and is allocated water from any one source. This was previously known as Water Right, Water Agreement or Sales of Water. This allocation, to be known as a "Nominal Allocation" will be shown on the Licence documents along with details of the holding and the management arrangements for the Area. I intend that your licence showing all these details will be issued as soon as possible.

A further change that will affect you is the new structure for the charging of interest. These changes are as follows:-

1) the annual charge will attract interest if unpaid after six (6) months of the due date not seven (7) months as at present
2) sales of water will attract interest if unpaid after one (1) month of the due date.

Annual invoices will be issued on 2nd April, 1990 and will show the above particulars. The water charges for 1990 are as follows:

Burdekin River Irrigation Area - Supply from Channels	- $30.45
Giru Benefitted Area - When benefitted from Haughton River Supplementation	- $13.90
Private diversion from regulated streams	- $ 9.70

A copy of Sections 10.13 and 10.14 of the new Act is enclosed for your information and if you have any questions please do not hesitate to contact this Office.

Yours faithfully,

E.P. DONOHUE
DISTRICT ENGINEER,
AYR.

Water Resources

Through the IROL the allocation of groundwater in the GBGA was 40,242 ML in 2000. This combined groundwater of 19,700 ML and BR of 20,549 ML. Measures were implemented to lock in a system where there was a real incentive to continue use of the groundwater through equal arrangements within the Giru Benefitted Groundwater Area (GBGA) as a strategy to stop rising groundwater affecting properties as has now happened elsewhere in the BRIA by encouraging continued use of the good quality groundwater. We understand that this was achieved by limiting supply to only half. The continued use of the GBGA aquifer and ongoing contribution by the Val Bird Weir and Giru Weir to supply water by irrigators demonstrates that the original function and purpose of these facilities has not changed. In recent years, it appears that the basis for these arrangements has been lost.

In a letter provided by the former regional engineer for the Water Resources Commission, we were advised that infrastructure was developed and implemented to ensure that all irrigators that had been contributing to the scheme had equal access to water.

Lower Burdekin Water (LBW) has a legislated free water entitlement. This allocation is a legacy from several deliberate, considered and consistent Government policy and regulatory decisions. Similarities are drawn between this entitlement and the current arrangements for the GBGA. If there were to be a loss of the free water entitlement as per the LBW water agreement and GBGA water plan there would be a significant increase in cost and irrigators would not have the capacity to pay.

Recent statistics released by SunWater indicates extremely low releases between the February flood event in this region and 30 June 2019 of approximately 300 ML. This statistic indicates that the groundwater supply would be capable of supplying the GBGA for at least six months for irrigation purposes even after water losses. It also proves the conclusion in the Water Solutions report on page VII and 49 that GBGA irrigators receive little contribution from natural Haughton River flows in dry period is inconsistent with recent observations and other data included in report.

2.1.2 Conclusions

BDCG seeks to outline factors that are considered critical to ongoing irrigation pricing in this region and specifically the Giru Benefitted Groundwater Area (GBGA). These issues are consistently raised through various reports and highlighted by irrigators outside of the GBGA where impact is minimal. The following conclusions can be drawn from available documentation and legislation:

- The existence of an aquifer in the Giru Benefited Groundwater Area (GBGA) has been officially recognised since 1967 before the existence of the Burdekin Falls Dam and the Haughton Burdekin Water Supply Scheme
- The GBGA is recognised in the Water Plan (Burdekin Basin) 2007 Schedule 3 as at June 2019
- The aquifer has been measured at 10,000 acre feet or 13,568 ML
- The Val Bird and Giru Weirs were constructed to enhance the availability and reliability of the aquifer and the groundwater supply in the GBGA by a further 6,132 ML bringing the groundwater supply to a total of 19,700 ML meeting the assessed irrigation needs in 1971 of 19,736 ML
- The GBGA is a separate area from the Haughton Zone A and should continue to be recognised as such
- Evidence continues to be shown through the IROL in 2000 for a capped allocation in the GBGA set to 40,249 ML with 19,700 ML groundwater and 20,549 ML BR

- Evidence of the existence of the aquifer can be found in usage data supplied by SunWater where the annual usage has significantly exceeded the annual release quantity adjusted for transmission losses
- Recent and compelling evidence of the continuing existence of an aquifer and enhanced availability of groundwater from the two weirs is evidenced in the GBGA water release and using data supplied by SunWater for the period 1 April 2019 to 30 September 2019 (awaiting formal confirmation of period 1/7-30/9 but known usage data for period 1/4/19-30/9/19 is 13,322 ML and releases for the period 7/2-30/6 totalled 300ML)
- Arrangements were initially established in 1987 to require the usage of equal parts of groundwater and surface water to deliberately provide an incentive for the use of groundwater in the GBGA to stop impact of rising groundwater affecting properties as evidenced in the BRIA region
- The GBGA free water entitlement is equivalent to the free water entitlement for the Lower Burdekin Water Board in terms of the aquifer's historical existence, regulatory precedents in the form of the Water Plan (Burdekin Basin) 2007, which recognises in Schedule 3 the GBGA and the fact that the 19,700 ML availability existed before both the Burdekin Falls Dam and the Burdekin Haughton Water Supply Scheme

2.1.3 Recommendations

As a result of the conclusions and in the context of current evidence of an aquifer and supporting weirs in the GBGA the following recommendations are put forward on this issue:

- The full entitlement of 19,700 ML be formally recognised in the Water Plan (Burdekin Basin) 2007 and be declared to incorporate the groundwater aquifer and the Val Bird Weir and the Giru Weir which serve to enhance the availability of the groundwater supply
- The Treasurer be requested to incorporate into future referral letters, an instruction to the QCA that provides ongoing security to the Giru Benefited Groundwater Area (GBGA) irrigators through the recognition of the free water entitlement of 19,700 ML or 49% reduction in price, which has been assessed and recognised since 1987 (pre-BHWSS and pre-BFD) and for it not to be subject to further scrutiny by the QCA in future pricing path negotiations
- In the context of the above recommendation and similar to the GBGA entitlement, the Burdekin District Cane Growers Ltd (BDCG) recommends the entitlement of 185,000 ML in existence before the Burdekin Falls Dam and before the Burdekin Haughton Water Supply Scheme for the Lower Burdekin Water Board be recognised and retained in perpetuity and continue not to be subject to further scrutiny by the QCA in future pricing path negotiations

2.2 Queensland Competition Authority Hydrologist Report – 2019

Burdekin District Cane Growers Ltd (BDCG) has identified and can clearly articulate a number of significant concerns relating to shortcomings in the reports provided on behalf of SunWater and the Queensland Competition Authority (QCA). These concerns relate to basic errors and inconsistencies that have a significant impact on pricing and the viability of farming in this region. BDCG questions the selection of a hydrologist, rather than the expected engagement of a hydrogeologist, who would be more appropriately qualified and experienced in order to conduct an assessment of a groundwater system. Combined with a reliance on inconsistent and unreliable data the underlying basis for the QCA review and conclusions which then give rise to proposed changes to irrigation pricing arrangements appears flawed. The following significant issues have been identified with the data presented by the QCA and SunWater as the basis for the pricing review.

2.2.1 Kavanagh Report 2017

The reports commissioned by SunWater (carried out by ODH) and by QCA (carried out by Water Solutions) relies heavily on the data provided within the Kavanagh Report. This data is considered to be incomplete, inaccurate and unreliable. The Kavanagh Report was never intended for irrigation pricing purposes yet forms a significant part of both reports prepared by consultants on behalf of SunWater and the QCA. SunWater specifically advised that the Kavanagh data was not intended for pricing purposes. The tables presented on page 12 of section 7,1 of the Kavanagh Report are impacted by estimated data and several key assumptions and qualifications including a failure to take into account system inefficiencies arising from water transmission losses. The failure to exclude water removed upstream above the GBGA and the use of water from this allocation for irrigation outside of the GBGA. The non-identification of temporary transfers and failure to exclude these from both the releases and usage data together with end of scheme loses at Healeys Lagoon results in data that appears to be misleading.

The omission of scheme efficiencies and loss of water between the supplier and customer is a significant error. In data put forward by SunWater for scheme identified efficiency in 2010 to 2011 at 55%. In real terms if SunWater supplies 10,000 ML to a customer approximately 5500 ML would be delivered. Based on this efficiency if a customer was to request 10,000 ML SunWater would have to release 18,181 ML to achieve this outcome. The scheme efficiency between the 2006 / 2007 and 2017 / 2018 for channel users was 65% and therefore had average loses of 35%.

	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Total Scheme efficiency %	71.3%	65.9%	60.4%	65.9%	55.0%	62.9%	61.4%	58.8%	71.0%	72.6%	78.9%	83.7%	84.5%

Total Scheme Efficiency, SunWater

Issues begin to arise when applying the Kavanagh data to actual usage by irrigators. The Kavanagh data highlights an annual release of more than 40,000ML yet irrigators used significantly less. BDCG highlights that the causes of transmission inefficiencies includes evaporation and channel leakage or seepage. Further contributing factors to losses include:

- Poor recording of releases through manual estimates; for example if a water gate is used and water release is estimated by way of the time the gate is opened then if weed was to be partially blocking the gate then the amount of release would be less than the volume recorded
- Losses of water out of Healeys Lagoon at the end of the system which are not trapped and are unrecorded
- Environmental flows when the Val Bird Weir is kept full and rain events are lost over the top of the weir instead of being captured.
- Water releases when weed control measures are being employed

Further evidence of this issue can be seen through a report completed on the efficiencies of the GBGA by the Department of Natural Resources (see below snapshot). This report prepared by GH&D dated April 2001 assessed the Haughton River (GBGA) efficiencies for the two years at 58.7% and 33.4% for 1996 to 1997 and 1997 to 1998 respectively as per the table below. It is also noted the assessor had issues with the availability of reliable release data for almost the entire review period during 1991/92 – 1997/98.

5.4.2 *Haughton River - Giru Benefited Area*

Releases are made from the Haughton balancing storage to supplement flows in the Haughton River, which supplies water to the Giru Benefited (groundwater) Area (GBA).

Val Bird and Giru Weirs regulate the Haughton River, with bulk water extractions made directly to Healey's Lagoon and in turn Reed Beds Lagoon. The area is primarily operated to maximise infiltration to the groundwater delta. All bores in the GBA are metered, with water use volumes available from the WERD database. Due to the availability of release data, however, the water balance analysis has been limited to the 1996/97 and 1997/98 water years only, as shown in Table 5.6 below.

It can be seen from Table 5.6 that annual efficiencies were calculated at 59% and 33% for the two years investigated.

The water balance analysis has also been undertaken on a quarterly time step, with the results included in Appendix D.2. A plot of quarterly releases and metered use has been shown in Figure 5.7.

In general it would appear that the return on releases to the Haughton River is relatively consistent, although the impacts of losses during dry periods appear to be considerable.

Table 5.6
Haughton River (GBA) Annual Water Balance

Annual Water Balance	Water Year	
	1996/97	1997/98
Regulated Release - Haughton Balancing Storage (ML)	38,528	22,895
Recorded Water Use (ML)	22,612	7,655
Operational Efficiency (%)	58.7	33.4

The above data adds further evidence to the importance of accounting for system efficiencies when calculating water usage in the GBGA.

The data within the Kavanagh Report appears not to have been checked or interrogated for accuracy by ODH or Water Solutions. Significant inconsistencies and inaccuracies included not taking into account known adjustments such as transmission losses that would materially impact on conclusions.

Burdekin District Cane Growers Ltd (BDCG) highlights these issues with the Kavanagh Report and concludes that the underlying data used by SunWater and QCA appears inaccurate and unreliable. This data was based on estimates, assumptions and has not been checked for validity and completeness. This data is potentially misleading and undermines the reports commissioned by both agencies.

Data Analysis: Kavanagh Report

Burdekin District Cane Growers Ltd (BDCG) has conducted an additional analysis of the Kavanagh report to examine the influence of efficiency on water usage and final data. The current Kavanagh Review was compiled by SunWater and the BRIA committee. There are number of errors and inconsistencies in the data presented within this report.

These inconsistencies are highlighted below and included within the additional analysis undertaken to demonstrate the impact of these factors and enclosed within this section.

1. Table 1 Estimation of Anticipated and Achieved Water Balance

Under the Column "Delivered" and the column "Efficiency of total usage Haughton Zone A"

2005/06	33,125	103%
2006/07	37,937	120%

There is an inconsistency with data recorded in Table 2 Diversion and Usage Figures for Haughton Zone A. Under the Column "Total Water Use Haughton Zone A SW & GW" and the Column "Efficiency of total usage in Haughton Zone A.

2005/06	33,994	106%
2006/07	37,985	120%

2. Table 2

Note (a) notes that efficiency does not take into account transmission efficiencies. This note does not appear under Table 1 or Table 9

3. Total Allocation in GBA:

- Appears as 40,249 twice on page 5
- Appears as HZA 40,184 on page 9 Table 5
- Appears as HZA 40,184 on page 10 Table 6

4. Table 2 Diversion and Usage Figures for Haughton Zone A

Under Column "Total Water Use Haughton Zone A SW & GW" and column "All Haughton Zone A SW Metered Usage" "efficiency of total usage"

Average Printed:	35,781	24,678	102%
Recalculated with existing figures:			114%
Recalculated with amended figures:	30,559	19,455	95%

5. The data that appears in Table 9 does not account for the Imported Temporary Transfers brought in from outside of the Haughton Zone A

- Sunwater provided 10 years data and advised that the data was indicative of the seasonal trends in ITTs
- For the purposes of testing the Kavanagh data only 7 years out of the 10 was used and for those years an average of 5,335ML resulted
- If we were to use the whole 10 years as indicative then the average of the 10 years was 6,448. We used in our calculations the lower figure

6. The data does not account for Transmission losses/system inefficiencies

- For the purposes of applying a comparable system in efficiency percentage it was determined that the efficiency percentage for the channel should be used
- Sunwater provided 10 years of channel efficiency data which showed an average of 64% efficiency as shown earlier in this submission

- In the attached spreadsheet it was determined to use actuals where known ad then apply the average percentage

7. Calculation of an Estimated Net Water Available after removal of ITTs and Transmission losses

Net Available water was calculated as 17,009 on average over the 19 year period

8. Calculation of an adjusted usage after removal of ITTs was 27,439

9. Calculation of an Estimated Efficiency percentage was 161%

There is still no allowance in the calculations for:

- Inaccuracies due to manual estimates of releases up until October 2015
- Losses out of the back end of the system of Healey's lagoon
- Environmental flows

In 2019, this efficiency is expected to be in excess of 200% based on preliminary release and usage data.

BDCG has attempted where possible to adapt the available data to the Kavanagh Report and produce results that are more accurate and more closely aligned with actual operations in the GBGA. This data analysis clearly demonstrates it is essential to incorporate inefficiency, transmission losses and temporary transfers to ensure an accurate and consistent analysis of water usage in the GBGA.

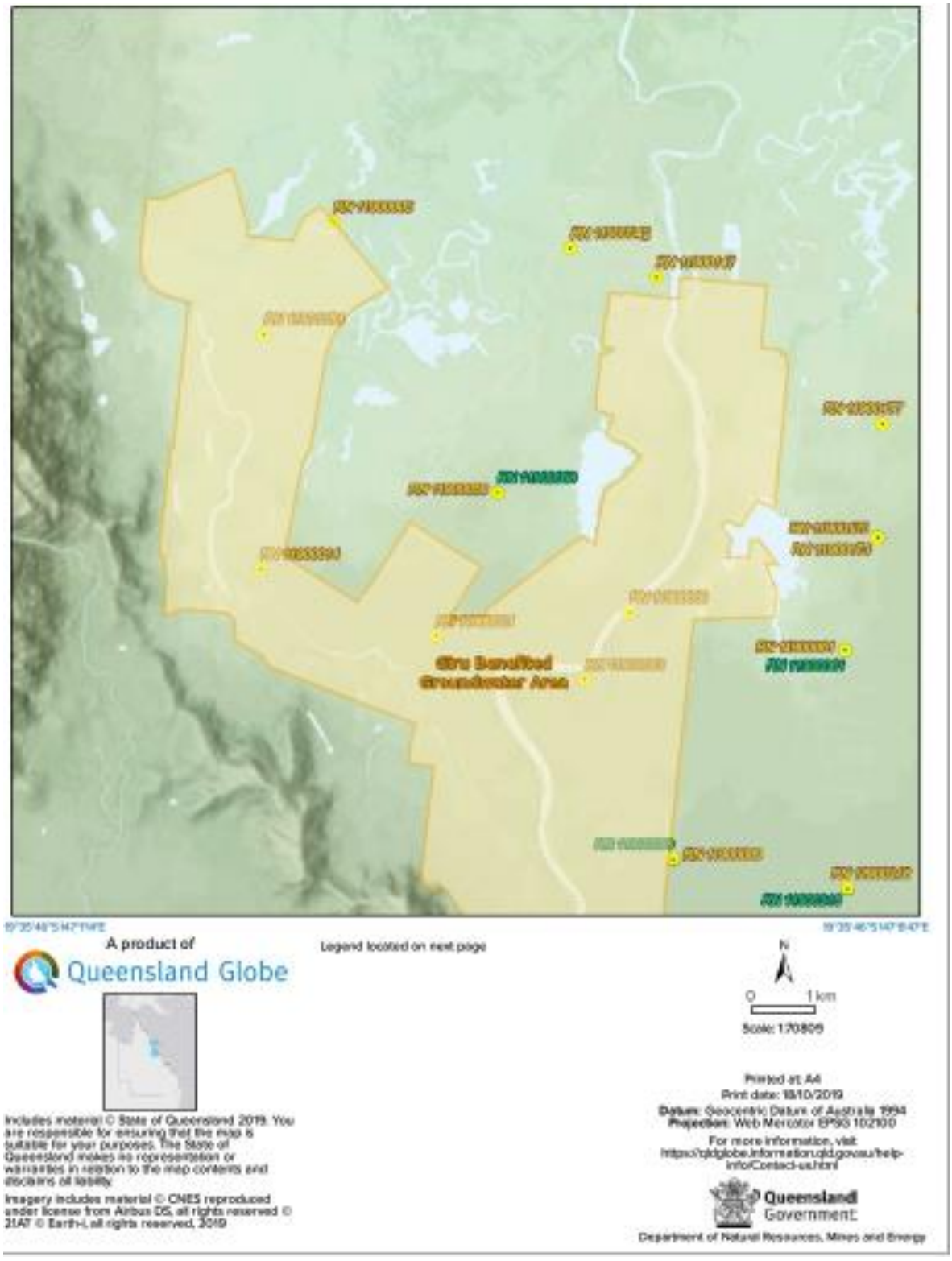
Year	Released to Haughton River	Used in Zone A (ML)	%						Released to Haughton River	Temporary Transfers in ML	Net Release available In GBA	Channel Equivalent Transmission Efficiencies	Net Water available after distribution losses	Used in Zone A (ML)	Temporary Transfers in ML	Used in GBA	% of Used to released
1997/98	22,873	28,297	81					1997/98	22873	Not Supplied	Not Available	Not Supplied	Not Available	28297	Not Supplied	Not Available	Not Available
1998/99	4,406	18,618	24					1998/99	4406	Not Supplied	Not Available	Not Supplied	Not Available	18618	Not Supplied	Not Available	Not Available
1999/00	25,138	22,832	110			over supply		1999/00	25138	Not Supplied	Not Available	Not Supplied	Not Available	22832	Not Supplied	Not Available	Not Available
2000/01	14,160	27,315	52					2000/01	14160	Not Supplied	Not Available	Not Supplied	Not Available	27315	Not Supplied	Not Available	Not Available
2001/02	43,685	48,059	91		drought			2001/02	43685	Not Supplied	Not Available	Not Supplied	Not Available	48059	Not Supplied	Not Available	Not Available
2002/03	60,037	51,253	117		drought	over supply		2002/03	60037	Not Supplied	Not Available	Not Supplied	Not Available	51253	Not Supplied	Not Available	Not Available
2003/04	42,453	42,485	100		drought			2003/04	42453	Not Supplied	Not Available	Not Supplied	Not Available	42485	Not Supplied	Not Available	Not Available
2004/05	45,257	48,609	93		drought			2004/05	45257	Not Supplied	Not Available	Not Supplied	Not Available	48609	Not Supplied	Not Available	Not Available
2005/06	32,136	33,125	97		drought			2005/06	32136	Not Supplied	Not Available	Not Supplied	Not Available	33125	Not Supplied	Not Available	Not Available
2006/07	31,556	37,937	83					2006/07	31556	Not Supplied	Not Available	71%	Not Available	37937	Not Supplied	Not Available	Not Available
2007/08	22,018	30,742	72					2007/08	22018	Not Supplied	Not Available	66%	Not Available	30742	Not Supplied	Not Available	Not Available
2008/09	19,101	27,061	71					2008/09	19101	Not Supplied	Not Available	60%	Not Available	27061	Not Supplied	Not Available	Not Available
2009/10	38,465	35,571	108			over supply		2009/10	38465	6283	32182	66%	21208	35571	6283	29288	138%
2010/11	5,872	6,677	88			prolonged rains		2010/11	5872	485	5387	55%	2963	6677	485	6192	209%
2011/12	29,603	20,387	145			over supply		2011/12	29603	1484	28119	63%	17687	20387	1484	18903	107%
2012/13	26,873	20,610	130			over supply		2012/13	26873	1032	25841	61%	15866	20610	1032	19578	123%
2013/14	44,671	29,668	151		drought	over supply		2013/14	44671	2883	41788	59%	24571	29668	2883	26785	109%
2014/15	47,405	46,422	102		drought	over supply		2014/15	47405	11815	35590	71%	25269	46422	11814	34608	137%
2015/16	47,019	47,031	100		drought	over supply		2015/16	47019	13364	33655	73%	24434	47031	13364	33667	138%
Average	31723	32774	97					Average	31723	5335	26387	64%	17009	32774	5335	27439	161%
									1997/98 - 2015/16	2009/10 - 2015/16	2009/10 - 2015/16	2006/07 - 2015/16	2009/10 - 2015/16	1997/98 - 2015/16	2009/10 - 2015/16	2009/10 - 2015/16	2009/10 - 2015/16
	red = exceeds annual allocation	red = exceeds annual allocation													Estimated Minimum Average number of days water supplied by Groundwater Aquifer	1997/98 - 2015/1	135

2.2.2 Water Solutions Report

The report prepared by Water Solutions on behalf of the QCA has a number of significant shortcomings and inconsistencies and delivers conclusions based on inaccuracies and unreliable data. As evidenced above the use of data from the Kavanagh Report undermines the completeness and integrity of any conclusion put forward within this report.

BDCG would initially like to highlight that the assessment of the aquifer and groundwater supply is a complex process that should be undertaken by an experienced and qualified hydrogeologist and not a hydrologist. As put forward in the report supplied by Kelvin Olzard, Groundwater Australia there is significant evidence to indicate that both the QCA and SunWater have not engaged an appropriate and qualified individual to conduct the required studies, see page 3 of attached report. Further to this the integrity of this report is undermined as the Water Solution hydrologist did not visit the site. In comments put forward as part of the consultation the hydrologist noted that a site visit was out of the scope provided by QCA. This significantly undermines the integrity of this report and questions the qualifications and capability of this organisation to draw conclusions that impact on data and pricing for irrigators.

Secondly, and of equally significant concern is an admission by the hydrologist from water solutions that a key focus was on one of the eight bores chosen by ODH for analysis instead of throughout the region. It has now been identified that this bore was outside of the GBGA. The result is that data extracted from this bore is not relevant to the GBGA. This finding significantly undermines the Water Solutions report and indicates that any analysis undertaken by this consultant is based, in part, on data from outside of the area. The primary bore (11900058) selected was not in GBGA as shown below:


Gbr Bandfed
Groundwater Area
A product of
Queensland Globe
Legend located on next page
N
0
1 km
Scale: 170809
Printed at: A4
Print date: 18/10/2019
Datum: Geocentric Datum of Australia 1994
Projection: Web Mercator EPSG 102100
For more information, visit:
https://qldglobe.information.qld.gov.au/help-info/Contact-us.html
Queensland
Government
Department of Natural Resources, Mines and Energy
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A number of other inconsistencies and issues are identified with this report. The conclusions put forward by the hydrologist are inconsistent and contain concerns about their internal process and data. Conflicting statements are made throughout the report in relation to the use and application of data for this purpose.

Of concern is the hydrologist's admission that the use of averaging data over a short period of time is not an appropriate way to assess the benefits of a supplemented scheme. However, the data utilised within this report was over a period of 11 years which included a three-year dry period. The hydrologist made the following statements: "the supplemented release data tends to indicate that it is unlikely that natural flows provide a large contribution to the water security of GBA irrigators". This statement appears to be sourced from averaging data despite a declaration on page 48 stating the following: "Using the average delivery over a period of average years will generally not be an appropriate way to assess the benefit of a supplemented scheme". Following this statement the report also stated: "This data also was subject to a host of real-world issues such as measurement errors and the GFC". The consultant went on to say: "It is recognised that a hydrology model should have been used to measure natural flow in this environment" This approach was not adopted by the Kavanagh Report, ODH or Water Solutions.

As indicated within the Kavanagh Report, Water Solutions also failed to acknowledge water distribution inefficiencies and other water losses. Between 2007 and 2008 and 2014 and 2015 this ranged between 33% and 45% for channel users and up to 35% on average. These percentages were reported as part of the SunWater efficiency assessment as noted in 2.2.1 of this response.

The lack available consultation and visit by the hydrologist from Water Solutions also caused additional concerns. This includes issues such as water taken outside of the GBGA, upstream, temporary transfers, system losses and water harvesting. In addition this report failed to acknowledge that water harvesting occurs in the Majors Creek area. Conducting a desktop review off site in Brisbane has limited the credibility and accuracy of the Water Solutions report based on the capacity to assess these and other local issues.

In the Water Solutions report it was concluded "GBA irrigators are receiving little contribution from natural Haughton River flow in dry periods". No clarification was provided how that conclusion was reached which appeared to contradict the reported data in the years 1998/99 (Use 18,618 V Diversion 4,406ML), 2000/01 (Use 27,315 V Diversion 14,160), 2007/08 (Use 30,742 V Diversion 22,018) and 2008/09 (Use 27,061 V Diversion 19,101). SunWater is still yet to provide release data for the period 1/4/19-30/9/19 which we fully expect will prove this conclusion wrong.

In the Water Solutions report it was concluded "The ODH Model also indicates that the contribution of natural flows is "very small"". No clarification was provided how that conclusion was reached which appears to contradict the statement in the OD Hydrology Report (on page ii) which states that "scenario assessment of an un-supplemented aquifer under varying levels of demand indicates a sustainable, reliable supply of approximately 30-50% of current demands (10,000-17,000ML/a)"

Further clarification from BDCG was sought from the Water Solution's Consultants in relation to:

- Reasons why the report did not note the fact that up until October 2015 the release data was only estimated by SunWater

- Reasons why the report did not recognize the fact that the estimation of water releases was affected in some years by excessive aquatic weed growth being caught up in the release gate and therefore giving the impression that more water had been released than was actually released, as noted in page 14 of the Kavanagh Report

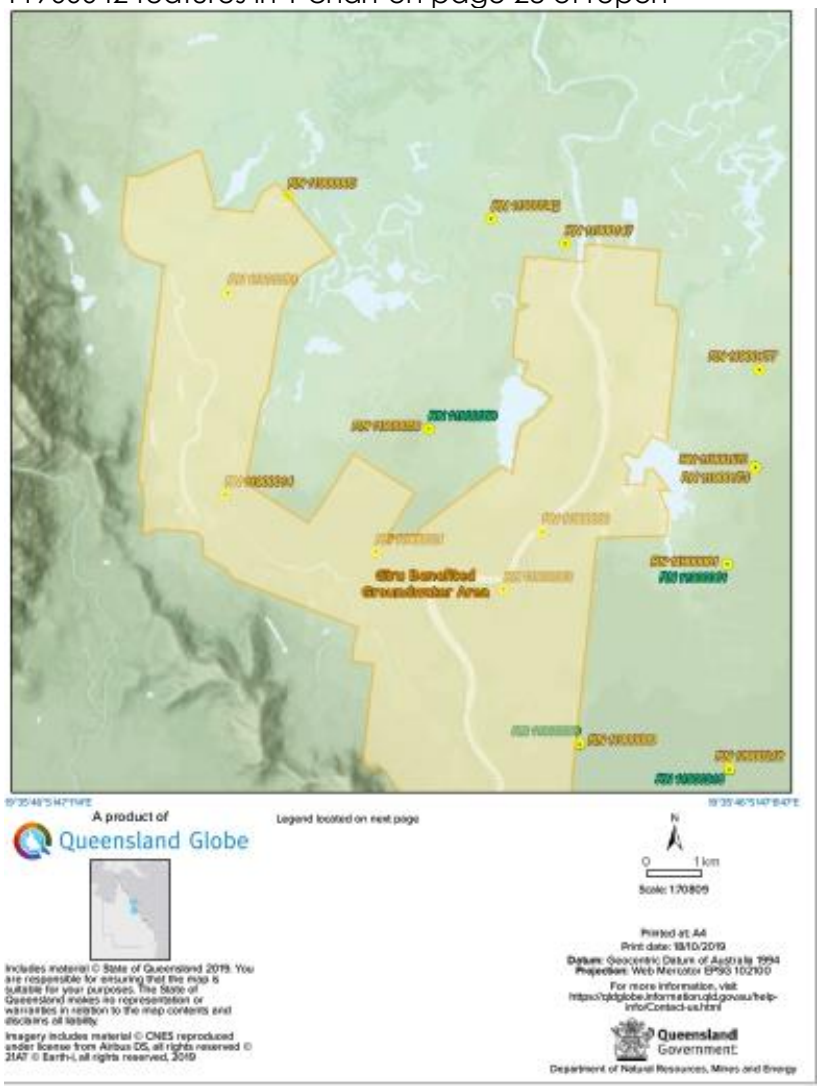
2.2.3 ODH Report

The report commissioned by SunWater and completed by ODH is also subject to the same inconsistencies as outlined above with the Kavanagh Report. The continued reliance on this dataset outside its intended purpose provides significant and justifiable cause for the integrity of any report to be questioned.

The dataset produced by ODH also utilised two bores outside of the GBGA. The use of the inaccurate mapping initially introduced within the Kavanagh Report has resulted in a number of inaccuracies in the collection of data from areas that are not included within the GBGA.

The two bores used for data and that are not in the GBGA are shown below:

11900058 features in 6 charts on pages 20,21,23,29 of report
11900042 features in 1 chart on page 28 of report



The ODH does make a number of concessions that support the ongoing maintenance of existing pricing arrangements for the GBGA. The acknowledgements within this report include:

- An acknowledgement was made by ODH of an aquifer and groundwater system contribution as shown through the following statement: "scenario assessment of an un-supplemented aquifer under varying levels of demand indicates a sustainable, reliable supply of approximately 30 to 50% of current demands (10,000 – 17,000 ML/a)"
- Acknowledgement of water distribution system inefficiencies estimated at 140 ML needed to supply 100 ML equating to approximately 28.57% inefficiency or a 71.3% efficiency

The ODH report while drawing from the same compromised set of data makes a significant indication and contribution to the establishment of an aquifer and groundwater supplemented system to the GBGA.

2.2.4 Queensland Competition Authority Consultation

The Queensland Competition Authority (QCA) initially conducted a consultation on 16 October in recognition of the sensitive and contentious nature of issues surrounding the GBGA irrigators. This specifically related to concerns on the Kavanagh and ODH reports on the reliability of data now considered the foundation for future decision-making. The GBGA irrigators in the consultation process highlighted that there were concerns on release and usage data and bore locations which were never subjected to scrutiny while containing obvious limitations.

The consultant, put forward as part of this consultation, did not appear to be qualified to make an assessment of the GBGA system. The Water Act in dealing with the requirements for an appropriately qualified person to undertake groundwater impact assessment roles provides an example of the eligibility requirements to be holding a geology degree.

The BDCG also highlighted concerns in relation to the final Water Solutions report issued on 4 September 2019 which was dated after the QCA report, 31 August 2019. The report indicated only minor revisions were made between the report described as final and issued on 26 July 2019 and the final report provided by Water Solutions after the date of the QCA report. This leads to concerns that the QCA had predetermined conclusions prior to receiving the final amended report from Water Solutions. The QCA did not clarify this inconsistency at stakeholder workshops.

Participants within the consultation highlighted potentially disastrous impacts based on recommended pricing arrangements using the Water Solutions report. Concerns were raised in relation to the openness and transparency of the QCA review process which included the availability of the consultant from Water Solutions at a follow up workshop held only three weeks prior to the 4 November 2019 deadline for submissions.

The QCA produced a summary of the scheduled and follow-up workshops, which was in our view incomplete and inaccurate. No participants in the consultation process were offered the opportunity to provide comments or suggested edits to the scheduled workshop summary of which has been made public. However, after a concern was raised an opportunity was offered in respect to the follow-up workshop to provide comment and suggested edits and a large number of amendments were made.

2.2.5 Conclusion

Burdekin District Cane Growers Ltd (BDCG) have significant concerns in relation to the transparency, accuracy and integrity of the draft report produced by the QCA based on the information presented above.

In summary the BDCG questions the integrity of this report based on the following:

- Use of inaccurate, incomplete and inconsistent data based on assumptions and estimates produced within the Kavanagh Report not intended for irrigation pricing
- Failure to incorporate system inefficiencies which range from 35% to 50% depending on each dataset when preparing conclusions
- Use of a hydrologist instead of a hydrogeologist to prepare a report
- Selection of a bore outside of the GBGA to conducted data analysis undermining conclusions made
- Insufficient availability of the consultant hydrologist to verify data with limited timeframes for response
- Failure of the hydrologist to visit the site to undertake assessments

2.3 Differential Pricing

Burdekin District Cane Growers Ltd (BDCG) seeks to highlight significant differences in the supply of services and as a result pricing between channel irrigators and the Giru Benefitted Groundwater Area (GBGA). As demonstrated in section 2.1 there is a clear case for the existence of an aquifer and the importance of an equal combination of groundwater and surface water use by irrigators in the GBGA.

BDCG's primary concern relates to the conclusion put forward by the Queensland Competition Authority (QCA) which states the following:

> *"As the costs of supplying the GBA tariff group customers are not materially different to the costs of supplying Burdekin Channel tariff group customers, we consider that the cost-reflective prices should be the same for both tariff group customers"*

BDCG seeks to confirm that the supply of water to customers in the Burdekin Channel tariff group and GBGA requires different service levels and infrastructure. All customers in the GBGA are required to pump surface water from bulk water assets such as weirs to required locations. The supply of water to these assets by SunWater requires minimal infrastructure. This is significantly different to supplying water to the Burdekin Channel tariff group which includes a large amount of infrastructure with associated maintenance and costs. BDCG argues that the costs associated with maintaining each of these systems is significantly different with customers in the GBGA receiving a lesser product and infrastructure than the Burdekin Channel tariff group. BDCG has sort advice and confirm this arrangement with Peter Gilbey, former Regional Manager for the Department of Primary Industries.

BDCG also has significant evidence to indicate that the original purpose in establishing current pricing and supply arrangements for the GBGA was to lock in a system with a real incentive to continue the use of groundwater in this area. The purpose of this approach was to ensure the water table did not come to the surface on farms as experienced elsewhere in the BRIA. The importance of continuing to incentivise this approach is essential to the long-term viability and sustainability of farming on lands within the GBGA.

The BDCG is confident that the evidence provided does not support the conclusion put forward by the QCA in that the costs of supplying both customer groups is not materially different. There is no doubt that the water systems are individual and different. The systems can be differentiated in terms of infrastructure requirements, operating maintenance requirements and determination of peak flow entitlement (PFE) which cannot be guaranteed as the Haughton River and both weirs do not constitute a distribution system. It however appears both weirs are being operated as a distribution system as noted in the Water Solutions report.

As part of the supply of a product especially which seeks significant remuneration the delivery of reliable and efficient system is essential. This includes the maintenance of quality infrastructure along with the capacity to guarantee supply such as a peak flow entitlement arrangement. A significant issue with the supply of water through the GBGA is the loss of water at the end of Healeys Lagoon.

It should be noted that the Burdekin Channel tariff group efficiencies have improved in recent years to 82%. However, we believe that similar improvements to the GBGA distribution system have not been implemented. This is significantly higher than the efficiency levels for the GBGA. Evidence has been provided to consistently demonstrate that poor management of the GBGA system as noted in the Olzard report and there

should be a further incentive for GBGA irrigators to use more groundwater than surface water. The current arrangement is for 51% surface water and 49% groundwater. This arrangement as stated above has been in place to arrest the rising groundwater problem in the GBGA.

BDCG has consistently provided evidence that the GBGA irrigators have used above and beyond the water delivered through the bulk assets or weirs demonstrating the existence of natural yield and the importance of this in maintaining sustainable farming operations. GBGA irrigators have consistently demonstrated the use of natural yield and achieved significant benefit from this process.

Recommendation

BDCG recommends an incentive be introduced to increase the proportion of useful groundwater across all areas in the Burdekin were rising groundwater problem exists.

2.4 Capacity to Pay

Burdekin District Cane Growers Ltd (BDCG) seeks to address a number of inconsistencies and issues surrounding the capacity for growers to pay for a significant increase in irrigation pricing. All cane growers function within a fixed price market subject to the fluctuations of the world sugar price. At no stage in the pricing process is there a capacity to increase this price to absorb additional cost. With no subsidies from Government or tariffs associated imported sugar, growers are vulnerable to regulated pricing increases that have a direct impact on the cost of doing business. All BDCG irrigators experience the same difficulties associated with the capacity to pay.

Previously the Invicta Cane Growers Organisation engaged Tom Mullins Consulting to undertake a comprehensive data analysis in relation to the sensitivity of cane growers in the Giru Benefitted Groundwater Area (GBGA) to absorb additional cost. With more than 20 years employment in the Burdekin region and particularly the agricultural sector Tom was able to provide valuable insight into the potential scenarios associated with pricing increases.

As a result of the release of this draft report the BDCG has again engaged Tom Mullins Consulting to conduct a more comprehensive analysis based on the pricing suggested by SunWater and recommended by Queensland Competition Authority (QCA) report. In summary the findings of this report (See attached) include:

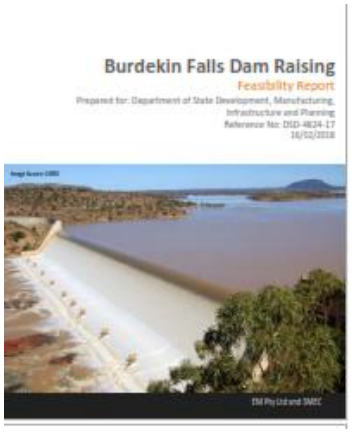
- BDCG irrigators would not be capable of sustaining the proposed increases in irrigation water charges
- Cash losses would escalate to unsustainable levels for GBGA irrigators
- The introduction of dam safety charges in 2025/26 would require a break even estimated sugar price of $485 per tonne which is approximately $45.50 per ton cane for GBGA irrigators
- Average QSL four year (2019 – 2022) indicates a price of $422 per tonne sugar or $38.66 per ton cane for the average GBGA irrigator resulting in a loss of $5.85 per tonne cane produced or $620 per hectare

As evidenced in the attached report there is significant evidence to indicate that GBGA irrigators will experience direct and significant cash losses as a result of the capacity to pay both irrigation price increases and dam safety charges.

Additionally the attached report also demonstrates that all BDCG irrigators experience a cash loss went facing increases in irrigation pricing and dam safety upgrades. While each area may vary in relation to breakeven point and return a financial analysis of all participant growers indicates a cash loss.

The analysis conducted by Tom Mullins Consulting along with the restrictive pricing experienced in relation to world sugar price creates an unstable environment for sugarcane production. Without the ongoing support and cooperation of Government agencies including SunWater and QCA any fluctuations in fixed prices has significant impacts to the cost of doing business and the sustainability of cane growing operations throughout the region.

There is a misconception held by many Government departments that cane growers have a greater capacity to pay increased costs than is realistically possible. An example of how Government departments hold this view can be seen in the following table which appeared in the Feasibility Study into the raising of the Burdekin Falls Dam, less than two years ago. This report published the following information:



BURDEKIN FALLS DAM RAISING - WATER DEMAND STUDY

Table 5.1: Crop Production and Gross Margin Summary

	Broad Acre			Horticulture			
Crop	Sugarcane[1]	Sorghum	Lucerne[2]	Capsicums[3]	Rockmelons[3]	Tomatoes[3]	Sweet Corn[3]
Price ($/t)	$40.9	$200	$300	$2,000	$675	$1,600	$727
Yield (t/ha)	150	6	15.4	24	32	50	35.4
Irrigation (ML/ha)	10 with 1/5 years fallow	5	6	4	4	4	4
Gross Margin ($/ha)	$2,978	$356	$3,162	$16,263	$4,727	$24,013	$10,455
Maximum Capacity to Pay for Water ($/ML)	$372	$71	$162	$4,566	$1,182	$6,003	$2,614
Market Depth	High	Medium	Medium-Low	Low	Low	Low	Low
Export Intensity	High	Med	Low	Low	Low	Low	Low

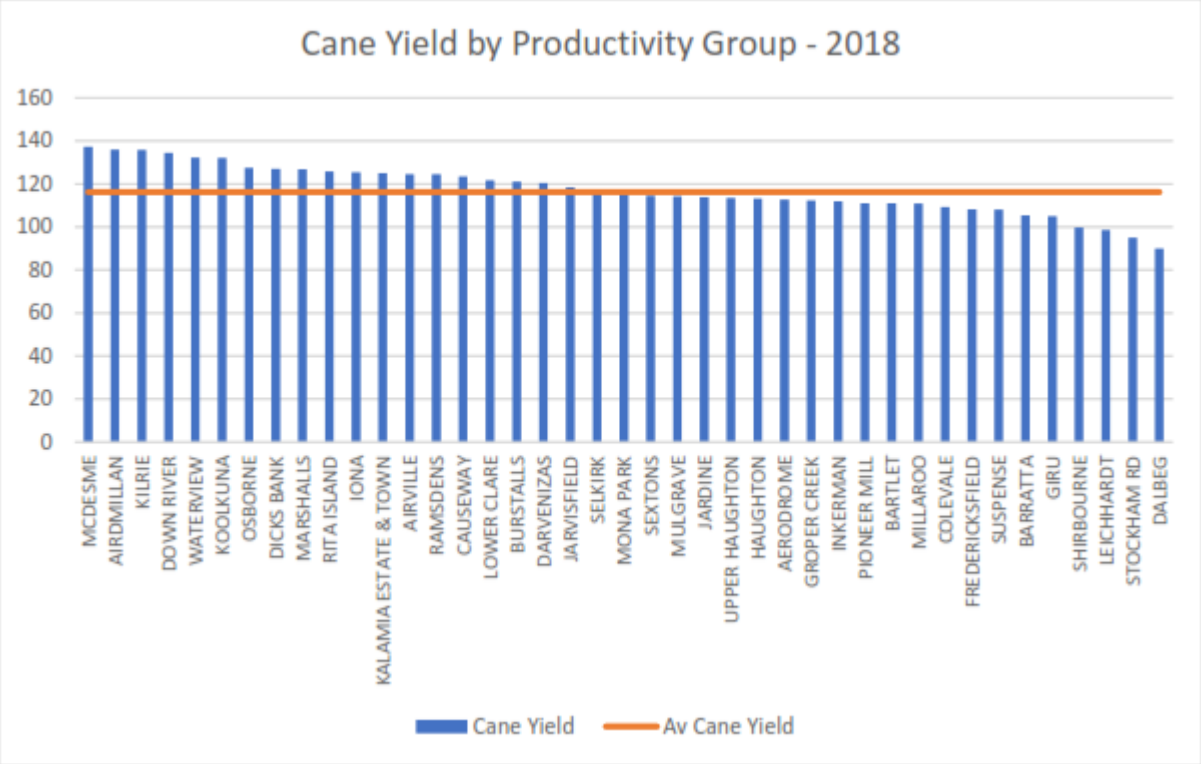
Note: [1] Based around whole of crop average and SRA Adviser kit long term average yields. [2] Based on four cuts per annum. [3] Indicators based on a single annual crop cycle.
Source: McKellar Et. Al (2013), DAF (2016), NSW DPI (2017), ABARES (2017b), LRAM (Unpublished), AEC

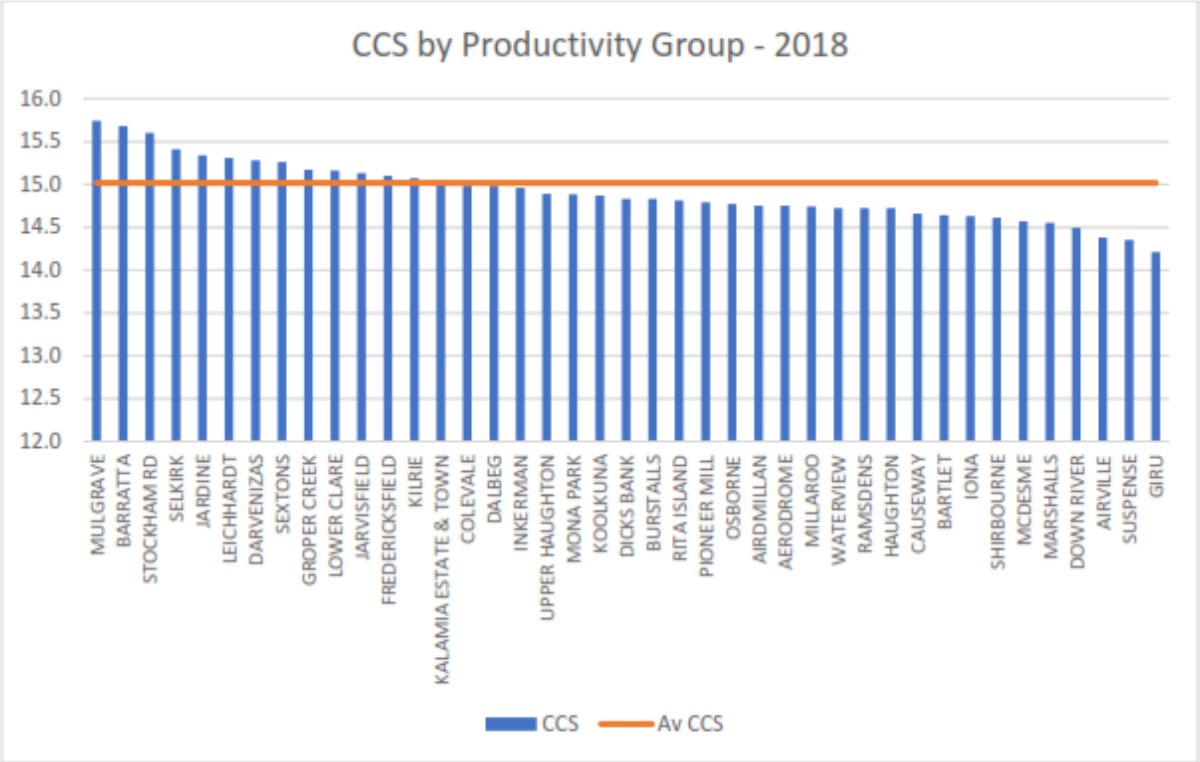
While the indicative capacity to pay considers the viability of new opportunities over the short term, the long term nature of the dam raising project means that new technologies and changing market factors will potentially make new opportunities viable. Potential capacity to pay will be assessed against the whole of life costs of the dam raising project as part of Phase 3 of this feasibility study.

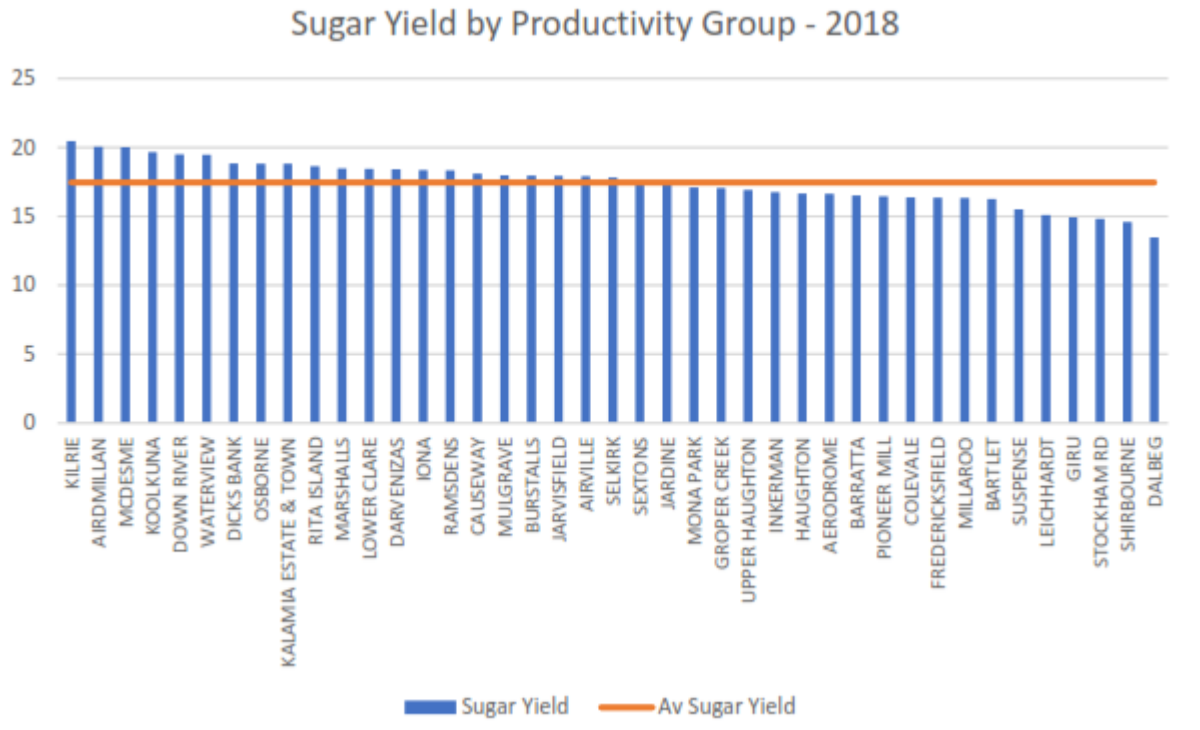
The data suggests that the Yield on a Tonnes per Hectare basis is 150. Data from Burdekin Productivity Services suggests that District Yields average around 120 and yields for the Giru / Shirbourne area average around 102. See below aggregated data:

	Giru					Shirbourne			
	Year	**TCH**	**High**	**Low**		**Year**	**TCH**	**High**	**Low**
	2018	103.31	152	56		2018	95.80	136	62
	2017	107.26	171	61		2017	101.17	133	76
	2016	109.37	150	89		2016	112.53	148	70
	2015	104.05	124	61		2015	107.18	141	62
	2014	92.96	119	74		2014	92.62	130	60
	2013	93.38	154	61		2013	86.63	114	62
	2012	94.37	116	80		2012	94.08	130	73
	2011	109.08	139	82		2011	113.92	144	78
	2010	117.96	134	84		2010	119.17	186	89
	2009	99.87	111	88		2009	92.36	123	48
10 year average		103.16	137	74			101.55	139	68

In the recent 2018/19 Burdekin Productivity Services Annual report the following 3 productivity graphs depict the Giru and Shirbourne areas as having some of the worst productivity in the Burdekin Region on pages vii and viii as follows:





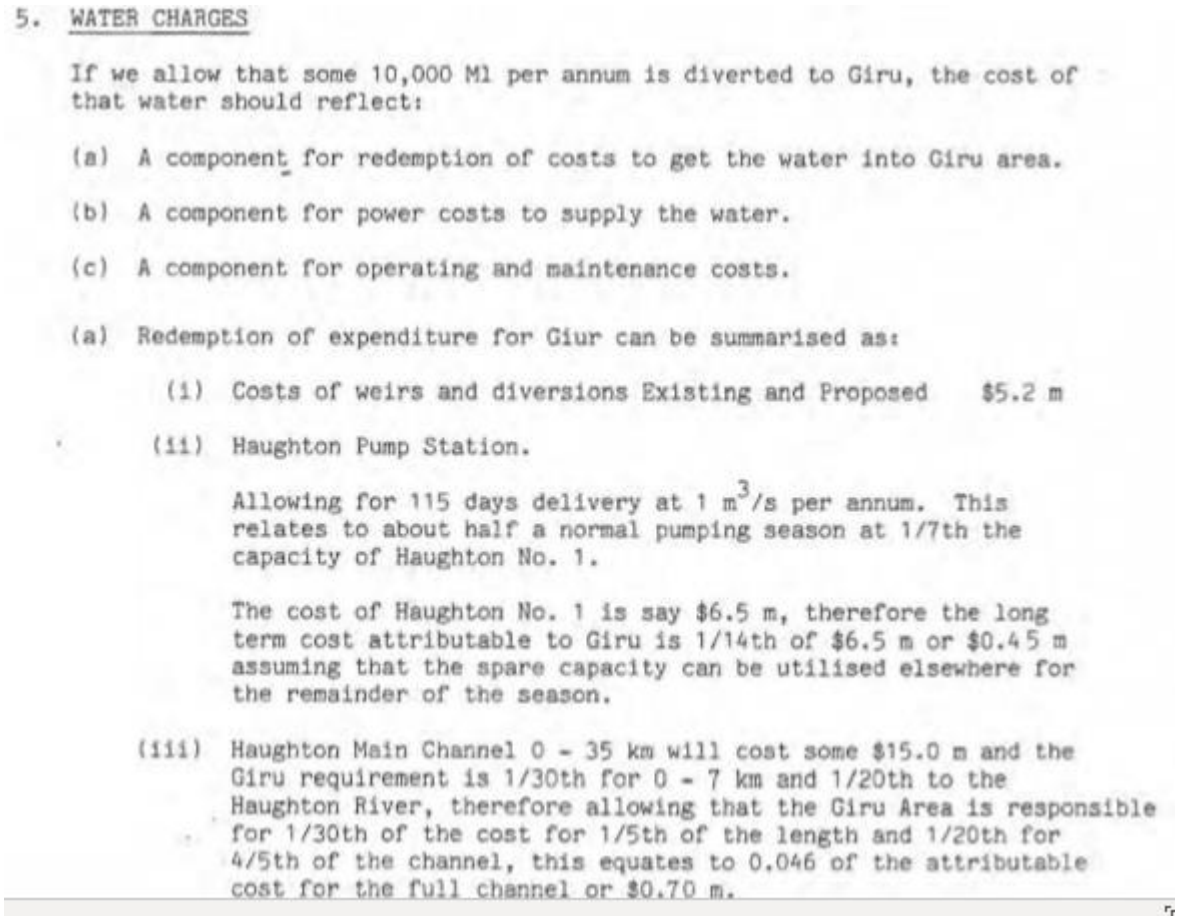


It is clear that the proposed increase in price for GBGA irrigators does not take into account the differences currently being experienced by GBGA irrigators in terms of low crop yields and the additional electricity costs borne in order to extract water from underground water supplies through pumps. These pumps not only incur significant capital

and maintenance cost but also operating costs. Many of these costs are not incurred by others especially those in the channel system.

It was confirmed that GBGA irrigators have already had built into their water costs a contribution for capital costs incurred for water diversion to the GBGA as set out in the attached letter which states in April 1987 that a charge would be levied.

> "A component for redemption of costs of water diverted to Giru (costs of weirs and diversions existing and proposed, Haughton Pump station and the Haughton Main channel), power costs to supply water into the Giru area, operating and maintenance costs."



5. WATER CHARGES

If we allow that some 10,000 Ml per annum is diverted to Giru, the cost of that water should reflect:

(a) A component for redemption of costs to get the water into Giru area.

(b) A component for power costs to supply the water.

(c) A component for operating and maintenance costs.

(a) Redemption of expenditure for Giur can be summarised as:

(i) Costs of weirs and diversions Existing and Proposed $5.2 m

(ii) Haughton Pump Station.

Allowing for 115 days delivery at 1 m^3/s per annum. This relates to about half a normal pumping season at 1/7th the capacity of Haughton No. 1.

The cost of Haughton No. 1 is say $6.5 m, therefore the long term cost attributable to Giru is 1/14th of $6.5 m or $0.45 m assuming that the spare capacity can be utilised elsewhere for the remainder of the season.

(iii) Haughton Main Channel 0 - 35 km will cost some $15.0 m and the Giru requirement is 1/30th for 0 - 7 km and 1/20th to the Haughton River, therefore allowing that the Giru Area is responsible for 1/30th of the cost for 1/5th of the length and 1/20th for 4/5th of the channel, this equates to 0.046 of the attributable cost for the full channel or $0.70 m.

The following analysis demonstrates use of available information from Sunwater in terms of diversions versus usage for the BRIA Channel system and Haughton Zone A from 2006/07 to 2015/16. Combined with SunWater fees and charges for 2015/16 and allowing for Non GBGA usage the return to SunWater for its diverted water to the channel area and the GBGA is very similar under the current pricing arrangement.

Channel Haughton Efficiency Tables

	Dalbeg	Total	Efficiency			Millaroo	Total	Efficiency
Year	Diversion	Water	of total		Year	Diversion	Water	of total
		usage	usage				usage	usage
	(ML)	(ML)				(ML)	(ML)	
2006/07	18,121	10,978	61%		2006/07	32,617	19,119	59%
2007/08	14,723	8,391	57%		2007/08	27,477	15,217	55%
2008/09	13,245	6,924	52%		2008/09	28,334	15,594	55%
2009/10	17,773	9,428	53%		2009/10	30,842	18,233	59%
2010/11	7,677	3,518	46%		2010/11	11,592	5,011	43%
2011/12	10,002	4,674	47%		2011/12	25,042	14,639	58%
2012/13	17,584	8,957	51%		2012/13	32,443	18,205	56%
2013/14	19,213	12,069	63%		2013/14	36,989	24,486	66%
2014/15	16,503	10,527	64%		2014/15	34,996	22,441	64%
2015/16	13,236	7,849	59%		2015/16	23,731	17,356	73%
Average	**14,808**	**8,332**	**56%**		**Average**	**28,406**	**17,030**	**60%**
	CLARE	**Total**	**Efficiency**			**NEW**	**Total**	**Efficiency**
Year	**Diversion**	**Water**	**of total**		**Year**	**BRIA**	**Water**	**of total**
		usage	**usage**			**Diversion**	**usage**	**usage**
	(ML)	**(ML)**				**(ML)**	**(ML)**	
2006/07	34,503	25,326	73%		2006/07	300,975	219,915	73%
2007/08	27,023	18,973	70%		2007/08	259,647	174,109	67%
2008/09	24,067	17,209	72%		2008/09	235,827	142,304	60%
2009/10	33,445	26,287	79%		2009/10	309,810	204,109	66%
2010/11	9,279	5,941	64%		2010/11	90,760	51,151	56%
2011/12	26,499	17,527	66%		2011/12	221,144	140,973	64%
2012/13	27,938	20,600	74%		2012/13	246,305	151,235	61%
2013/14	34,900	25,252	72%		2013/14	368,452	208,230	57%
2014/15	30,940	27,615	89%		2014/15	398,624	280,965	70%
2015/16	29,412	23,484	80%		2015/16	335,754	243,425	73%
Average	**27,801**	**20,821**	**75%**		**Average**	**276,730**	**181,642**	**66%**

BRIA Combined								
	Burdekin	Total	Efficiency			Haughton	Total	Efficiency
Year	Channel	Water	of total		Year	Zone A	Water	of total
	Diversion	usage	usage			Diversion	usage	usage
	(ML)	(ML)				(ML)	(ML)	
2006/07	386216	275338	71%		2006/07	31,556	37,984	120%
2007/08	328870	216690	66%		2007/08	22,018	30,742	140%
2008/09	301473	182031	60%		2008/09	19,101	27,061	142%
2009/10	391870	258057	66%		2009/10	38,465	35,571	92%
2010/11	119308	65621	55%		2010/11	5,872	6,677	114%
2011/12	282687	177813	63%		2011/12	29,603	20,387	69%
2012/13	324270	198997	61%		2012/13	26,873	20,610	77%
2013/14	459554	270037	59%		2013/14	44,671	29,668	66%
2014/15	481063	341548	71%		2014/15	47,405	46,422	98%
2015/16	402133	292114	73%		2015/16	47,019	47,031	100%
Average	**347744**	**227825**	**66%**		**Average**	**31,258**	**30,215**	**97%**

Return to SunWater $ Per ML Diversion Update

10 year Average 2006/07 to 2015/16 Sunwater Data		Price	2015-2016				Return to Sunwater per ML Diverted
Burdekin Channel	**ML**	**Part A**	**Part B**	**Part C**	**Part D**	**TOTAL**	**Burdekin Channel**
Average Usage	227825		$0.52		$26.82	$6,228,725	
Allocation	278957	$12.22		$20.74		$9,194,423	
Average Diversion	**347744**					**$15,423,147**	**$44.35**
Giru Groundwater Area (GBA)	**ML**	**Part A**	**Part B**	**Part C**	**Part D**	**TOTAL**	**GBA**
Average Usage	24507		$0.52		$13.42	$341,628	
Allocation	40249	$12.22		$7.82		$806,590	
Average Diversion to supply GBA	**25640**					**$1,148,218**	**$44.78**
Average Temporary water allocation transfers into Haughton Zone A	5268						
Council Average Usage, Haughton Zone A(non GBA allocation usage)	350						
TOTAL Non GBA Allocation usage	**5618**						
Haughton Zone A Average usage	30125						
less Total Average Non GBA Allocation Usage	-5618						
Average GBA Usage	**24507**						
Haughton Zone A Average Diversion	31258						
less Total Non GBA Allocation Usage	-5618						
Average Diversion to supply GBA	**25640**						

Chart showing QCA draft price increase impact							
QCA Cost reflective Draft Price. Part A+C Table 88, Part B+D Table 90							**Return to Sunwater**
		Price					**per ML Diverted**
Burdekin Channel	**ML**	**Part A +C**	**Part B+D**			**TOTAL**	**Burdekin Channel**
Average Usage	227825		$22.34			$5,089,602	
Allocation	278957	$45.08				$12,575,382	
Average Diversion	**347744**					**$17,664,983**	**$50.80**
Giru Groundwater Area (GBA)	**ML**	**Part A +C**	**Part B+D**			**TOTAL**	**GBA**
Average Usage	24507		$22.34			$547,486	
Allocation	40249	$45.08				$1,814,425	
Average Diversion to supply GBA	**25640**					**$2,361,911**	**$92.12**

Not only does this support the findings of BDCG in relation to the capacity to pay for all irrigators this provides additional evidence on the difference in pricing and product supplied by SunWater to customers in the GBGA and channel system. The return to SunWater in relation to these two areas is similar and indicates the lack of infrastructure and service requirements to the GBGA irrigators.

2.5 Reclassification of Val Bird Weir and Giru Weir from Bulk Water Assets to Distribution Assets

The following is a press release from September 1988 which confirms that the water diversions, weirs and water storages were designed to "augment groundwater supplies in the area"

PRESS STATEMENT

Water Resources Minister, Don Neal today advised Local Member, Mr. Mark Stoneman MLA that further existing cane farms at Giru would now benefit from water diverted from the Burdekin River into Nealeys Lagoon.

The Minister said he had agreed that the Nealeys Lagoon/Pirelko system would be extended by the Water Resources Commission.

The works including open channel and diversion structures would cost an estimated $65,000 and promises of funding assistance had been received from the Local Mill Suppliers Committee.

Mr. Stoneman said that he was pleased the Minister had given the scheme priority. These works would now conclude that section of the project to augment groundwater supplies in the area.

Mr. Neal said that non riparian growers who wish to take water from the weirs or other storages would be able to obtain advice and assistance with planning their works through the Regional Engineer at Ayr. The construction of those works would be the responsibility of the individual growers, he said.

Mr. Neal concluded by saying that the diversion of water to the Haughton River is expected to recommence within the next few days so that the storages will be fully replenished for the coming irrigation season.

"Over recent years, the scheme has had a major impact on stability of production in the area. Without the emergency installation of temporary pumps last year to divert water to the Haughton River and Nealeys Lagoon, production from the area would have been a disaster", Mr. Neal said.

"These remaining works will ensure the greatest impact possible is obtained from the overall augmentation scheme."

The Queensland Water Resources Commission Preliminary Design Report dated April 1987 from Peter Gilbey confirms the purpose of the weirs and explains how the total works were seen to improve the annual yield of the aquifers by some 6,000 ML to 20,000ML and its connection to an irrigation rate of 6ML/Ha to the total gross assigned area.

The Water Solutions report provided by the QCA also indicates that SunWater has been utilising these bulk water assets as distribution facilities. The original construction of these facilities was based on a focus to provide 51% surface water to GBGA irrigators supplementing the 49% natural yield or ground water. At this stage there is inconsistent reports on how these assets were reclassified and what decision-making process was implemented.

Further evidence of the intended purpose for the weirs and the shared arrangement between groundwater and surface water for GBGA and other irrigators in the region is shown through correspondence provided by Tim Smith, former Regional Engineer North Queensland for the Department of Water Resources (See attached). In this correspondence Tim states the following:

> *"At no time did the Government envisage that use of the underground resource would be abandoned in favour of some system of operation that just flooded the weirs with water from the BRIA pumping and channel system. Consultation with the sugar industry and miller, had agreed for good reasons that the future should be based on conjunctive use of groundwater and Burdekin water."*

The initial intention and use of these weirs in this region was to supplement the groundwater system used for irrigation in the GBGA. There was never an intention that the weirs be used as a distribution system. This shift in operational procedure ignores the initial intention and investment by Government, irrigators and the miller.

Current evidence suggests that SunWater is seeking to change the purpose of these assets from their original design intention.

Recommendation

BDCG suggests that SunWater provides further detail and clarification on why these assets were reclassified.

2.6 Consequences of Proposed Price Increases to GBGA irrigators

A shift to the use of more surface water over groundwater is causing significant problems to cane growers through a rising water table. In the report provided by Olzard there is continued and significant risk associated with the water table rising and affecting crops throughout the region. Other areas within the BRIA have experienced similar issues and problems in this process. An incentive-based approach towards encouraging Giru Benefitted Groundwater Area (GBGA) irrigators to maintain the use of groundwater will continue to address this issue.

Burdekin District Cane Growers Ltd (BDCG) holds significant concerns over SunWater's capacity to guarantee peak flow entitlement in the event that all irrigation water is sourced through current bulk assets and weirs. Included in this submission is significant evidence of the existence of a natural yield and aquifer important to supplementing irrigation in this region and particularly the GBGA. In the event that all water is sourced from these assets the capacity for SunWater to meet their obligation in terms of a peak flow entitlement will be severely compromised. The increased usage of surface water aligned with the potential for SunWater to not guarantee a peak flow entitlement reinforces the importance for no commercial basis to the change in pricing.

A significant increase in price for GBGA irrigators will continue to drive up the cost of cane production. With limited incentives for continued production cane growers will make a transition to other crops with a higher yield and less production costs. This cost increase must also be taken in the context of constant pressures from Government agencies as shown through changes in electricity charges and rates.

BDCG holds significant concerns over the capability of SunWater to maintain service delivery if full reliance on surface water is required. Evidence has been provided that demonstrates the existence of natural yield and the aquifer that currently provides additional and significant amounts of water to the BDCG and GBGA irrigators.

2.7 Dam Safety Upgrade

Burdekin District Cane Growers Ltd (BDCG) submits to the Queensland Competition Authority (QCA) that costs associated with the Burdekin Falls Dam safety upgrade should not be passed on to irrigators in the Burdekin Haughton region. In relation to the safety upgrade insufficient information and evidence is provided on the exact nature of this upgrade, detailed cost analysis and scope of works to be completed. The safety assessment conducted by SunWater in relation to this upgrade has not been made public.

In Part B, section 3.6.1 of QCA's draft report it is identified that the dam safety upgrade is in response to an improved understanding of extreme rainfall events and resultant floods and increased understanding of potential failure of dams. BDCG concern is that the Burdekin Falls Dam safety upgrade is driven by the regulatory requirement for SunWater to maintain this asset and protect communities with little relevance or economic correlation to irrigators and the use of water throughout the Burdekin Haughton Water Supply Scheme. BDCG recognises the importance of protecting communities and ensuring dam safety however the burden of cost associated with this lies more with government regulators and associated entities than consumers.

BDCG is also an agreement with the submission put forward by the Lower Burdekin Water Board which highlights the significant issues associated with the dam safety upgrade and passing cost through to consumers. In this report the capacity for this board to comply with additional cost requirements and the need to pass these on to irrigators was clearly outlined and demonstrated to be detrimental towards long-term industry performance. In addition to the conclusions put forward in this report BDCG also have demonstrated above the capacity for irrigators in the GBGA to absorb additional costs above any pricing changes. Increases would result in significant and demonstrated hardship as shown through the documentation and evidence presented in item 2.4 Capacity to Pay.

A recent example of similar construction projects is shown through the Tinaroo Dam Upgrade. This was a $40 million project relating to the insertion of steel cable anchors into the main dam wall and strengthening the dam by further securing the wall to the foundation bedrock. The height of the saddle dam was increased with a specific focus on minimising damage caused by seepage during a flood event. Federal funding was a part of this project.

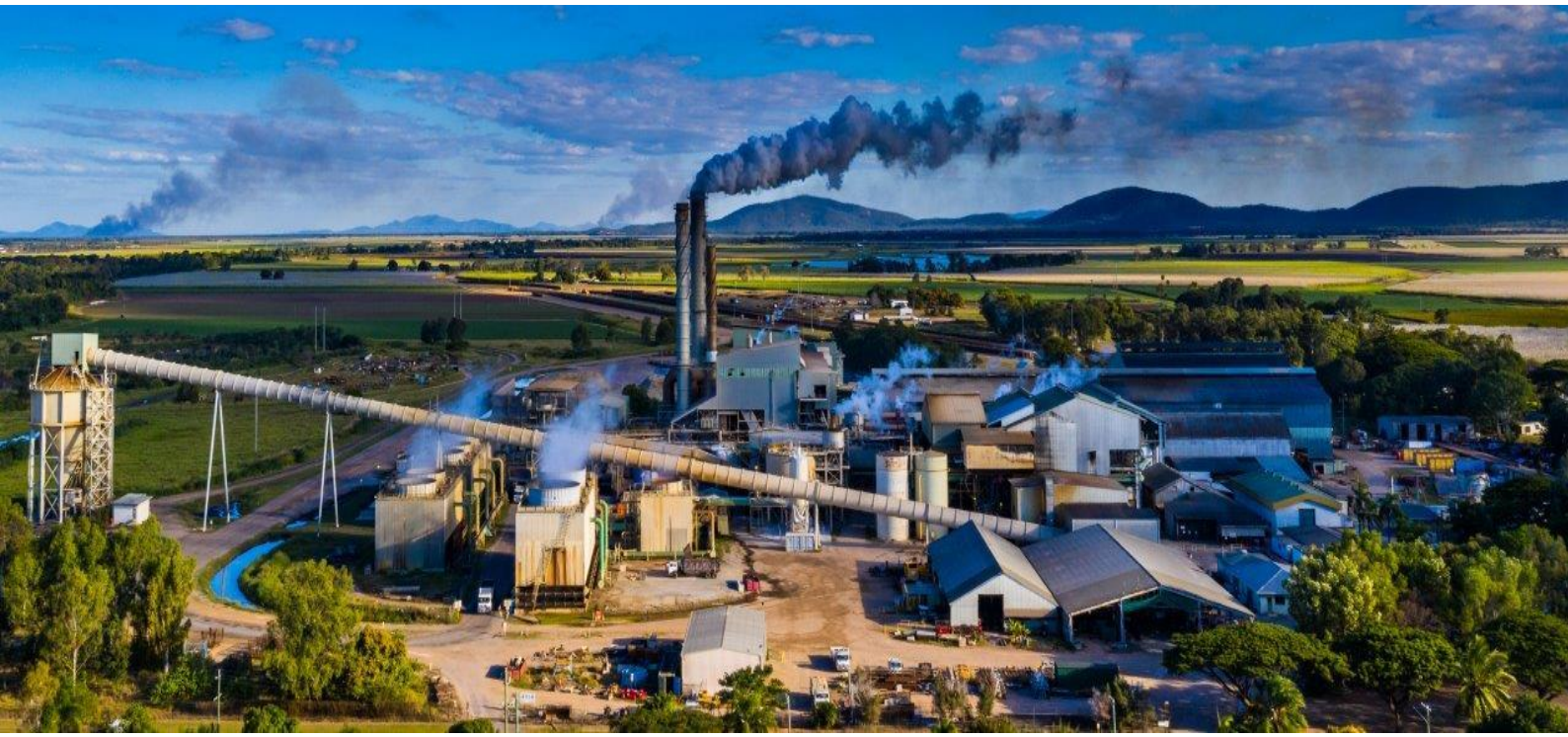
BDCG also submits that given the lack of information available in relation to the safety upgrade and exact scope of works to be completed with an associated detailed costing the potential for major capital works being undertaken in the current price path is unrealistic.

3 Attachments

Irrigation Pricing Review Part 2 – Tom Mullins Consulting

Correspondence Tim Smith

Groundwater Australia Report



Irrigation Pricing Review

Issues submission paper (Part 2) – Queensland Competition Authority

Invicta Cane Growers Organisation Ltd.

Capacity to Pay report (Part1)

The original submission lodged in March 2019, investigated the capacity of Invicta Growers to absorb any irrigation water price increase based on current prices and returns using financial analysis techniques.

Table 1. Summarises the findings of that report

TABLE1. Financial analysis of participant growers in the Invicta mill area based on current costs and returns

Aggregate of all participant growers

Breakeven point $/Tonne cane		$40.51
Income	$/Tonne	$37.78
Return $/Tonne		($2.72)

Giru Benefit Area Growers

Breakeven point $/Tonne cane		$39.88
Income	$/Tonne	$35.74
Return $/Tonne		($4.14)

"Other" Invicta Growers

Breakeven point $/Tonne cane		$41.17
Income	$/Tonne	$39.84
Return $/Tonne		($1.33)

The report summarised that at present costs and returns, growers did not have the capacity to absorb increases in irrigation costs.

Financial Impact on growers as a result of "proposed" changes in irrigation water charges.

Analysis of the proposed changes and resultant increases in water charges on $/ML basis are represented in tables (2) and (3).

TABLE 2. Proposed $/ML increase in Giru ground water costs without and with Dam Safety (DS) charges												
Year	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
Proposed $/ML - with Dam Safety (DS)	36.71	$39.96	$43.35	$46.87	$50.53	$55.16	$72.37	$78.21	$80.68	$82.40	$84.16	$85.96
Proposed $/ML increase- no DS		$3.25	$6.64	$10.16	$13.82	$18.45	$23.64	$29.48	$31.95	$33.67	$35.43	$37.23
Proposed $/ML increase-with DS		$3.25	$6.64	$10.16	$13.82	$18.45	$35.66	$41.50	$43.97	$45.69	$47.45	$49.25

TABLE 3. Proposed $/ML increase in Burdekin Chanel water costs without and with Dam Safety (DS) charges												
Year	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
Proposed $/ML - with Dam Safety (DS)	$72.73	$67.40	$69.02	$70.65	$72.32	$74.03	$87.80	$89.58	$91.41	$93.28	$95.20	$97.16
Proposed $/ML increase- no DS		-$5.33	$1.62	$1.63	$1.67	$1.71	$1.74	$1.79	$1.83	$1.87	$1.92	$1.94
Proposed $/ML increase-with DS		-$5.33	$1.62	$1.63	$1.67	$1.71	$13.76	$13.81	$13.85	$13.89	$13.94	$13.96

The $/ML increases in water charges have been converted back to $/Tonne Cane using the production data (2015-2018) supplied by Wilmar International. The data has been aggregated and DE identified by BPS.

Table 4. Summary of Giru Benefit Area (GBA) production data, 2015- 2018.					
Total Tonnes harvested 2015-2018		1,814,185			
Total Ha		17,176			
Average CCS		14			
Average Tonnes per Ha		106			
Sourced from Wilmar international. The data has been aggregated and DE identified by BPS.					

The Queensland Sugar Limited site was used to source indicative pricing $/tonne sugar for 2019- 2022.

Table 5. Queensland Sugar Limited, Indicative Pricing ($/Tonne sugar).						
Year	2019	2020	2021	2022	4 yr average	
Indicative price	$397	$417	$436	$436	$422	
Sourced from QSL web site, 03/11/2019.						

Financial Analysis

All the above information was used to identify the financial impact on Giru Benefit Growers using the original financial analysis and then including the proposed irrigation water price changes.

Table 6. Financial analysis - capacity based on $/Tonne cane and sugar of Giru Benefit										
	Area (GBA) growers to absorb proposed increased water charges.									
(Fixed and variable costs other than water have been indexed by 2% per annum)										
Year	*2020/21*	*2021/22*	*2022/23*	*2023/24*	*2024/25*	*2025/26*	*2026/27*	*2027/28*	*2028/29*	*2029/30*
Breakeven point $/Tonne Cane	$40.60	$41.35	$42.12	$42.90	$43.70	$44.51	$45.35	$46.19	$47.06	$47.94
Income $/Tonne Cane	$38.12	$39.83	$39.83							
Income $/Tonne Cane based on 4 yr average indicative price (2019-2022)				$38.66	$38.66	$38.66	$38.66	$38.66	$38.66	$38.66
Return $/ Tonne Cane	**-$2.48**	**$1.52**	**-$2.29**	**-$4.24**	**-$5.04**	**-$5.48**	**-$6.69**	**-$7.53**	**-$8.40**	**-$9.28**
Breakeven $/Tonne sugar	$445	$450	$460	$470	$475	$485	$495	$505	$515	$525
Indicative Price $/Tonne sugar	$417	$436	$436							

4 Yr average (2019-2022) indicative price				$422	$422	$422	$422	$422	$422	$422
Surplus or Deficit $/Tonne sugar	**-$28**	**-$14**	**-$24**	**-$48**	**-$53**	**-$63**	**-$73**	**-$83**	**-$93**	**-$103**

Summary

On the available knowledge of likely income and expenditure a GBA cane grower would not be capable of sustaining the proposed increases in irrigation water charges.

Analysis indicates that cash losses would escalate to unsustainable levels. In 2025/26 when Dam safety charges are applied the growers would require to break even an estimated sugar price of $485/tonne which is approximately $45.50 per tonne cane.

The QSL 4 yr (2019-2022) average indicative price is $422/ tonne sugar or $38.66 per tonne cane for the average GBA grower which equates to a loss of $5.85 per tonne of cane produced or $620 per ha.

Correspondence Tim Smith

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28 October, 2019

Comments on the Water Resources of the Giru Benefitted Area

Comments provided by Tim Smith, former Regional Engineer North Queensland based in Ayr with responsibility for the Department of Water Resources programs in the area from Ingham down to Bowen from 1983 to 1991. Those programs included the planning, design, construction and operation of the Burdekin River irrigation Area (BRIA) and the extension of that scheme to supplement existing water allocations from the Haughton River and in the Giru Benefitted Area (GBA).

Before the Burdekin Water

The Giru area and in particular the what was later gazetted as the GBA had ground water resources before the decision was made by the Commonwealth and State Governments to construct the Burdekin Dam, build the Burdekin Dam to provide water to Townsville and establish the BRIA adjacent to the existing North and South Burdekin Water Board Areas at Ayr and Home Hill.

At that time, the Giru area had an established cane growing area, an area assigned to the CSR owned and operated Invicta Mill. Cane growing was based on irrigation from groundwater resources drawn from the aquifers that depended on annual recharge from the Haughton River. While flows in the Haughton River were obviously variable, that source of water was sufficient to support an industry at Giru including the investment by CSR in the Invicta Mill.

The State Government decisions to construct first the Giru Weir in 1977, then Val Bird Weir in 1983 and then the pipeline from that weir to Ironbark Creek and Healeys Lagoon in 1984 were made to increase the available ground water resource and improve it's reliability for the Giru area.

At the same time (1982/83), the construction of the Burdekin Dam was commenced, funded by the Commonwealth. In 1984, the State was able to accelerate the design, and construction of works for the BRIA. At that stage, given that the weirs and the Ironbark Creek pipeline had been completed what benefit the BRIA water might eventually be able to add to the sugar industry in Giru area was not a planning or design priority What planning had been completed was to add the bag to Val Bird Weir to further increase its capacity to store wet season flows in the Haughton and cause additional recharge of the underground system.

The Burdekin Water

The 5 years of well below average rainfall in the Dry Tropics Region from 1983 to 1987 stressed the availability of water on the whole Townsville and Giru area. The Haughton River didn't flow and the ground water system all but failed. So did Townsville's water supply from Ross River Dam. In 1987, both the people of Townsville and the Giru sugar industry and Invicta Mill were in extreme need of water.

Temporary works were put in place to get water to Townsville and partially replenish groundwater resources for the GBA. Operational charges were set for both Townsville and the GBA to supply water from the just completed Burdekin Stage 1 Pumpstation.

Later, after the emergency was over, the consultation with the Giru sugar industry – growers and miller and planning took a new direction – the recent experience of the drought signalled the priority then giver to the introduction of Burdekin water through the BRIA pumping and channel system was completed after the temporary works were dismantled, water as a backup on an assured basis.

Final Decisions

So the State Government decided to formalise the option of having Burdekin water available to supplement the groundwater system used for irrigation in the GBA when the system was under stress. Water could be diverted to Val Bird Weir and released to Giru Weir to recharge the underground.

At no time did the Government envisage that use of the underground resource would be abandoned in favour of some system of operation that just flooded the weirs with water from the BRIA pumping and channel system. Consultation with the sugar industry and miller, had agreed for good reasons that the future should be based on conjunctive use of groundwater and Burdekin water.

That view had not changed when I left the Burdekin in 1991.

Those reasons mentioned included

- the GBA had a resource that had supported and industry and sugar mill before the Burdekin scheme and that resource was still available
- on average, the weir infrastructure had enhanced the whole ground water system the State and industry had invested in and was operable for the benefit of the whole area
- conjunctive use was going to be an important factor in managing ground water levels for the long term sustainable use of the land for growing cane
- cost, the area had lower cost water if irrigation continued to be based on the ground water resource of the GBA with Burdekin water available as an option to supplement ground water supplies when necessary

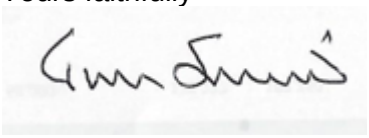
Irrigation today

I understand that today, the weir system may not be being operated as was envisaged when it was constructed and operated in the 1980's. If it is not, what is going on ignores the reasons mentioned above. Conjunctive use, and a cost structure for water based

on that, was what the State Government, cane growers and the miller intended. Any other system ignores the earlier investment made for the longterm by those stakeholders and I believe would look in their eyes unreasonable..

I believe that the canegrowers and miller are focussed on sustainable longterm cane and sugar production in the Giru area, and surely the options and cost of water supply for irrigation need align with that focus.

Yours faithfully



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REVIEW OF AQUIFER STORAGE AND NATURAL RIVER FLOWS IN THE GIRU BENEFITED GROUNDWATER AREA (GBGA)

INVICTA CANE GROWERS ORGANISATION LTD

4 NOVEMBER 2019

1 INTRODUCTION

There is a substantial groundwater aquifer in the Giru Benefited Groundwater Area (GBGA), and it's ludicrous for anyone to suggest otherwise. The GBGA is often referred to as the Giru Benefited Area (GBA) by Sunwater, the QCA and other parties, which removes acknowledgement that it is in fact a groundwater system with significant storage. There are historic reports from Government departments from the late 1960's and 1970's that acknowledge and define the limits and storage capacity of the aquifer/s in the area and refer to it as the GBGA.

A sugar mill was constructed in 1920 (68 years before the GBGA scheme) to process sugar cane only from this area. Logically, a mill would not have been built if there was a risk of having insufficient groundwater.

The GBGA has been flooded with Burdekin surface water since it's inception, which has led to masking of the natural river flows and groundwater storage. The GBGA has been subject to rising water levels in some places, which will continue to be a problem if there is not a significant reduction of surface water supplied to the GBGA, better management of the supply, and an increased use of groundwater.

This investigation is based on a review of limited data available at the time. The investigation relies on establishing the facts about the substantial aquifer that exists within the GBGA. The facts are based on earlier studies in the 1960's and 1970's, and current bore hole data provided on Queensland Globe by the Department of Natural Resources, Mines and Energy (DNRME).

Give more time (six to twelve months) a robust and comprehensive numerical groundwater model of the aquifer system could be constructed, which would enable reliable simulation and prediction of:

- the impacts of over supplying the system with freshwater,
- the impacts of supplying too little,
- the best locations to monitor groundwater levels which would inform decisions to release water,
- how much groundwater should be used by irrigators,
- which areas should take more or less groundwater,
- the impacts of seawater intrusion or upwelling of saline groundwater.
- the impacts of salinity caused by rising water tables,
- the volume of water exiting the system in aquifers,
- the volume of groundwater entering the system from all sources.

Instead, Sunwater has failed to acknowledge the existence of a groundwater system.

2 QUALIFICATIONS AND EXPERIENCE - KELVIN OLZARD

I have worked in the Burdekin area since 2006, for the following clients:
South Burdekin Water Board
North Burdekin Water Board
Lower Burdekin Water
Sunwater

The projects I was involved with include:

- seawater intrusion and saline upwelling investigations - both Boards
- rising salinity, rising water table - BRIA, Homestead Road (SBWB), Woods Road (SBWB), Ardmillan Road (NBWB),
- improving groundwater recharge – both Boards
- injection bores for seawater intrusion prevention - Woods Road (NBWB).
- Rising water tables/salinity – Upper Burdekin – various sites – Mona Park, Haughton Main Channel, Upper Haughton, Mulgrave.
- Design and installation of groundwater monitoring bores – SBWB.
- Groundwater monitoring and analysis of SBWB and DNRME bore data.
- Organised and supervised geophysical surveys to define the seawater interface – NBWB and SBWB.

During the current 2019 pricing review by the Queensland Competition Authority (QCA), for Sunwater, a qualified hydrogeologist was not used to assess the existence, capacity and sustainability of the GBGA aquifer/s or the natural flows in the Haughton River, both within the bed sands and neighbouring sediments. Instead hydrologists, who are not generally qualified to give advice on groundwater, were used.

3 THE GBGA AQUIFER

3.1 Hydrogeology

The aquifers in the GBGA are comprised of narrow Recent sandy alluvial deposits that occur within and adjacent to old channels and the current channel of the Haughton River, which has incised older Tertiary clay-rich marine sediments. Fresh to brackish groundwater is contained within sandy alluvium to deeps of approximately 10 metres. The aquifers overly saline clay rich sediments so are at risk of saltwater contamination due to upwelling caused by pumping. The area is also at risk of seawater intrusion caused by over pumping.

3.2 Storage Capacity

The Queensland Irrigation and Water Supply Commission (QIWSC) estimated the boundaries of the aquifer as shown in Figure 1. In 1967, the QIWSC estimated the "available storage" at 10,000 acre feet (12,300 ML) which was "sufficient to meet full irrigation requirements for 9,200 acres for some 160 days". In 1971, the QIWSC re-estimated the available storage (without the weirs) to be 13,568 ML. With the weirs, the combined storage in the aquifer and weirs was estimated to be

19,700 ML. This was the volume used as the natural yield of the aquifer since 1983. This was what the irrigators relied on solely for irrigation, despite periods of drought.

The available storage volume of the aquifer could be higher than 13,568 ML.

Using the grey shaded areas in Figure 1, which represent the groundwater areas, I produced similar outlines in Google Earth (Figure 2), although my areas were much more trimmed to the edge of the Haughton River, are thinner in the Healey's Lagoon area and did not include additional areas previously drawn in Figure 1. I used a value of 30% for available storage in the sands, which is reasonable given the coarse nature of the sediments in many of the bore logs in the area. Average aquifer thicknesses of 8 metres and 6 metres for the Haughton Aquifer and the Healy's Lagoon Aquifer respectively were used. I arrived at a total aquifer storage volume of about 15,600 ML, which is higher than the 13,568 ML estimated in 1971. This is without the weirs.

The point is that qualified hydrogeologists can replicate the estimation process that was used in 1967 and 1971 and reach similar aquifer storage volumes. The aquifer does exist and, with the weirs, holds around 20,000 ML of water.

The weirs themselves only hold about 1,640 ML. If the aquifer is insignificant, as Water Solutions are suggesting, and the only storage is in the weirs (1,640 ML), then it would be very difficult indeed to balance and distribute the full annual usage (20,000 ML to 40,000 ML) from such a small pond. There is certainly an aquifer there, it holds at least 20,000 ML and it serves as a significant balancing storage. Before 1988 this aquifer was topped up by natural flow in the Haughton River.

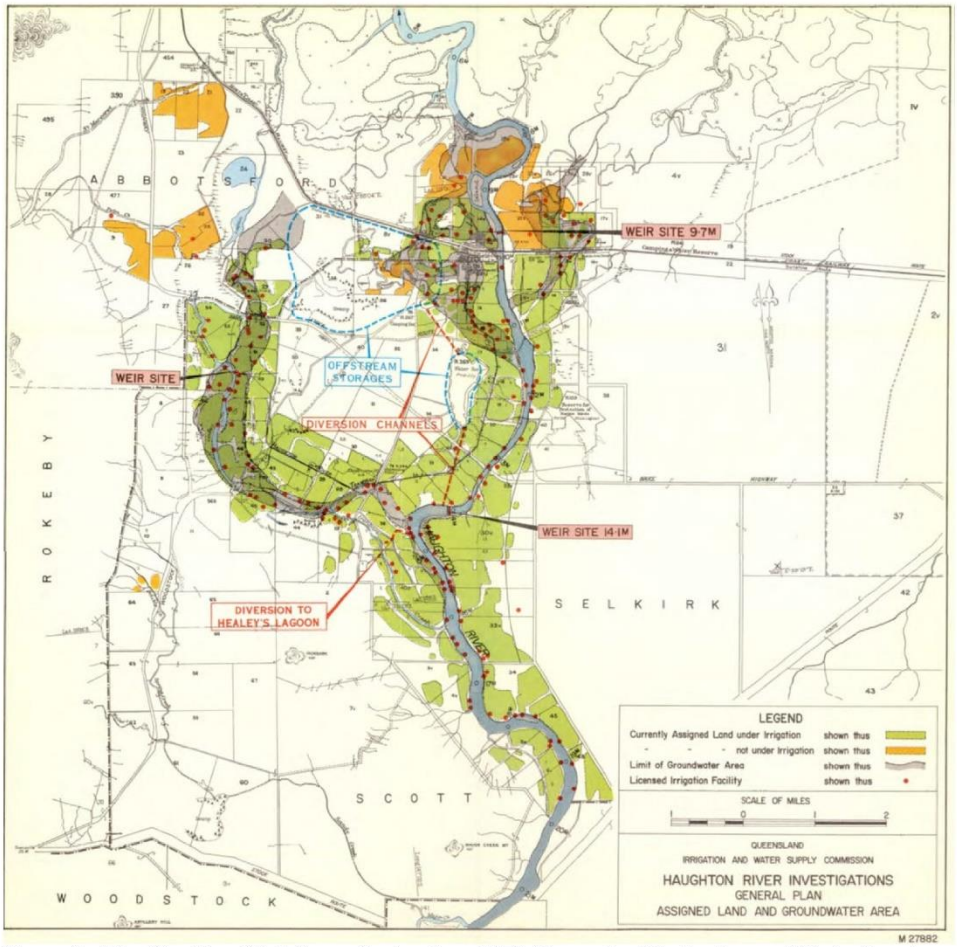


Figure 1 - The Giru Benefited Groundwater Area 1971 (Queensland Irrigation and Water Supply Commission). The aquifer includes the darker grey area defining the river and the paler grey areas which cross the green irrigated areas.

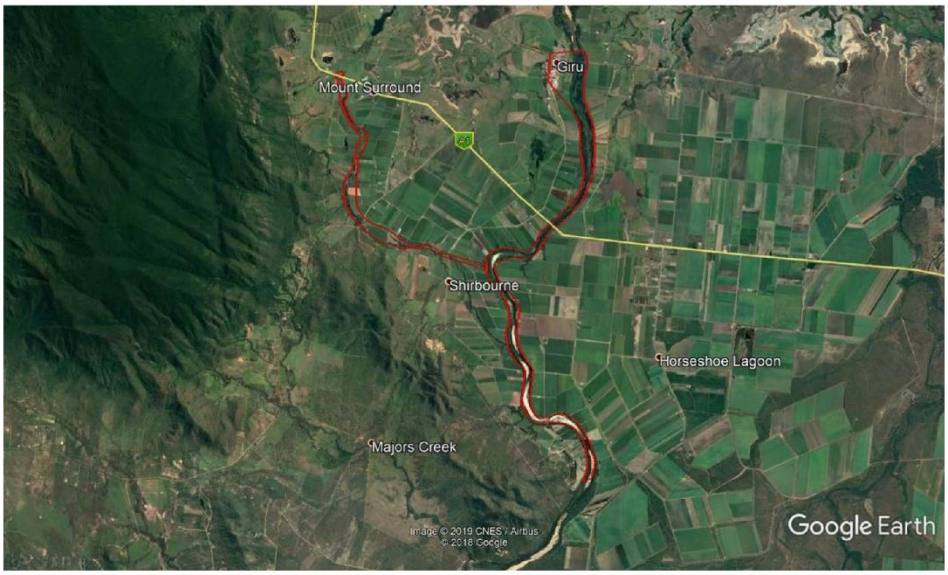


Figure 2 - A possible outline of the GBGA aquifers, which are similar to outlines shown in Figure 1.

3.3 Giru Sugarcane Expansion 1975

In 1975, The Haughton Sugar Company Limited engaged McIntyre and Associates Pty Ltd to conduct the "Caneland Expansion Study". Figure 3, shows the aquifers identified at the time and the directions of groundwater flow (thick grey arrows). The location of the aquifers is similar to the locations provided in the 1971 QIWSC report (Figure 1). The sugar company would not have considered expansion unless there was a reliable water supply. Farmers in the Giru area had been using predominantly groundwater for decades by then. Sugar cane was on consignment so there had to be security of a successful crop each year, which was enabled by groundwater.

Figure 4 shows a plot of soils types in the region. Within the Giru area the soils are classified as 'delta soils', which are "light sandy soils ideally suited sugar cane". It is no coincidence that the Giru Benefited Groundwater Area has the same shape as the soil map. This was an enclave of sugar producers that had the correct soils and a fresh groundwater supply through the middle, independent of the Barattas and the Burdekin. They operated successful productive farms independently of the rest of the Burdekin Delta long before the weirs and the Haughton Main Channel. There were periods of drought where water supplies became depleted and water security was threatened, and there was a risk of seawater intrusion as water demand increased. When a supplementary freshwater supply was made available by Sunwater, from the Burdekin River, it was welcomed because it essentially eliminated those risks. But what has developed in practice is a system that is so oversupplied with freshwater that the natural flows are no longer recognised, but they are still there. Sunwater has supplied so much water for so long that water levels are continuously elevated resulting in an increasing threat of rising groundwater levels, which is as detrimental to sugar cane production as seawater intrusion.

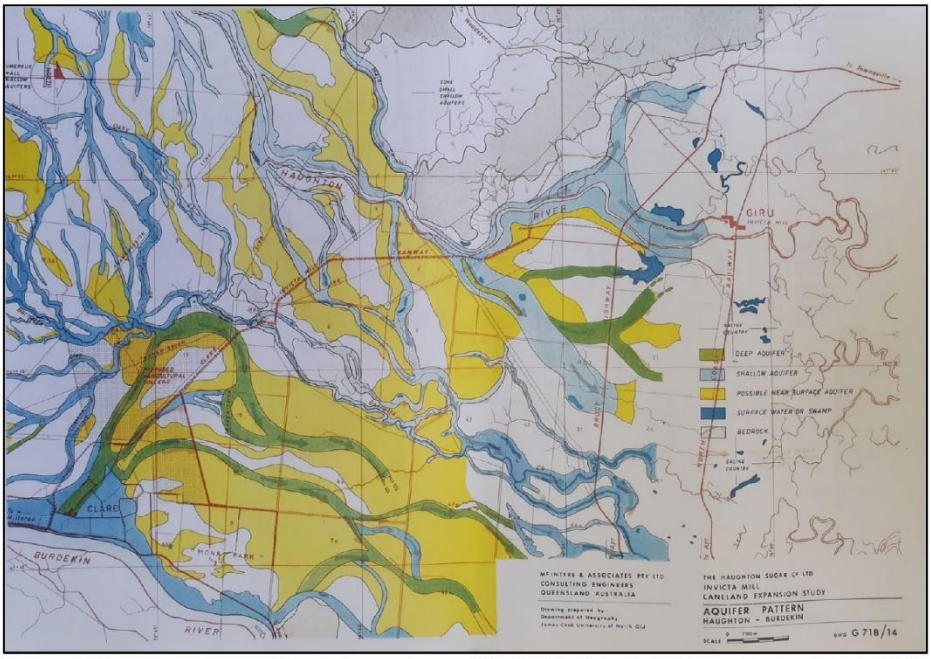


Figure 3 - Groundwater aquifers in the region and in the GBGA. McIntyre and Associates (1975).

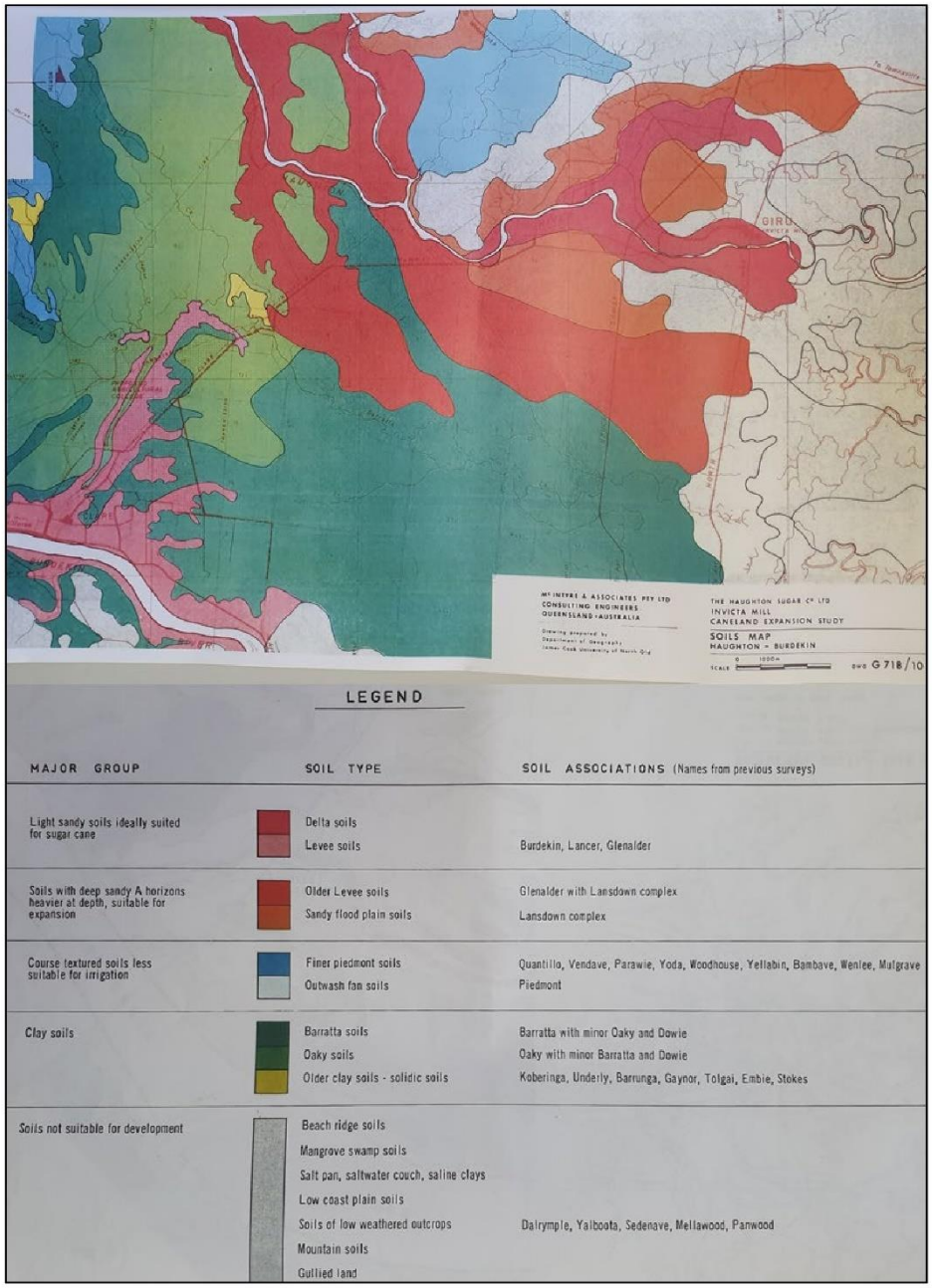


Figure 4 - Soil types in the Giru Benefited Groundwater Area

3.4 Groundwater Modelling

Detailed groundwater numerical modelling has not been conducted for the GBGA aquifer. But modelling is the only way that a true balance of incoming and outgoing groundwater (and surface water) can be simulated or demonstrated. The available storage is not only the groundwater held in the aquifer itself but should include an assessment of the groundwater in transit towards the aquifer from other sources, such as riverbed sands and neighbouring sediments.

In Sunwater's current assessment of the GBGA aquifer/s, there is no accounting for the volume of groundwater entering the GBGA groundwater system:

- via the Haughton River upstream of the junction of Majors Creek.
- from Majors Creek, which receives extended run-off and seepage from Mt Elliot after the wet season. Mt Elliot is a wet tropical mountain region which would receive more rainfall than Giru itself.
- via bed sands in the Haughton River (not visible to observers), a substantial system of groundwater storage, which transports groundwater to the GBGA.
- run-off and seepage from Mt Elliot to Healey's Lagoon.
- via groundwater flow from other sediments surrounding the GBGA.

Also, there is no accounting for the volume of groundwater leaving the GBGA groundwater system:

- via the Haughton River downstream of the Giru Weir.
- via the downstream side (ocean side) of Healey's Lagoon.
- via other groundwater flow paths from the GBGA towards the North.
- flood harvesting by farmers along Majors Creek, where water is taken before it reaches the GBGA. This water is part of the natural flow of the Haughton River. Is this water accounted for and the usage adequately charged to the users?

4 WATER BALANCE OF THE GBGA AQUIFER

The bathtub concept in Figure 5 shows the inflows and outflows of the GBGA system. The only part of the system that is measured with any degree of accuracy and confidence is the amount used by irrigators. Sunwater have not supplied all the relevant information relating to the losses in the Haughton River, the natural flows from the whole Haughton Catchment, the flood harvesting that is done from Major Creek, or the Temporary Transfers to farmers in Haughton Zone A (upstream of the GBGA). At the last meeting with the QCA in October 2019, the GCA hydrology consultant (Water Solutions) did not know:

- that there is historic evidence for the GBGA aquifer, which holds in excess of 20,000 ML.
- the shape and location of the aquifer/s.
- where Major Creek is.
- that a bore (RN11900058), which was chosen by Water Solutions to represent the aquifer, was not located in the aquifer or the GBGA.
- that water is being flood harvested from Major Creek
- that surface water and groundwater enter Healey's Lagoon from Mt Elliot for many months after the wet season ends.

Water Solutions and OD hydrologists seem to be pushing the line that there is insignificant natural flow in the Haughton River system, despite the overwhelming historic evidence to the contrary.

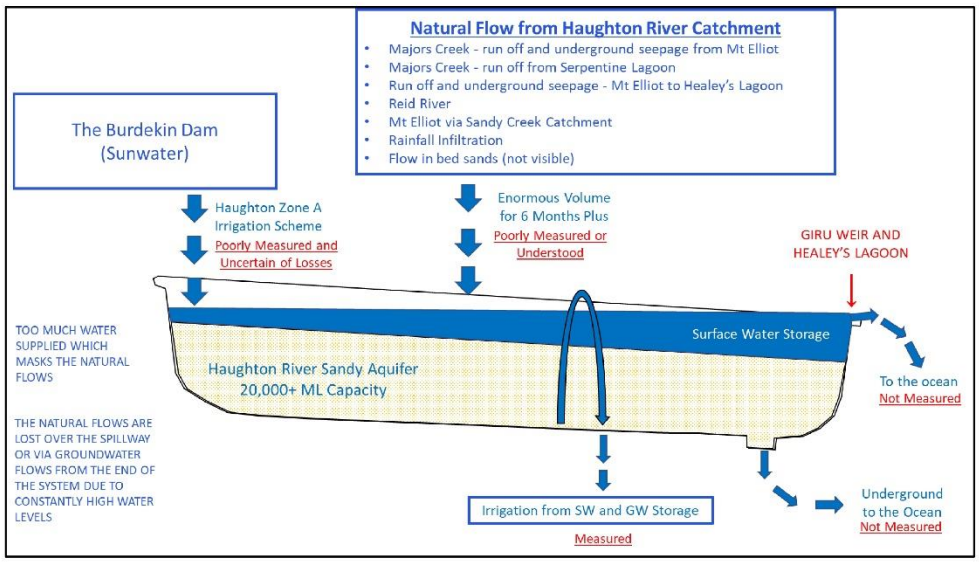


Figure 5 - An overfilled bathtub analogy to explain the problem with the GBGA. Too much water supplied by Sunwater, and very poor measurement of losses and other allocations or extractions upstream of the GBGA.

Figure 6 shows the sources of natural flow in the Haughton River Catchment, and its distance of separation from the Burdekin River and Barrattas. The sources of water in the Haughton River Catchment are:

- The Haughton River catchment upstream of Reid River
- The Reid River
- Serpentine Lagoon which drains into Major Creek.
- Major Creek.
- Mt Elliot into Major Creek. Mt Elliot is a tropical rainforest area which receives much more rainfall than the surrounding area. Rainwater drains from the southern side of Mt Elliot as run off in Major Creek and through groundwater infiltration in soils, fractures and bed sands which feed Major Creek.
- Sandy Creek which drains the south eastern side of Mt Elliot.
- Run off and seepage from the north eastern side of Mt Elliot.
- Direct rainfall run off , overland flow and infiltration through soils and sediment.

The Haughton River catchment provides surface water and groundwater to the Giru Benefited Groundwater Area. It is a separate system to the Barrattas and the Burdekin River.

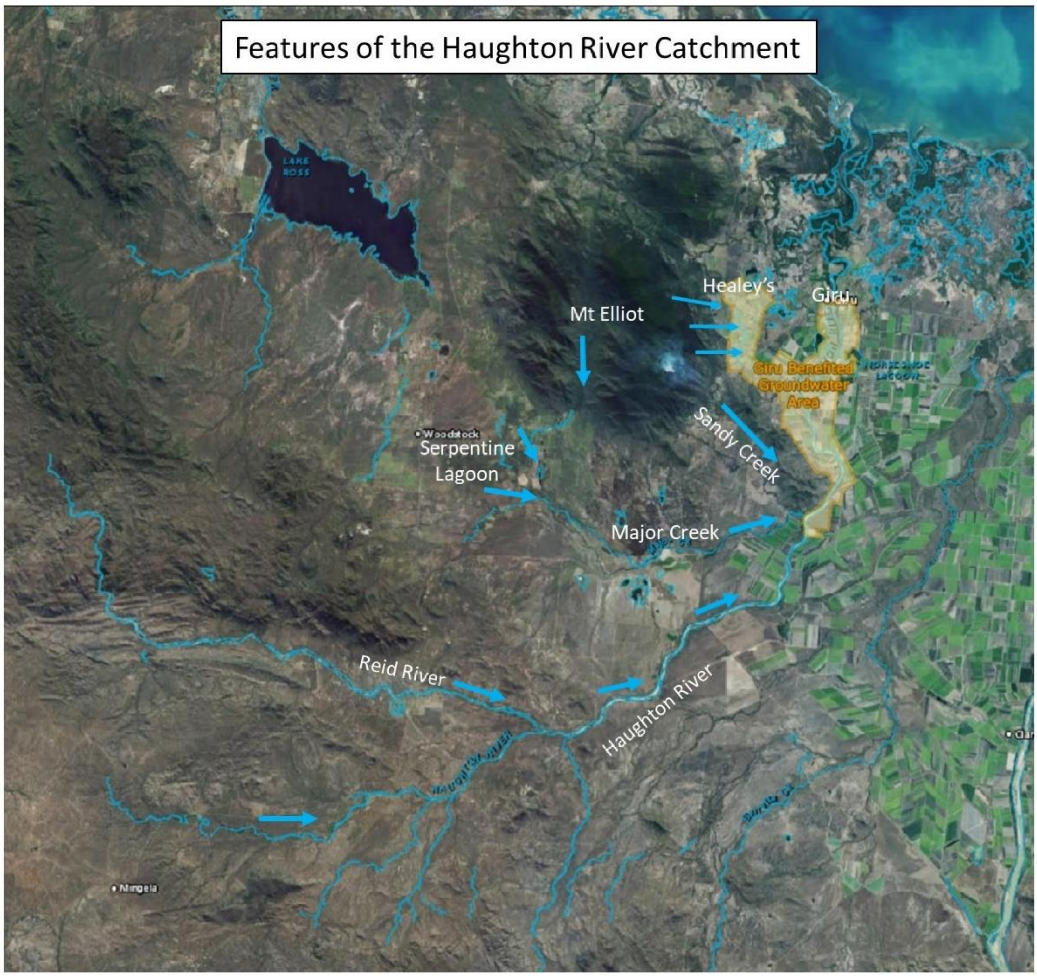


Figure 6 - Features of the Haughton River Catchment, including surface water flow and groundwater infiltration.

5 NATURAL YIELD AND AQUIFER STORAGE

Tim Smith (former engineer with the Haughton Irrigation Scheme, 1980's and 1990's) stated recently that it took 3 months for water to reach bores at the downstream end of the GBGA aquifer (near Giru township) when they first released water from the Haughton Main Channel into the Haughton River, in the late 1980's. The water levels in the aquifer were very low (about 6 metres below ground level in bore 11900147) after a prolonged drought, and bores were being monitored in the Giru township area (probably bore 11900147) for the signs of rising groundwater levels which would have been a result of aquifer recharge from the water released into the Haughton River. Water was released from the scheme at a rate of 60ML per day for three months before a

change in groundwater levels was noticed. This is a total volume of 5400 ML over the three-month period. Surface water continued to be pumped into the system until the full thickness of the aquifer and the weirs were full. This is evidence of the significant volume of groundwater stored in bed sands, in palaeochannels (buried river channels) running off the Haughton River, and in the sediments beside and under the Haughton River.

In 1988 it took 5,500 ML of water to fill that space (storage capacity) within the sediments. In other words, this represents the volume of water making its way along the 19+ km section of river towards the Giru Weir, and being soaked up by the porous sediments and bed sands. After a normal wet season all that storage capacity is full, and there is an enormous load of surface water (not measured) and groundwater (not measured) which is still making its way to the GBGA. Flood water, and water in-transit after the flood, is considered the natural yield. The flow in Major Creek and the Haughton River can last up to 6 months or more after a big wet season. This volume easily exceeds 5,500 ML but is not properly measured and recorded by Sunwater.

The aquifer storage capacity is the volume of groundwater the aquifer can hold. It is estimated to be in excess of 20,000 ML (including surface water). The natural yield of the aquifer should not only be thought of as the volume held in the aquifer (20,000 ML) but should also include the residual natural flows in the whole catchment for months after a wet season. During most wet seasons, between January and April (4 months inclusive), the aquifer will remain full. The farmers will be using less water than normal over that period because there will be occasional rainfall to assist with irrigation. The creeks and rivers in the catchment will continue to flow for another two months or more (potentially up to six months as is the case after the February 2019 Monsoon Event), which may maintain the aquifer at full capacity, and meet irrigation requirements. According to the 1971 QIWSC study, a full aquifer will last approximately 8 months.

Therefore, in most years the natural flows and the storage capacity of the aquifers during and after a wet season is enough to sustain irrigation for 10 to 12 months. An attempt to quantify that volume is provided in Table 1. Irrigators in the GBGA should be permitted to extract at least 20,000 ML per year, as planned at the inception of the scheme, and not have to pay for that portion, since it is widely viewed as the natural yield or storage capacity of the aquifer. In most years the aquifer and natural flow is sufficient to supply all the water for irrigation.

Table 1 - Estimate of natural flows and storage in the GBGA

Water Sources for Irrigation	Volume (ML)	Description
Natural Flows. Bed sands and sediments upstream of the GBGA	20,000	Estimated but will be greater than this. Includes surface water and groundwater in transit (not measured) towards GBGA after a wet season. Not measured by Sunwater.
Full aquifer	20,000	full at the end of the wet season and available for irrigation for 6 to 8 months. Partially supplemented by natural flows for several months after a wet season
Usage during the set season	10,000	water taken in between rainfall events. The aquifer is topped up through out the 4 month period.
TOTAL	**50,000**	**Exceeds the GBGA total allocation**

5.1 Pricing – Fixed Charges

GBGA water users currently pay a fixed price (half the price paid in the BRIA) for the full 40,249 ML annual allocation. The current pricing review proposes GBGA users to pay the full rate (same as BRIA) for the 40,249 ML allocation. Given that the aquifer and natural flows can provide full irrigation in most years, being charged the full rate for the allocation seems unreasonable. There should be a move by GBGA irrigators to appeal for charges to be applied only to 20,000 ML (the storage capacity of the aquifer).

According to the Kavanagh (2017) table shown in Table 2, the average annual water consumption from 1997 to 2016, in Haughton Zone A (of which the GBGA is a subset), was 32,774 ML. Therefore, the annual allocation should be set lower than 40,249 ML. It seems inappropriate to charge for amount that is rarely used.

The data in Table 2 for "diversions from balancing storage" prior to 2015 are only estimates.

Table 2 - 1998 to 2016 releases and usage in ML (Kavanagh, 2017)

Year	Diversion from Balancing Storage (ML)	Total Water Use Haughton Zone A SW & GW (ML)	Percentage of water required to be delivered from the Balancing Storage
1997/98	22,873	28,297	81%
1998/99	4,406	18,618	24%
1999/00	25,138	22,832	110%
2000/01	14,160	27,315	52%
2001/02	43,685	48,059	91%
2002/03	60,037	51,253	117%
2003/04	42,453	42,485	100%
2004/05	45,257	48,609	93%
2005/06	32,136	33,125	97%
2006/07	31,556	37,937	83%
2007/08	22,018	30,742	72%
2008/09	19,101	27,061	71%
2009/10	38,465	35,571	108%
2010/11	5,872	6,677	88%
2011/12	29,603	20,387	145%
2012/13	26,873	20,610	130%
2013/14	44,671	29,668	151%
2014/15	47,405	46,422	102%
2015/16	47,019	47,031	100%
Averages	**31,723**	**32,774**	**97%**

5.2 Pricing – Usage Charges

GBGA water users are charged per ML for the water they use, but they pay half the rate of the BRIA users. This was set in place in recognition of the natural yield of 19,700 ML that the system provides. The question is, how much of the water used is natural yield.? As already mentioned, in most years the natural yield and aquifer storage is enough to provide full irrigation.

Sunwater releases water into the Haughton River approximately 5.5 kilometres upstream of the GBGA. That section of the river is part of Haughton Zone A, not the GBGA. Water users in Haughton Zone A have annual allocations of 2,400 ML, but they probably need about 10,000 ML per year, based on water consumption for the same area in other places. Temporary transfers of those additional allocations are provided to those irrigators. Sunwater have only provided temporary transfer volumes from 2009 to 2018 (Table 3). The temporary transfers should be subtracted from the values in Table 2 to show usage and release volumes for the GBGA only, as shown in Table 3. The release values should also be reduced by the losses in the river. Losses of 35% are experienced in the Haughton Main Channel, so has also been applied to data in Table 3. In the grey columns, for the period shown (2009 to 2017) the average annual releases were 20,333 ML (less temporary transfers and losses) instead of 33,840 ML and the average annual usage was 25,131 ML (less temporary transfers) instead of 31,520 ML.

In summary, the data provided by Sunwater for releases and usage within the GBGA are erroneous, unreliable and incomplete. Therefore, it is unreasonable and irresponsible of Sunwater to base pricing calculations on these numbers. Much more accurate and reliable data should be provided before the pricing review can continue.

Based on the revised average release volume (20,333 ML) shown in Table 3, it is most likely that natural storage and flows could have met that demand over that period. Why should Sunwater start charging users the full price (BRIA rates) when the natural yield supplies in excess of 19,700 ML/year, which was the entitlement of the GBGA water users at commencement of the Haughton irrigation scheme? Sunwater no longer recognises the contribution that natural yield provides, but the 19,700+ ML of natural yield still exists, and is being used.

Table 3 - Modified water releases and usage for the GBGA

Year	Temporary Transfers (ML)	Released to Haughton R (ML)	Released to Haughton R. (less temporary transfers) (ML)	Released to Haughton R. (less temporary transfers and 35% losses) (ML)	Used in Zone A (ML)	Used in Zone A less temporary transfers (ML)	Volume released as a % of volume used
2009/10	6,283	38,465	32,182	23,839	35,571	29,288	81
2010/11	485	5,872	5,387	3,990	6,677	6,192	64
2011/12	1,484	29,603	28,119	20,829	20,387	18,903	110
2012/13	1,032	26,873	25,841	19,141	20,610	19,578	98
2013/14	2,883	44,671	41,788	30,954	29,668	26,785	116
2014/15	11,814	47,405	35,591	26,364	46,422	34,608	76
2015/16	13,364	47,019	33,655	24,930	47,031	33,667	74
2016/17	7,841	29,357	21,516	15,938	33,502	25,661	62
2017/18	12,318	35,291	22,973	17,017	43,814	31,496	54
Average	**6389**	**33840**	**27450**	**20333**	**31520**	**25131**	**82**

6 WATER LEVELS

There is no dispute that water levels in the aquifer have been very low in the past, and that there is a risk to seawater intrusion if water levels are too low for too long. What is not clear is how low groundwater levels can drop and remain there before seawater starts to migrate into the aquifer. This could be done if there was a detailed calibrated numerical groundwater model, but there isn't one. The whole system (surface and underground) is flooded constantly, masking any of the natural flows and keeping groundwater levels constantly high. This is likely to cause other issues including waterlogging of sugar cane and rising salinity if groundwater extraction is not managed correctly.

6.1 Rising Water Levels and Salinity

The GBGA is at risk of rising groundwater levels and rising salinity if not managed correctly. The volume of freshwater supplied by Sunwater should be managed closely, and the volume of groundwater taken by bores should be maintained (or increased) to prevent these problems.

Figure 7 shows water levels and salinity rises in a bore located above the Val Bird Weir (CSIRO, 2004). The same pattern is observed in other bores throughout the GBGA which are located slightly off the Haughton River, in clay rich saline sediments. The problem of rising water levels in the GBGA was evident in 2004. The problem will spread an get worse if not managed correctly. The root zone of cane extends to about 2 metres below ground level. There are times that groundwater levels are recorded within that zone. If it hasn't already been noticed, this will cause depletion or loss of can production.

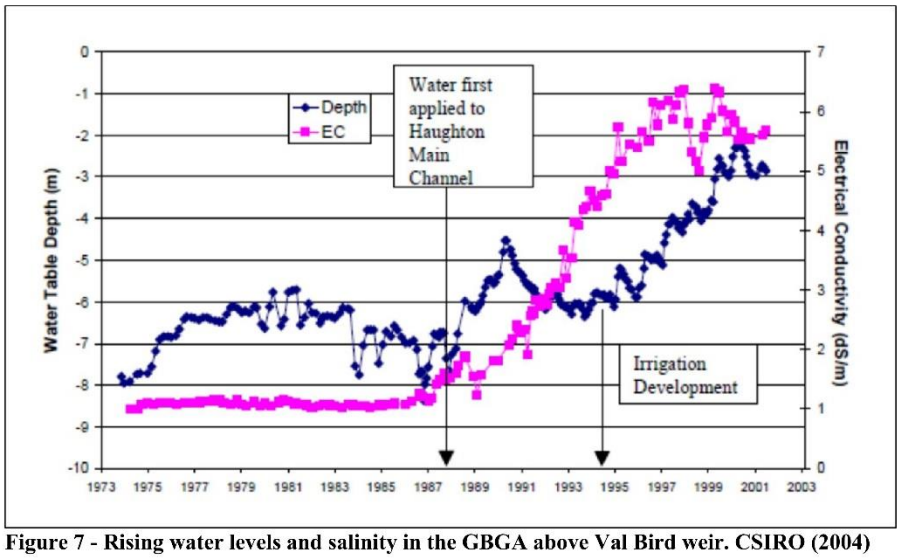


Figure 7 - Rising water levels and salinity in the GBGA above Val Bird weir. CSIRO (2004)

6.2 Groundwater Monitoring

A basic review of all the Queensland Government bores registered in the GBGA confirmed the existence of sandy tightly constrained aquifers which fringe the Haughton River and old channels, and which are recharged by the Haughton River. OD Hydrology (2018) chose two bores (11900054 and 11900058) which they believed represented the hydrogeology of the GBGA (shown in Figure 8). They are not within the GBGA aquifer system. They are located within older saline clay rich sediments with very high salinity (Figure 9). It is important to have a clear understanding of the shape, extent and nature of the aquifer in this hydrogeological setting. The aquifer overlies and is surrounded by unfavourable sediments.

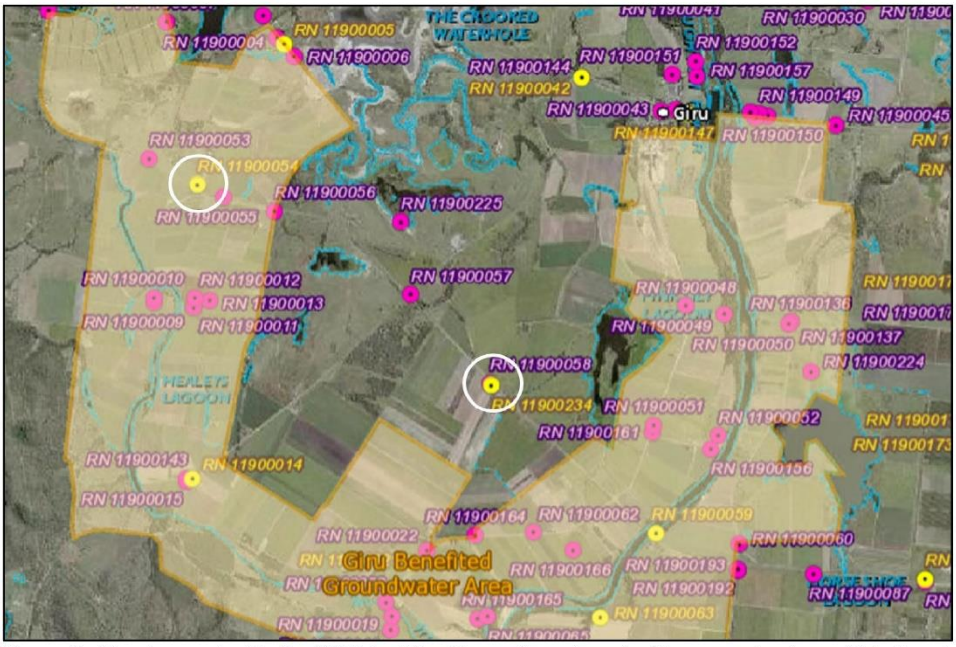
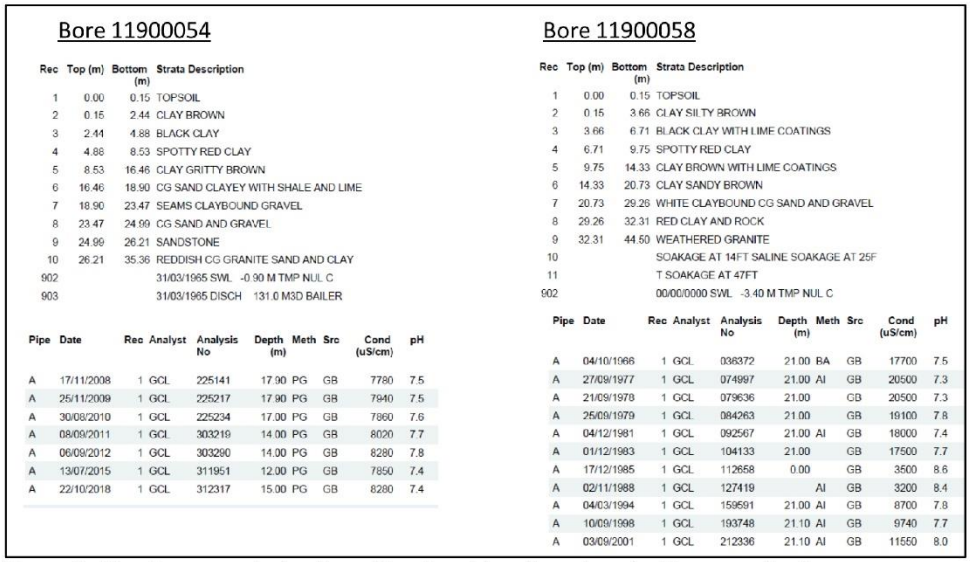


Figure 8 - Two bores otuside the GBGA with saline sediments and saline groundwater, which do not represent the GBGA aquifer.



Bore 11900054

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.15	TOPSOIL
2	0.15	2.44	CLAY BROWN
3	2.44	4.88	BLACK CLAY
4	4.88	8.53	SPOTTY RED CLAY
5	8.53	16.46	CLAY GRITTY BROWN
6	16.46	18.90	CG SAND CLAYEY WITH SHALE AND LIME
7	18.90	23.47	SEAMS CLAYBOUND GRAVEL
8	23.47	24.99	CG SAND AND GRAVEL
9	24.99	26.21	SANDSTONE
10	26.21	35.36	REDDISH CG GRANITE SAND AND CLAY
902			31/03/1965 SWL -0.90 M TMP NUL C
903			31/03/1965 DISCH 131.0 M3D BAILER

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH
A	17/11/2008	1	GCL	225141	17.90	PG	GB	7780	7.5
A	25/11/2009	1	GCL	225217	17.90	PG	GB	7940	7.5
A	30/08/2010	1	GCL	225234	17.00	PG	GB	7860	7.6
A	08/09/2011	1	GCL	303219	14.00	PG	GB	8020	7.7
A	06/09/2012	1	GCL	303290	14.00	PG	GB	8280	7.8
A	13/07/2015	1	GCL	311951	12.00	PG	GB	7850	7.4
A	22/10/2018	1	GCL	312317	15.00	PG	GB	8280	7.4

Bore 11900058

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.15	TOPSOIL
2	0.15	3.66	CLAY SILTY BROWN
3	3.66	6.71	BLACK CLAY WITH LIME COATINGS
4	6.71	9.75	SPOTTY RED CLAY
5	9.75	14.33	CLAY BROWN WITH LIME COATINGS
6	14.33	20.73	CLAY SANDY BROWN
7	20.73	29.26	WHITE CLAYBOUND CG SAND AND GRAVEL
8	29.26	32.31	RED CLAY AND ROCK
9	32.31	44.50	WEATHERED GRANITE
10			SOAKAGE AT 14FT SALINE SOAKAGE AT 25F
11			T SOAKAGE AT 47FT
902			00/00/0000 SWL -3.40 M TMP NUL C

Pipe	Date	Rec	Analyst	Analysis No	Depth (m)	Meth	Src	Cond (uS/cm)	pH
A	04/10/1966	1	GCL	038372	21.00	BA	GB	17700	7.5
A	27/09/1977	1	GCL	074997	21.00	AI	GB	20500	7.3
A	21/09/1978	1	GCL	079636	21.00		GB	20500	7.3
A	25/09/1979	1	GCL	084263	21.00		GB	19100	7.8
A	04/12/1981	1	GCL	092567	21.00	AI	GB	18000	7.4
A	01/12/1983	1	GCL	104133	21.00		GB	17500	7.7
A	17/12/1985	1	GCL	112658	0.00		GB	3500	8.6
A	02/11/1988	1	GCL	127419		AI	GB	3200	8.4
A	04/03/1994	1	GCL	159591	21.00	AI	GB	8700	7.8
A	10/09/1998	1	GCL	193748	21.10	AI	GB	9740	7.7
A	03/09/2001	1	GCL	212336	21.10	AI	GB	11550	8.0

Figure 9 - Bore log excerpts showing saline clay rich sediments and saline groundwater.

The Department of Natural Resources Mining and Energy (DNRME) have recorded water levels, electrical conductivity and other features in registered monitoring bores since the 1960's. There are dozens of registered bores that are currently being monitored in real time, or that have been monitored in the past. This department should have a very good understanding of the behaviour of groundwater levels in the aquifers since before the establishment of the Giru and Val Bird weirs in 1977 and 1983, and the introduction of the GBGA scheme in the late 1980's.

Groundwater monitoring bores could be used by Sunwater to better manage the releases into the river, not only by using weir levels. One such bore (RN11900147) that could be used is shown in Figure 10. It lies just outside the GBGA but it is screened in deep sands (9.5 metres thick) and is in a prime area of the aquifer, where there is elevated water levels resulting from the weirs being almost full most of the time, and a constant head of water which is allowing groundwater to leave the system towards the North through buried channels (palaeochannels).

Figure 11 shows the historic water levels recorded in Bore 11900147 and the rainfall (Majors Creek Station) for the same period. (the Giru North Station does not record water levels past 2016). Notice the rise in water levels at the introduction of Burdekin water in 1988, and the relatively stable and small fluctuations in water levels ever since. Burdekin water was introduced to the system after a five-year drought which broke in about 1988. Prior to 1988, the water levels, which represent the natural storage of groundwater in the aquifer, dropped below sea level two times for short periods, not enough to cause seawater intrusion. Pre 1988 water levels fluctuated between about 1.5 metres below ground level (mbgl) and 4 mbgl, which means that more of the groundwater stored in the aquifer was being used than we see after 1988. After 1988 the system is always top up, with water levels not dropping below 3.5 mbgl, but instead rising to 0.5 mbgl. The

system is over supplied with Burdekin water which will lead to problems of rising water levels and rising salinity seen elsewhere in the BRIA.

Figure 10 - Location of DNRME Bore 11900147. The royal blue arrows indicate the flow direction of groundwater, in old river channels (part of the aquifer), which leaves the area towards the North. Pale blue arrows indicate the continuous flow of surface water into the aquifer from the weir.

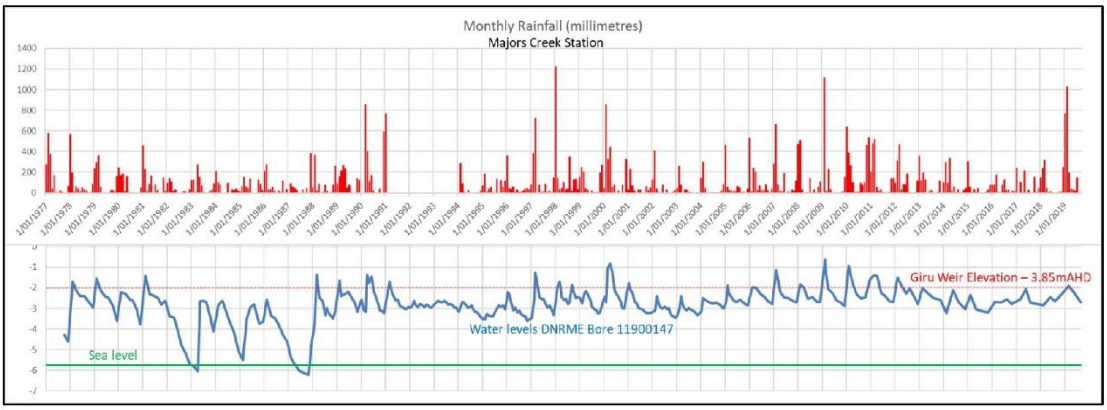


Figure 11 - Water levels from Bore 11900147 and rainfall from the majors Creek Station.

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Dated: **November 2019** **Groundwater Australia**

Kelvin Olzard
Principal Hydrogeologist

To Queensland Competition Authority.

The Below Irrigators —

Which to advise that we want any negotiations on the matter of pricing to be conducted with the

Manager of the Invicta suppliers committee and Manger of CBL growers committee in consultation with The GBA Sub-committee members

Name	Signature	Date
GLEN PARISE	G Parise	11/10/19.
JOHN PARISON	G J Parison	11/10/19
PRIMO-PILLA	P. Pilla	11/10-19
JOHN KERSH	J. Kersh	11-10-19
S+D.P. Pappalardo	S Pappalardo	11-10-19.
Rod Cogill	R T Cogill	11-10-19
William Huston	Huston	11-10-19.
Daniel Smith		11-10-19.
WILLIAM HORSFALL	Wm Horsfall	11-10-19
Robert. Poletto	R.A. Poletto.	11-10-19.
John Bahr	J Bahr	11/10/19
Mary Dixon		11/10/19.
DINO POLETTO	D Poletto	11/10/19
IAN FLETCHETT		11/10/19.
John Centrusco		11/10/19.
MARK FRANETTOVICH		11/10/19
Andrew Cross		11/10/2019
ARMIN WESSEL		11. 10. 2019
ROBERT STOCKMAN		11-10-2019
ANTHONY WHELAN	A Whelan	11/10/2019

To Queensland Competition Authority.

The Below Irrigators —

Which to advise that we want any negotiations on the matter of pricing to be conducted with the

Manager of the Invicta suppliers committee and Manger of CBL growers committee in consultation with The GBA Sub-committee members

Name	Signature	Date
Steven Pilla		11/10/19
Daryl Stockman		12/10/19
Mary Lyons		12/10/19.
Gary Lyons.		12/10/19
John Pierotti		12/10/19
Anton Zebedin		15/10/19.
Bruno Todeschino		15/10/19.
Francis Serrahel		15/10/19

To Queensland Competition Authority.

The Below GBA Irrigators –

advise that we want any negotiations on the matter of pricing to be conducted with the

Manager of the Invicta suppliers committee and Manger of CBL canegrowers committee in consultation with The GBA Sub-committee members

Name	Signature	Date
NEIL SHEATHER	N Sheather	15/10/2019
GARY MARCHESINI	G. Marchesini	24/10/2019

BURDEKIN DISTRICT CANE GROWERS LIMITED

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PO Box 588
AYR QLD 4807
Phone: 07 47832111
Email: manager@pcgo.com.au
ABN 30 168 732 269

12 December 2019

Professor Flavio Menezes
Chairman
Queensland Competition Authority
Level 27
145 Ann Street
Brisbane Queensland 4000

For Attention: Mr Darren Page - Darren.Page@qca.org.au

Dear Chair,

Further to our 4 November 2019 submission in response to the Queensland Competition Authority's draft Report "Rural Irrigation Price Review 2020-24 Part B: Sunwater, dated August 2019, we provide the following additional Late Information, that we have been advised by Mr Darren Page will be accepted and reasonable endeavours used to consider this information as part of the QCA's assessment. We further advise that we are happy for this letter and the information contained therein to be published on the QCA's website.

You will recall that one of the reasons why an extension of time had been requested for the Burdekin District Cane Growers Limited to lodge its submission after the 4 November deadline, was because Sunwater had failed to provide some critical and important information that we had requested.

QCA had advised that it would not be granting any formal extensions to the deadline and so BDCG was forced to make an incomplete submission. This was noted on page 8 of the submission (electronic page 10). After numerous requests, the information was finally provided by Sunwater last week on Tuesday 3 December 2019, after a 43-day delay.

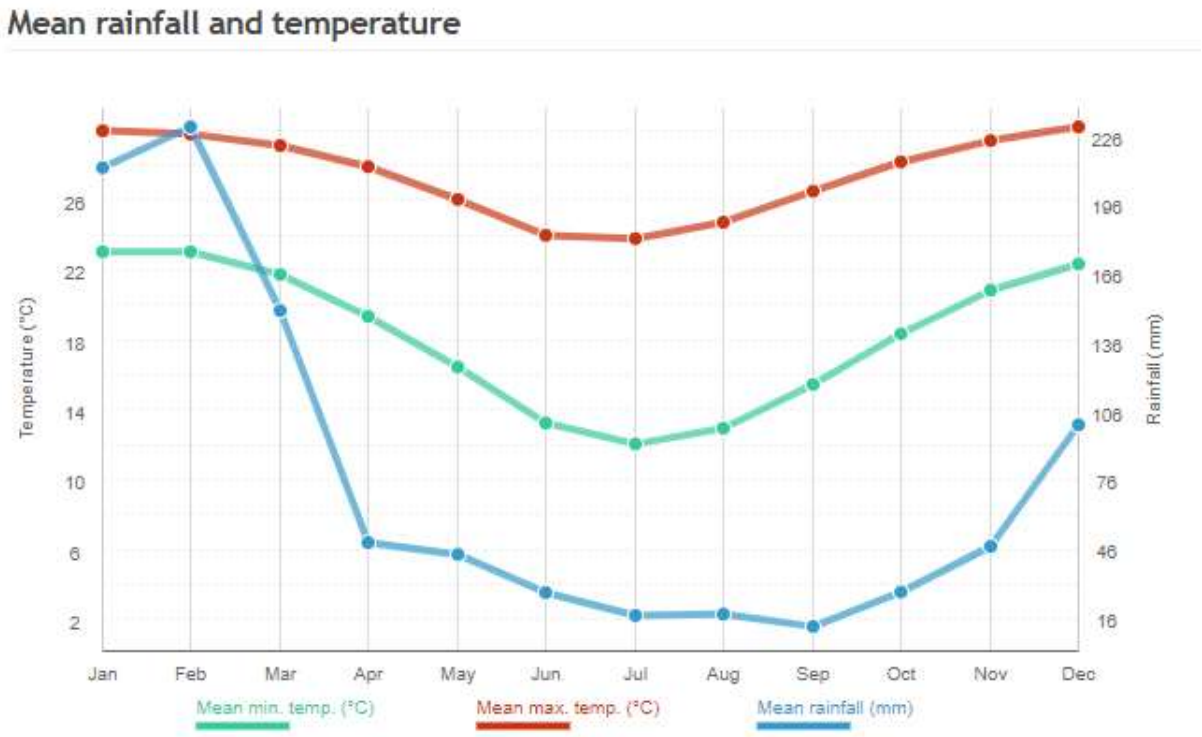
Based on the information provided, the total releases and usage for the 6 months 1/4/19 to 30/9/19 were:

Releases:	300ML + 4,230ML	=	4,530ML
Usage:	6,100ML + 7,222ML	=	13,322ML
Usage to Releases %:	13,322ML / 4,530ML	=	294%

Usage to Releases % adjusted for Channel equivalent transmission inefficiencies (64%): 13,322ML/(4,530ML X 64% = 2,900ML) = 459%

Using estimated rainfall based on an Australian Meteorology website, BOM's Ayr (40KM south of Giru) rainfall for the months April through September, I estimate that around 160mm fell in the Burdekin district during this time.

My conclusion is that the period 1 April 2019 through to 30 September 2019 was a "dry period" and it appears that based on an assessment of usage to release data, whether adjusted for transmission inefficiencies (459%), or not (294%), there appears to be a complete inconsistency with the conclusions drawn by Water Solutions, the QCA consultant, "*that GBA irrigators are receiving little contribution from natural Haughton River flows in dry periods*" and "*that the contribution of natural flows is very small*".



If we were to add in the usage and release data between the flood event (early February) and 1 April (a further period of 2 months), the % of usage to release gets even bigger as does the overall contribution of natural flows. And while the release information is known – there were no releases of water during this period (as advised by Sunwater) – Sunwater does not capture daily usage information and so it would not be possible to accurately calculate this information. Suffice to say the % of natural flow contribution would only get better.

The above information is critical information that disproves the conclusions drawn by Water Solutions in their report and has been provided to the QCA within 6 working days of having received information from Sunwater in response to our original question and only 5 weeks after the original deadline for submissions. As the GBA irrigators are probably one of the groups that are worst impacted by the QCA's recommendations in its draft report, I assume consultations have not yet commenced with key stakeholders as we would have been one of the first stakeholders to have been contacted.

Yours faithfully
BURDEKIN DISTRICT CANE GROWERS LTD

MR MICHAEL KERN

Water Solutions
Certainty in Water

Report to

QUEENSLAND COMPETITION AUTHORITY

on

RURAL IRRIGATION PRICE REVIEW 2020-24

ASSESSMENT OF HYDROLOGIC FACTORS: FURTHER ASSESSMENT - GIRU BENEFITED GROUNDWATER AREA

Job Number	WS0895.1901.001
Doc Number	WS190096
Revision	3
Date	28 January 2020

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Queensland Competition Authority
Rural Irrigation Price Review 2020-24
Further Assessment - Giru Benefited Groundwater Area

Prepared for: **Queensland Competition Authority**

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Document Quality Control

Job No. WS0895.1901.001
Document No. WS190096

Revision	Date	Revision Details	Author	Reviewer
0	16/12/2019	Draft Report	TM	JM
1	6/01/2020	Updated Draft	TM	JM
2	14/01/2020	Updated Draft	TM	JM
3	28/01/2020	Final Report	TM	JM

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Executive Summary

Following on from Water Solutions' initial advice summarised in the report "Rural Irrigation Price Review 2020-24 – Assessment of Hydrologic Factors", this report provides additional advice to assist with pricing for the Giru Benefitted Groundwater Area (GBGA), in response to hydrologic issues raised in submissions on the draft QCA report.

A major issue raised in the submissions was concerns about the accuracy of the extraction and release data used to provide an indication of the likely contribution of 'natural' flows to meeting GBGA demands.

This assessment thus included an independent review of available source records on releases from Haughton Balancing Storage (HBS) and extractions from Haughton Zone A (HZA). The efficiency of HBS releases in meeting HZA demands was used to provide an indication of the likely relative contribution of HBS Releases and Non-HBS Release Sources to meeting GBGA demands.

It is highlighted that Non-HBS Release Sources includes all other processes which affect water availability in Haughton Zone A, including, for example: rainfall on the Haughton River Catchment, leading to surface flow in the Haughton River and recharge to the GBGA aquifer, less licenced unsupplemented diversion from the catchment, plus supplementation by Haughton Zone A infrastructure, and subject to a range of operational losses and environmental requirements.

The source release and extraction data were obtained and reviewed, and updated estimates of annual releases and extractions derived. The resultant recomputed minimum annual efficiency over the period of available data (2002/03 to 2018/19) was 0.66, with the average efficiency 0.99.

A range of complicating issues associated with interpreting the data and the estimation of releases, extractions and efficiencies were assessed. While all data comes with a level of uncertainty, it is concluded that the data may be used to inform this assessment.

The key conclusion of the Water Solutions Sept 2019 report regarding the GBGA is thus confirmed. That is, that review of release and extraction data indicates that GBGA irrigators are receiving little contribution from non-HBS Release sources in dry periods, and thus that there does not appear to be a strong hydrologic basis for differential pricing of GBGA MP users (that is, increasing unit prices for other Burdekin distribution system MP users to be able to provide a discount for GBGA MP users). It is thus recommended Haughton Zone A (including the GBGA) is considered to be fully part of the Burdekin Haughton Channel Distribution System, with all MP allocations in this distribution system paying the same price.

Lastly, based on consideration of the various factors discussed in this report, it is considered unlikely that a more detailed analysis will identify a substantially different conclusion to the above. However unlikely is not the same as impossible. A more detailed assessment may be undertaken to inform deliberations in future price reviews. Such assessment, if undertaken, should consider the issues raised in this report, the WS Sept 2019 report, and the submissions received on the draft QCA report.

Table of Contents

Nomenclature

Term	Description
AA	Announced Allocation
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
Att	Attachment
ARI	Average Recurrence Interval
ARR2016	Australian Rainfall and Runoff, 2016 Edition
BHWSS	Burdekin Haughton Water Supply Scheme
BDCG	Burdekin District Cane Growers Ltd
BPEQ	Board of Professional Engineers of Queensland
BRIA	Burdekin River Irrigation Area Irrigators Ltd
CWSA	Critical Water Sharing Arrangements
DERM	Department of Environment and Resource Management
DNRM	Department of Natural Resources and Mines
DNRME	Department of Natural Resources, Mines and Energy
DLWC	Department of Land and Water Conservation
DSL	Dead Storage Level
DSV	Dead Storage Volume
EA	Engineers Australia
EFO	Environmental Flow Objective
FSL	Full Supply Level
FSV	Full Supply Volume
GA	Groundwater Australia
GBA	Giru Benefited Area, a shortened version of GBGA
GBGA	Giru Benefited Groundwater Area
GGA	Giru Groundwater Area, a shortened version of GBGA
Govt	Government
GS	Gauging Station
HBS	Haughton Balancing Storage
HMC	Haughton Main Channel
HP	High Priority
HPA	High Priority Allocations
HUF	Headworks Utilisation Factor
HZA	Haughton Zone A
IQQM	Integrated Quantity Quality Model
IWSC	Irrigation and Water Supply Commission (Qld)
MAD	Mean Annual Diversion
MP	Medium Priority
MPA	Medium Priority Allocations

MOV	Minimum Operating Volume (usually same as DSV)
NOL	Nominal Operating Level
NV	Nominal Volume
OM	Operations Manual
QA	Quality Assurance
QCA	Queensland Competition Authority
Qld	Queensland
RFQ	Request For Quote
ROL	Resource Operations Licence
ROP	Resource Operations Plan
RPEQ	Registered Professional Engineer of Queensland
S or s	Section
SEQ	South-East Queensland
SILO	Scientific Information for Land Owners
SL	Storage Loss
TOL	Transmission and Operational Loss
TOR	Terms of Reference
UV	Useable Volume
WAE	Water Allocation Entitlements
WASO	Water Allocation Security Objective
WMP	Water Management Protocol
WP	Water Plan
WRP	Water Resource Plan
WS	Water Solutions Pty Ltd
WSS	Water Supply System

1 Introduction

1.1 Background

The Queensland State Government referred the monopoly business activities of Sunwater and Seqwater to the QCA for an investigation about pricing practices via a referral notice to the QCA dated 29 October 2018. The monopoly business activities to be investigated are those associated with the bulk water supply and distribution of water for irrigation in a specified set of water supply schemes and distribution systems. The key objective of the investigation was to recommend irrigation prices for the period 1 July 2020 to 30 June 2024.

Sunwater and Seqwater subsequently provided submissions to the investigation, as have a range of stakeholders, with the submissions available on the QCA website.

In April 2019 the QCA issued a Terms of Reference (TOR) for a project to undertake an assessment of hydrological factors as a basis for cost allocation in specific water supply schemes, and in May 2019 Water Solutions was engaged to provide this assessment. The results of this assessment was reported in the Water Solutions report "Rural Irrigation Price Review 2020-24 – Assessment of Hydrologic Factors", Doc No WS190040 Rev 2 dated 3 September 2019. This report covered three main topics, quality assurance of Headworks Utilisation Factor (HUF) calculations for six specified schemes, a hydrologic review of submissions associated with pricing for the Central Brisbane River scheme Medium Priority (MP) irrigators, and a hydrologic review of submissions associated with pricing for the Giru Benefited Groundwater Area (GBGA) MP irrigators.

The QCA subsequently released their draft report on 9 September 2019. Following the release of the QCA's draft report a range of parties made submissions on the draft report.

The QCA's draft report, the Water Solutions report and the submissions from stakeholders may be found on the QCA website.

Following receipt of the submissions Water Solutions was requested to provide further input in relation to issues identified in submissions in the Central Brisbane scheme and the Giru Benefited Groundwater Area.

This report presents the results of the further hydrologic investigations carried out into issues associated with the Giru Benefited Groundwater Area, while the companion report (WS190095) presents the results of the further hydrologic investigations carried out into issues associated with the Central Brisbane scheme.

It is highlighted that this report follows on from the original Water Solutions report "Rural Irrigation Price Review 2020-24 – Assessment of Hydrologic Factors", Doc No WS190040 Rev 2 dated 3 September 2019. A good understanding of the earlier report is strongly recommended before reading this report.

1.2 Key Objective

The key objective of this report is the same as in the original report, that is:

To provide expert hydrologic advice and guidance to assist the QCA to determine the appropriate apportionment of costs between different customer groups in specified schemes/systems.

It is highlighted that this review is focused on hydrologic factors. There may be a range of other factors that have influence on the appropriate apportionment of costs between users groups in the scheme. Assessment of non-hydrologic factors is beyond the scope of this review.

1.3 GBA, GGA or GBGA

It is noted that the BDCG submission mainly refers to the area of interest as the Giru Benefitted Groundwater Area (GBGA), although the labels Giru Benefitted Area or the Giru Groundwater Area also appear in the submission. Other documents also appear to use 1-3 of these names for the area, e.g. the Water Plan, Sunwater's fees and charges schedule, Sunwater's Nov 2018 submission, the OD Hydrology Report, the Kavanagh report, the 2012-17 QCA report and the draft 2020-24 QCA report.

All of these names essentially refer to the same area of land and its associated water allocations. These allocations draw from surface water or groundwater (defined to be water in the watercourse as per the Water Plan). The official name of this area would appear to be the Giru Benefitted Groundwater Area, as that is the name used to define the area in Schedule 3 of the Water Plan, however the use of the alternate names Giru Benefitted Area or the Giru Groundwater Area appears to be common.

In this document the full Giru Benefitted Groundwater Area (GBGA) name will be used to be consistent with the Water Plan, however please note that all three names appear to be used for essentially the same resource area in a range of documents referenced in this review.

1.4 GBGA and BRIA Meetings

On 16 October 2019, prior to the closing date for submissions on the draft QCA report, two meetings were held with allocation holders, the first with representatives of the GBGA and Sunwater, and the second with Board members of BRIA (Burdekin River Irrigation Area Irrigators Ltd). A presentation on the methodology and findings of the previous hydrologic assessment (as summarised in Doc No WS190040 Rev 2 dated 3 September 2019) was presented to those attending the meeting.

Stakeholders attending both meetings made numerous comments and suggestions, most of which have been reinforced in their submissions. The GBGA stakeholders generally expressed the desire to retain the existing discount for GBGA users. However the BRIA did not support the continuation of the current discounted tariff in the GBGA, owing to the discount being funded by higher charges for other distribution system allocation holders. The assessment presented in the following sections has considered the issues raised in the submissions and the comments made on these issues at the consultation sessions.

1.5 Structure of this Report

The remainder of this report is structured as follows:

- Section 2 presents an overview of the submissions made on the draft QCA report which raise hydrology related issues pertinent to pricing for GBGA users.
- Section 3 summarised the site inspection carried out as part of this assessment.

- Section 4 provides a review of release and extraction data associated with the GBGA, and discusses a number of complicating factors associated with the interpretation of this data.
- Section 5 discusses a range of other hydrology related issues raised in the submissions, to inform any future detailed assessments made to assist in deliberations for future pricing reviews.
- Section 6 summarises the conclusions of this report.
- Section 7 lists the key references used in this assessment.

2 Submissions Overview

The QCA provided key submissions received that related to the hydrologic matters relevant to the GBGA pricing issue for consideration in this study, and indicated the relevant sections in larger submissions. The list of submissions provided for review was:

- Burdekin District Cane Growers (BDCG) 4/11/19 Submission, submitted by BDCG and 14 other parties.
- Burdekin District Cane Growers (BDCG) Follow Up Submission 12/12/19
- Canegrowers Burdekin 4/11/19 Submission, with 9 other submissions providing support to this submission.
- MH Premium Farms 4/11/19 Submission
- Wessel A 4/11/19 Submission
- Burdekin River Irrigation Area (BRIA) 4/11/19 Submission, pg 6-7
- Burdekin River Irrigation Area (BRIA) Follow Up Submission 5/12/19
- Sunwater 4/11/19 Submission, pg 95

QCA also advised of 8 additional submissions relevant to pricing in the GBGA but which only raised concerns regarding affordability. Consideration of economic issues is outside the scope of this assessment, and hence these submissions were not reviewed as part of this assessment.

The submissions were reviewed and grouped into three general categories.

- The BDCG, Canegrowers Burdekin, MH Premium Farms and Wessel A submissions.
- The BRIA submissions
- Sunwater's submission

Each group of submissions is briefly discussed in the following sections.

2.1 BDCG, Canegrowers Burdekin, MH Premium Farms and Wessel A Submissions

This group of submissions all raised a number of criticisms related to hydrologic issues with the QCA draft report, the Water Solutions Sept 2019 report, Sunwater's Nov 2018 Appendix K submission, the OD Hydrology 2018 report and/or the Kavanagh 2017 report.

This report has focused on addressing these submissions, with the contents of Sections 3, 4 and 5 drafted to address the key hydrology related issues raised: Sections 3 provides a brief summary of the site inspection carried out as part of this assessment, Section 4 presents an independent review of release and extraction source data associated with the GBGA, and Section 5 discusses a range of other hydrology issue raised in these submissions.

2.2 BRIA Submissions

The BRIA submissions presented an opposing view to the first group of submissions. BRIA stated that they cannot support the continuation of the current discounted tariff in Zone A/GBA, as the under recovery of costs are then debited against channel distribution customers. Further, they

stated that a discounted tariff for Haughton Zone A/GBA should not continue when the principles upon it was originally established no longer apply. BRIA thus supported the draft QCA proposal.

Most of the issues raised in the BRIA submissions are also raised in the first group of submissions, although BRIA's perspective is typically opposite to the perspective raised in the first group of submissions. Sections 3, 4 and 5 thus also address most of the key hydrology related issues raised in BRIA's submissions.

2.3 Sunwater Submission

Sunwater made two main hydrology related points on pg 95 of their submission:

- Sunwater states that the availability and quantum of natural yield available is inherently dependent on the seasonal rainfall, and that there are significant periods where natural yield is the predominant supply to the Haughton Zone A customers.
- Sunwater considers that the hydrologic assessment information provided in the OD Hydrology report provides a more recent and representative analysis of the level of supplementation and natural yield within the GBA and requests the QCA review irrigation prices for the GBA.

In response, it is agreed that the flow in the Haughton River is inherently dependent on rainfall, and that in wet years rainfall over the Haughton River catchment makes a significant contribution to the amount of water available for diversion from Haughton Zone A users. While the benefits that water supply schemes provide to users in a complex climatic environment are not easy to distil down to a single number, Sunwater has addressed this difficult question by focusing on the performance in dry periods as the most appropriate benchmark. For example, Sunwater has adopted the '15 year driest period' as the standard for the HUF methodology to apportion costs between high and medium priority groups in most schemes in the state.

Section 4 of this report presents an analysis of the Haughton River performance over the period of available source data provided by Sunwater, showing the performance in a range of wet and dry years, and making conclusions focusing on dry years in accordance with the general approach adopted by Sunwater and the QCA.

Regarding the second point, Water Solutions Sept 2019 raises a number of significant issues associated with the modelling in the OD Hydrology Report, issues that resulted in the conclusion that the model should not be used for pricing purposes. The first group of submissions have raised further issues associated with the OD Hydrology modelling of the GBGA.

Sunwater's comment is acknowledged, however the conclusions of the Water Solutions Sept 2019 regarding the OD Hydrology Model results is unchanged, that is, there is significant uncertainty associated with using the results reported in OD Hydrology (2018), and thus use of the OD Hydrology model, in its current form, to provide a basis for pricing is not recommended.

It is highlighted that the hydrologic modelling approach is an appropriate technique for analysing many of the key issues discussed in this report. If a more detailed modelling study is undertaken to assist with alternate apportionment of costs in future price paths, it is strongly recommended that the study addresses the issues raised in this report, the Water Solutions Sept 2019 report, and in the submissions made on the QCA Draft Report.

3 Site Inspection

A site inspection of the key infrastructure and sites of relevance to this assessment was held on 27 November 2019. The site inspection included meeting with officers from Sunwater to discuss the data they hold related to operation of the GBGA, with a focus on matters that might affect the accuracy of that data. Sunwater officers then guided the project team to key sites around the scheme, including the Haughton Balancing Storage, the Powerline stream gauge, Val Bird and Giru Weirs, Ironbark Creek, the Healeys Lagoon Pump Station and Major Creek.

A range of photos from the site inspection are provided in the following figures. A few notes on the images are provided below:

- Figure 3-1 shows the overflow weir from the Haughton Balancing Storage in the foreground, with the diversion point for the Townsville water supply just upstream in the centre-right of the image.
- Figure 3-2 is just downstream of Figure 3-1 and shows the two outlet gates from the Haughton Balancing Storage. These gates control release into a pipe which conveys the water under a road to a short channel which delivers the water to the Haughton River.
- Figure 3-3 shows the meter measuring the total release made from HBS to Haughton Zone A.
- Figure 3-4 shows the discharge of the release pipe from the HBS, before the channel joins the Haughton River.
- Figure 3-5, Figure 3-6, and Figure 3-7 show the Haughton River cross-section near GS119003A Haughton River at Powerline. The creek cross-section consists of extensive sand beds with a low flow channel on the left side. Major Creek joins the Haughton River near this location.
- Figure 3-8 shows a sample meter for a GBGA user.
- Figure 3-9 shows Giru Weir and Figure 3-10 the level gauge on Giru Weir.
- Figure 3-11 shows the intake to the recently installed bypass pipe at Giru Weir, and Figure 3-12 the gauge on that release pipeline.
- Figure 3-13 shows Val Bird Weir.
- Figure 3-14 shows Major Creek some distance upstream of the supplemented section, near the Woodstock-Giru Road.
- Figure 3-15 and Figure 3-16 shows Ironbark Creek upstream and downstream of the Woodstock-Giru Road crossing. Healeys Lagoon is downstream.
- Figure 3-17 shows the Healeys Lagoon pumpstation, located on the banks of the Val Bird Weir pond. This pump station pumps water from the Haughton River into Ironbark Creek, which flows down to Healeys Lagoon and then to Reed Beds, near the end of GBGA area.

Figure 3-1 – Haughton Balancing Storage

Figure 3-2 – Haughton Balancing Storage – Release Gates to Haughton River

Figure 3-3 – Haughton Balancing Storage Release Gauge

Figure 3-4 – Release from Haughton Balancing Storage

Figure 3-5 – Haughton River – Powerline Gauge Section from Right Bank

Figure 3-6 – Haughton River – Powerline Gauge Section from Mid-Channel

Figure 3-7 – Haughton River – Powerline Gauge Section – Left Bank Low Flow Channel

Figure 3-8 – Giru Benefitted Area – Sample Meter

Figure 3-9 – Giru Weir

Figure 3-10 – Giru Weir – Level Gauge

Figure 3-11 – Giru Weir – Intake to Bypass Pipe

Figure 3-12 – Giru Weir Bypass Pipe Gauge

Figure 3-13 – Val Bird Weir

Figure 3-14 – Major Creek - Upstream Near Woodstock-Giru Road

Figure 3-15 – Ironbark Creek upstream of Woodstock-Giru Road

Figure 3-16 – Ironbark Creek downstream of Woodstock-Giru Road

Figure 3-17 – Healeys Lagoon Pump Station on Val Bird Weir

4 HBS Release and HZA Extraction Data

The previous review concluded that the reported historical records presented in Kavanagh 2017 indicate that GBGA irrigators are receiving little contribution from 'natural' Haughton River flows in dry periods.

The consultation session with GBGA users and the first group of submissions raised a number of concerns regarding the potential accuracy of the release and extraction data in Kavanagh 2017.

To address this concern an independent review of available source data on releases and extractions was undertaken.

This section presents the methodology of this review and also discusses a number of complicating issues associated with interpreting the data and the estimation of releases, extractions and efficiencies.

4.1 Clarification of Terms

The word 'natural' is problematic as it often means different things to different people. For the purposes of this review the following key terms are used:

- **HBS Release** – The release made from the Haughton Balancing Storage for the purposes of supplying allocations in Haughton Zone A.
- **HZA Extraction** – The total extraction of allocation water in Haughton Zone A.
- **HZA Efficiency** – The efficiency of releases from the Haughton Balancing Storage in meeting the scheme demand in Haughton Zone A.

It follows that: **HZA Efficiency = HZA Extraction / HBS Release**

If HZA Efficiency is greater than 1.0, this means that some water source other than the HBS Releases is supplying a net part of the Haughton Zone A demand. The other water source is not well defined by the word 'natural'. Rather, the 'other water source' is defined in this report as **Non-HBS Release Sources**, which includes all other processes which affect water availability in Haughton Zone A, including, for example:

- Rainfall on the Haughton River Catchment, leading to surface flow in the Haughton River and recharge to the GBGA aquifer, less licenced unsupplemented diversion from the catchment, plus supplementation by Haughton Zone A infrastructure (such as Val Bird Weir, Giru Weir and the Healeys Lagoon Pump Station), and subject to a range of operational losses and environmental requirements.

Section 4 thus focuses on calculating annual HZA Extraction and HBS Release volumes from the available period of source data recorded by Sunwater, and then calculating the HZA Efficiency, to provide an indication of the likely relative contribution of HBS Releases and Non-HBS Release Sources to meeting HZA demands.

4.2 Source Data Requests

A request was provided to Sunwater to provide an updated table of annual release and extraction volumes, and the source data used to calculate those annual values. Sunwater advised that they

could only provide data since about 2002, as earlier data was tracked and recorded in DNRME's systems.

The initial set of data provided did not include any data for 2007-08, and Sunwater provided 2007-08 in a follow up package.

Pre-2002 data was requested from DNRME, but they advised that this data is not available without significant searching through local office and Brisbane-based archives, and that they have general concerns about the reliability of data from pre-2002.

Hence this review focused on data available for the 2002-2019 period.

4.3 HZA Extraction Data

Sunwater provided a spreadsheet containing records of metered extractions for all users the BHWSS. (QCA Information Request FR23_Attachment 4_Burdekin Water Usage 2002 to 2019.XLSX).

Usage of allocation water for users in Haughton Zone A was extracted from this spreadsheet. This was done by filtering the data to select all entries with "Giru Benefited System" in the Operational System Description and "Allocation Water" in the Product Description. A few notes on this data follow:

- From discussions with Sunwater it was identified that all Haughton River users are included in the database as being in the 'Giru Benefited System' operational system. That is, the non-GBGA Haughton Zone A users are listed in Sunwater's systems as being within the GBGA.
- The data also appeared to include a small number of miscellaneous extractions, e.g. truck loads from Ironbark Gully.

The extracted records thus appear to represent all allocation water extraction from Haughton Zone A, which is the quantity of principal interest to this review.

The annual total allocation extractions for each water year determined from the provided data are shown in Table 4.1. Also shown are the total extraction data from Table 9 in Kavanagh 2017. The values that Kavanagh applied are within 3% of the updated annual totals determined from the latest extract from Sunwater's database.

With these totals being re-derived from the source data, and reasonably matching previous estimates, the annual Total Extractions shown in Table 4.1 were adopted for this study.

Table 4.1 – Estimates of Annual Extractions from Haughton Zone A

Year	Total Extraction (ML/a)	Total Extraction from Kavanagh (2017)	Ratio
2002/03	51,294	51,253	1.00
2003/04	42,586	42,485	1.00
2004/05	47,203	48,609	0.97
2005/06	33,994	33,125	1.03
2006/07	37,985	37,937	1.00
2007/08	30,157	30,742	0.98
2008/09	27,061	27,061	1.00
2009/10	35,572	35,571	1.00
2010/11	6,677	6,677	1.00
2011/12	20,387	20,387	1.00
2012/13	20,610	20,610	1.00
2013/14	29,668	29,668	1.00
2014/15	46,422	46,422	1.00
2015/16	47,031	47,031	1.00
2016/17	33,592		
2017/18	43,814		
2018/19	31,553		
Average	34,447		

4.4 HBS Release Data

Sunwater provided raw HBS release data in three spreadsheets:

- QCA Information Request FR23_Attachment 1_Haughton Diversion 1997_2007.XLS
- QCA Information Request FR23_Attachment 2_Haughton Balancing Storage Diversion rates 2008_2017.XLS
- QCA Information Request FR23_Attachment 3_Haughton Diversion Post Kavanagh Report.XLS

With the initial three spreadsheets missing 2007-08 Sunwater later provided the data for 2007-08 in the following spreadsheet

- QCA Information Request FR40_Attachment 1_Diversion flow data 2007-08 water year.XLSM

These data were analysed to re-derive total releases into Haughton Zone A and total diversions from Haughton Zone A. Notes on the processing of these data is provided below:

- Despite the name, the first data in the 1997-2007 spreadsheet started in 2002.
- The format of the four spreadsheets were adjusted to enable them to be combined into a single record.
- The “Meas. Point Desc” column in the 2008-19 data included records of:
    - “VOLUME RELEASED (TOTAL)” – releases made from HBS through the gates into HZA, in ML/d. This data starts in about 2001.
    - “VOLUME DIVERTED – TOTAL” – total releases from HBS into HZA, including both releases through the gates and releases over the HBS spillway, in ML/d. This data starts in about 2008.

  - "OVERFLOW" - releases made from HBS over the HBS spillway into HZA, in ML/d (Figure 3-1). This data starts in about 2008.
  - "VALVE 1 TURNS" and "VALVE 2 TURNS" – The number of turns on the handwheel that opens gate valve 1 and 2 releasing water from HBS to HZA (Figure 3-2). This data starts in about 2009.
  - "FLOW METER READING" – Recently, the reading on the flow meter on the pipe between HBS and Haughton Zone A (Figure 3-3). This data starts in about 2016 (see below).
- The 2002-07 data spreadsheet only showed one quantity, labelled as "VOLUME RELEASED (TOTAL)" in the "Meas. Point Desc" column. This is the same label as used in the 2008-2019 data for the releases made through the gates (i.e. it does not include overflows).
- Sunwater advised that the "VOLUME RELEASED (TOTAL)" values were generally determined based on a rating curve converting valve turns to a flow rate. Sunwater supplied the applicable rating table, shown in Table 4.3.
- A comparison of the "VOLUME RELEASED (TOTAL)" values to what you would get from applying the supplied rating curve identified some differences on some daily values, however comparison over the long term (2009-19) indicated that the total volume calculated from the valve turns was within 1% of the total volume labelled as "VOLUME RELEASED (TOTAL)".
- Sunwater advised that the "OVERFLOW" values were generally determined by subtracting the volume through the gates (determined based on gate turns) from the volume measured at the gauge. There have been few overflows recorded coincident with the recorded cumulative meter readings (2016 on), but a spot check of an overflow in May 2017 appeared to confirm this.
- The "FLOW METER READING" data is all zero up to about 2012. In the period 2012-13 it appears that the net flow might be occasionally recorded against this label, although it appears to be recorded only occasionally. From ~2016 on it appears to be recording the incrementing numbers on the gauge (which are in ML), although a reset appears to have occurred (a sudden jump reduction) in early 2019.
- Values are provided on most days of the year, but there are quite a few days with no flow recorded. It is necessary to estimate the applicable flow on days with no record (otherwise assuming no flow by default on missing days would be a systematic error.) Missing days of data were infilled using the following process:
  - If the release volume on the day before and after the missing days was 0 ML/d, it appeared to be appropriate to assume that the release over the missing period was 0 ML/d.
  - Otherwise it is not straightforward to estimate releases during the missing period. As an approximate method, it was assumed that the operators would be more likely to record the daily release on days that they adjust the valves. It was thus decided to infill missing periods with the same daily flow rate as on the day before the missing period.
- Estimates of the total releases from HBS to the HZA were then derived as follows:
  - Based on the annual totals of infilled "VOLUME RELEASED (TOTAL)" data.
  - Based on the annual totals of infilled estimates of flow from the recorded Valve Turn information.
  - Based on the cumulative meter readings, less the infilled estimates of overflows.

- These three estimates are listed in Table 4.2, along with the estimated values from Kavanagh 2017.

The infilled volume released records were adopted for use in this study. The last column of Table 4.2 shows the adopted releases.

Table 4.2 – Estimates of Annual HBS Releases to the HZA

Year	Gate Release (Vol Rel) Only (ML/a)	Release based on Valve Turns (ML/a)	Release based on Cumulative Meter Records - Overflow (ML/a)	Total Release from Kavanagh (2017) (ML/a)	Adopted Release (ML/a)
2002/03	60,117			60,037	60,117
2003/04	42,833			42,453	42,833
2004/05	45,322			45,257	45,322
2005/06	32,201			32,136	32,201
2006/07	31,556			31,556	31,556
2007/08	23,150			22,018	22,018
2008/09	20,921			19,101	20,921
2009/10	40,685	40,618		38,465	40,685
2010/11	4,710	4,745		5,872	4,710
2011/12	16,243	16,665		29,603	16,243
2012/13	29,400	28,937		26,873	29,400
2013/14	44,664	43,855		44,671	44,664
2014/15	52,527	51,942		47,405	52,527
2015/16	50,129	57,823		47,019	50,129
2016/17	30,197	28,791	27,664		30,197
2017/18	40,682	39,069	35,795		40,682
2018/19	23,940	22,432	24,509		23,940
Average (09-19)	33,318	33,488			33,318

Table 4.3 – HBS Release Valves: Valve Turns – Flow Relationship

No of Valve Turns	Flow Rate (ML/d)
0	0
10	20
20	40
30	65
40	90
50	115
60	140
70	177
80	215
90	230
100	245
110	260

4.5 HZA Efficiency

With Section 4.3 and 4.4 presenting annual estimates of HBS releases into HZA and the supplemented extraction from HZA, the annual efficiency of supply may be estimated, as shown in the table below.

Table 4.4 – HZA Efficiency

Year	Total Release (ML/d)	Total Extraction (ML/d)	Efficiency
2002/03	60,117	51,294	0.85
2003/04	42,833	42,586	0.99
2004/05	45,322	47,203	1.04
2005/06	32,201	33,994	1.06
2006/07	31,556	37,985	1.20
2007/08	23,150	30,157	1.30
2008/09	20,921	27,061	1.29
2009/10	40,685	35,572	0.87
2010/11	4,710	6,677	1.42
2011/12	16,243	20,387	1.26
2012/13	29,400	20,610	0.70
2013/14	44,664	29,668	0.66
2014/15	52,527	46,422	0.88
2015/16	50,129	47,031	0.94
2016/17	30,197	33,592	1.11
2017/18	40,682	43,814	1.08
2018/19	23,940	31,553	1.32
Average	**34,663**	**34,447**	**0.99**
Lowest Efficiency			**0.66**

The results in Table 4.4 show that there are a number of years where more water is released to HZA than is extracted from HZA, with the lowest efficiency over the period analysed being 0.66 in 2013/14. This appears to indicate that, in dry periods, there is little net contribution from non-HBS Release Sources to the volume of extraction made by HZA users.

The average efficiency of 0.99 indicates that, on average, HBS releases into Haughton Zone A are about the same as extractions from Haughton Zone A over the period of available data from 2002 to 2019.

4.6 Data Issues

Developing appropriate estimates of inflow and extraction from Haughton Zone A for the purposes of assessing the likely relative contribution of HBS Releases and Non-HBS Release Sources to meeting HZA demands is not a simple task. A number of issues were identified during this review, and GBGA stakeholders have raised a number of issues in consultation and in their submission.

The sections below briefly discuss the identified issues, and their potential effect on the estimated efficiencies presented in Table 4.4.

4.6.1 Period of Available Data

It is noted that the period of data analysed, 2002/03 to 2018/19, was selected based on the period of source data that was made available for this review. The start year, 2002/03, is that year because it is the first year that the newly formed Sunwater managed the data, i.e. the 2002/03-18/19 period was not selected based on hydrologic factors, and thus it does not necessarily represent average conditions or contain the worst dry period. Choosing to analyse over a shorter or longer period would likely change both the minimum and the average[1] efficiency.

A longer period of data is generally preferable because it is more likely to provide a balanced appreciation of the climatic flow regime, however the further back in time the less the scheme operational conditions are the same as currently apply. BRIA's submission lists a few of the changes, the loss of the bag on Val Bird Weir, increasing area of irrigation, and the shift to take water direct from surface water. There would be diminishing returns in attempting to extend this analysis by collating release and extraction data for earlier periods[2], and care would need to be taken not to bias statistics by extending back to just capture the last big wet or dry period.

The 2002-19 period used in this report is considered to be acceptable for the purposes of this study.

4.6.2 Sub-Annual Efficiency Estimates

Seasonal climatic variation is significant, and it is considered that one year is the minimum period over which HZA efficiency should be calculated. Furthermore, to gain an appreciation of the effects of annual variability, efficiencies must be calculated over a period of many years, as was presented in Section 4.5.

In BDCG's 12/12/19 supplemental submission additional release and usage data for the 6 month period 1/4/19 to 30/9/19 is presented, with efficiencies calculated in excess of 250%. Figure 4-3 illustrates that this period had substantial upstream flows during and just before the period, and so is comparatively wet. It is possible to also calculate an efficiency number for three month periods, and if you did this for Mar-May 2019 a near-infinite efficiency would result (see Figure 4-3). Similarly, the efficiency could be calculated for periods with little upstream flows just before or during the period (e.g. June-Dec 2002 or May-Nov 2018 see Figure 4-2 and Figure 4-3), which would result in low efficiencies.

Efficiencies on a sub-annual basis provide little account for inter-seasonal variability, and thus may provide a misleading appreciation of the relative contribution of HBS releases and non-HBS Release sources. Use of sub-annual efficiencies for the purposes of pricing is not recommended.

[1] It is noted that page 11 of the submission includes an extract from a 2001 GHD report, who examined data in 1996/97 and 97/98. This source report has not been reviewed in this study, but the GHD report estimated HZA Efficiency in these two years as ~59% and ~33%, considerably lower than the calculated lowest efficiency in the 2002-19 period. If adequate source data could be obtained, extension of the period to include these two years might result in a lower minimum efficiency and a lower average efficiency.

[2] If a longer period of analysis is seen as desirable, a hydrologic modelling approach that applies a long period of climatic data to a static set of infrastructure and operational rules is recommended, see Section 5.1.

4.6.3 Accuracy of Release and Extraction Records

As part of this study Sunwater was requested to provide previous laboratory testing reports / data in relation to the likely accuracy of the instrumentation measuring releases and extractions. Sunwater indicated that Siemens was currently servicing and calibrating the release gauge, and that calibration details could be provided when received. Sunwater did not provide any other gauge/meter testing reports from which an appreciation of accuracy could be gained.

In the absence of such reports, it is considered that the record of user extractions would be generally reasonable. This data drives invoicing, and thus there is financial incentive for Sunwater to make sure it is not too low, and for users to make sure it is not too high. Sunwater indicates that adjustments are made in circumstances where the meter fails, estimating water use based on other data such as power records, pump records or previous similar periods. The extraction data is thus expected to be of reasonable quality.

The approach used to estimate releases by the operators, based on the number of valve turns, would appear to be a reasonable method. This is because there is a reasonably fixed relationship between the number of turns of the valve wheel (Figure 3-2) and the opening of the gate valve itself, and the flow rate through the gate valve is related to the extent of the opening of the gate valve.

The head in the channel upstream, see Figure 3-1, will affect the rate of flow through the gate valve at a certain number of turns / opening. This is an uncertainty, but from discussions with Sunwater it is understood that the Haughton Balancing Storage is usually operated over a fairly narrow level range, and thus the extent of this uncertainty is not expected to be large at the annual scale.

The three years of estimated total releases based on the cumulative readings on the flow gauge since 2016/17 do show some differences but appears to indicate that the recorded gate releases are of the right order.

At the bottom of pg 17 of BDCG's submission is a comment that states that "up to October 2015 the release data was only estimated by Sunwater." As can be seen in Table 4.2, cumulative meter readings start to be recorded in Sunwater's database in 2016, so this comment may be a reference to this new method of estimating releases. Both the pre and post 2015 values are of course estimates, the difference is the Siemens gauge does not appear to have been used to inform the estimate in earlier years. As discussed above, while there are uncertainties associated with the recorded releases over time, the 2002 to 2019 estimates used in this report are considered to be a sufficient accuracy for the purposes of this assessment.

4.6.4 GS119003A Haughton River at Powerline

GS119003A Haughton River at Powerline is a stream gauge on the Haughton River below where supplemented releases from the HBS enter Haughton Zone A. This gauge thus provides an additional method to assess the uncertainty associated with the recorded releases.

GS119003A Haughton River at Powerline is located close to the junction with Major Creek, near the start of the GBGA area. There are a few Haughton Zone A users between the supplementation point and the gauge, and some river distance where transmission losses and groundwater recharge would occur, and thus you might expect the gauged flow to be a little below the recorded release in dry conditions.

The gauged records at the nearby gauging stations were plotted with the recorded releases, with Figure 4-1 showing an example dry year before supplementation from HBS releases commenced, and Figure 4-2 an example dry year after HBS releases commenced, and Figure 4-3 the most recent year 2018-19. Some notes to assist in interpreting these plots are shown below:

- Flows at three gauging stations are shown:
  - GS119003A Haughton River at Powerline, below the supplementation point.
  - GS119005A Haughton River at Mount Piccaninny, a gauge above the supplementation point on the Haughton River, and one of the two gauges used for determining the required passflow.
  - GS119006A Major Creek at Rocky Waterhole, a gauge above Haughton Zone A on Major Creek, and one of the two gauges used for determining the required passflow.
- Rain recorded at GS119003A Haughton River at Powerline is shown on the 2nd y axis. (Note the rain record at this site did not commence until 1995, so the absence of any recorded rain on the first plot does not mean it did not rain in 1982-83.)
- The dotted purple line is drawn at 40 ML/d, the required passflow. The passflow rule requires the combined GS119005A and GS119006A flow up to this rate to be passed through the system and released from Giru Weir.
- The black line is the infilled recorded release though the gates from HBS to the Haughton River. (Supplementation did not start until about 1987 and so no releases are shown on the 1982-83 period graph.) The yellow line is the raw, not infilled data – it can be seen that in 2002/03 there were few days without recorded release data, while 2018/19 has a number of missing days.
- Note that flows and releases are plotted on a log scale to enable large and small flow rates to be seen.
- There is some missing data at the three gauging stations – flows on days with missing data are not plotted. Owing to the log scale, days with zero flow are also not plotted on the graph.
- For the releases, days with zero release (or missing days) have been set to 1 ML/d so a trace can be seen along the x axis for these lines, to assist in interpretation of changes in release rates.

Figure 4-2 and Figure 4-3 show that the recorded flows at Powerline are of a similar order to the recorded release at the HBS outlet. The 2002-03 Powerline flows in dry periods are generally a little below the release volume, which seems reasonable as they are some users and losses between the HBS release point and Powerline. On the 2018-19 plot the Powerline flows tend to be similar or slightly higher than the release volume. The difference is not large, but might be caused by a range of issues at the stream gauge (e.g. local rain, travel time, erosion or deposition at the gauge altering the rating curve, the general accuracy of the rating curve at low flow rates with a sandy control) or it might be caused by the HBS release records being low. However, in general, the Powerline data appears to provide support that the release data is reasonable.

The contrast between Figure 4-1 and Figure 4-2 shows the benefit of supplementation in dry years, with Figure 4-2 showing a fairly steady constant flow being released year round to meet user requirements. Figure 4-2 shows only one small fresh in the Haughton River, with HBS releases ceasing during this small flood. From this plot it appears that the vast majority of extractions in this year would be accessing water released from HBS.

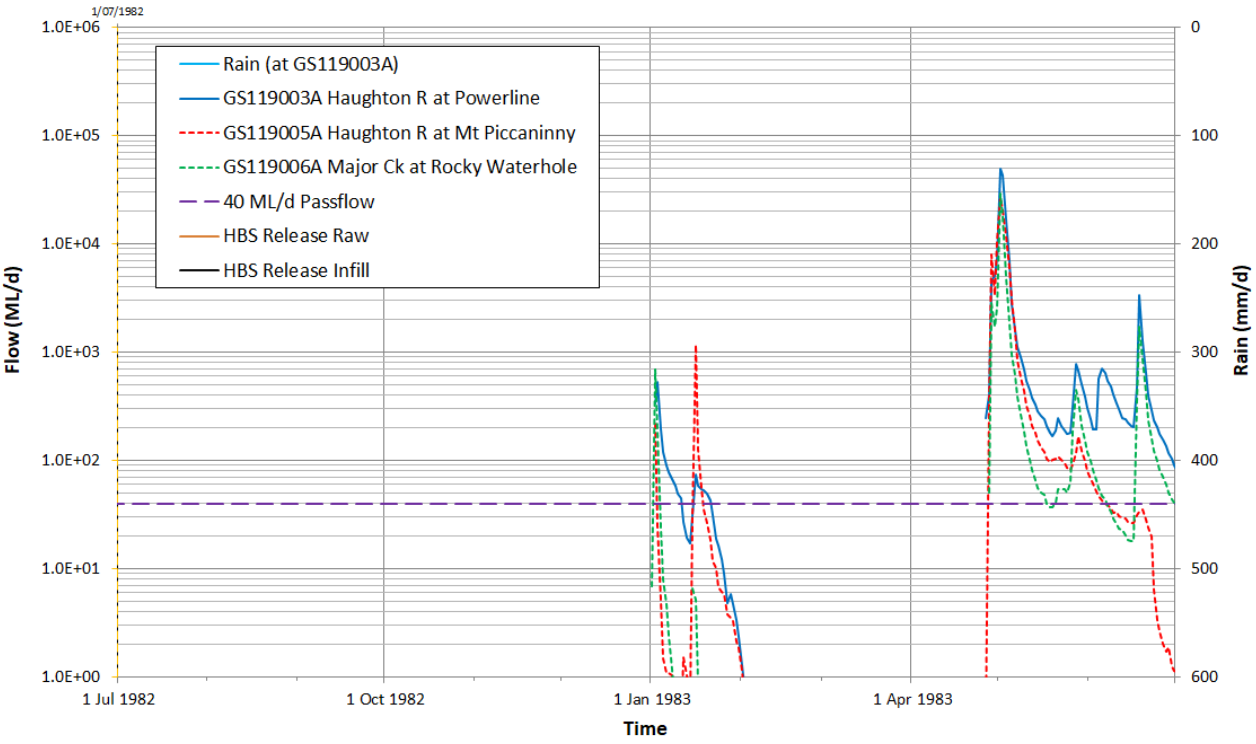

Figure 4-1 – Sample Dry Year Before Supplementation

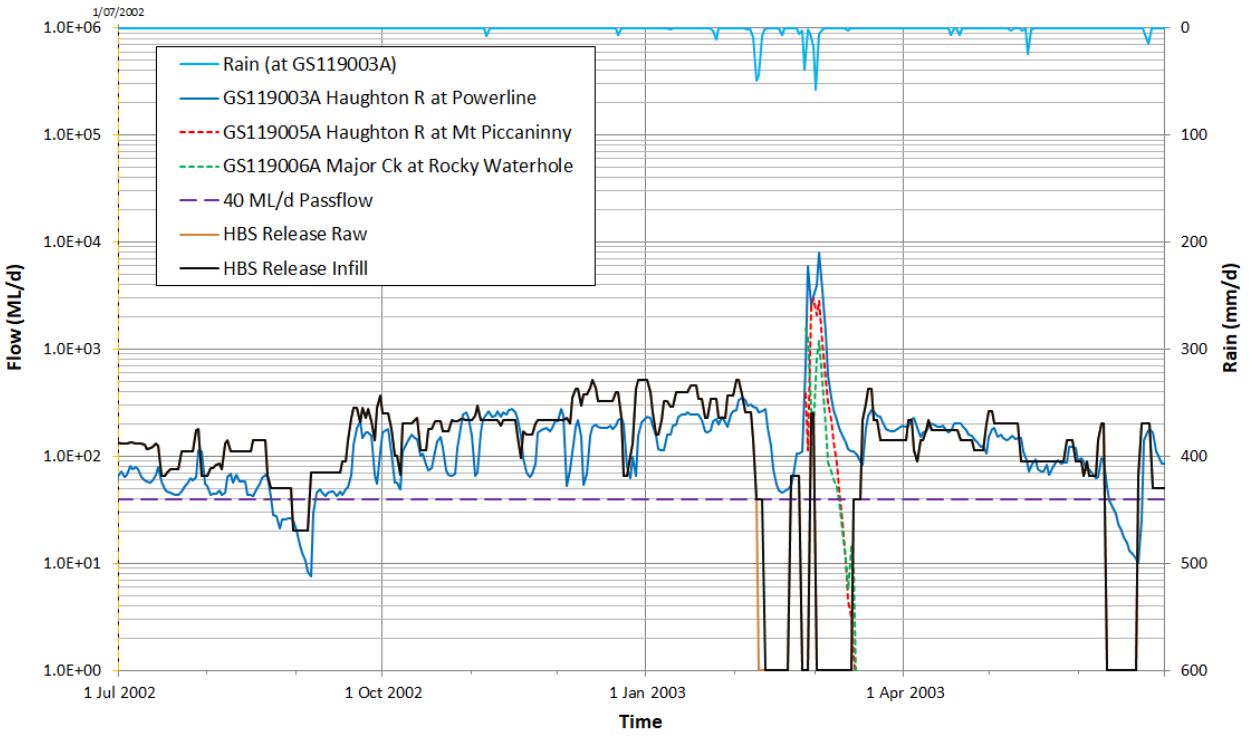

Figure 4-2 – Sample Dry Year After Supplementation

Further, it is noted that the historical release in 2003 only re-started right at the end of this small fresh, some ~5 days after the upstream surface flow dropped below the threshold, a practice that will likely not be able to continue with the passflow requirement being observed. If 2002-03 conditions occur in the future, with the infrastructure in place to allow the passflow requirement to be met, it would be expected that efficiency would be lower in this year than that indicated by the historic data, 85%, all other things being equal.

The most recent water year 2018-19, is shown in Figure 4-3. The end of 2018 was fairly dry, however the rain commenced in late 2018 and significant flows occurred in the Haughton River over the December to May period. It can be seen that supplemented releases in this most recent year commenced at about the same time that the upstream gauges fell below the 40 ML/d threshold in May 2019, likely because Sunwater was endeavouring to meet user requirements while also meeting the passflow requirement in this year.

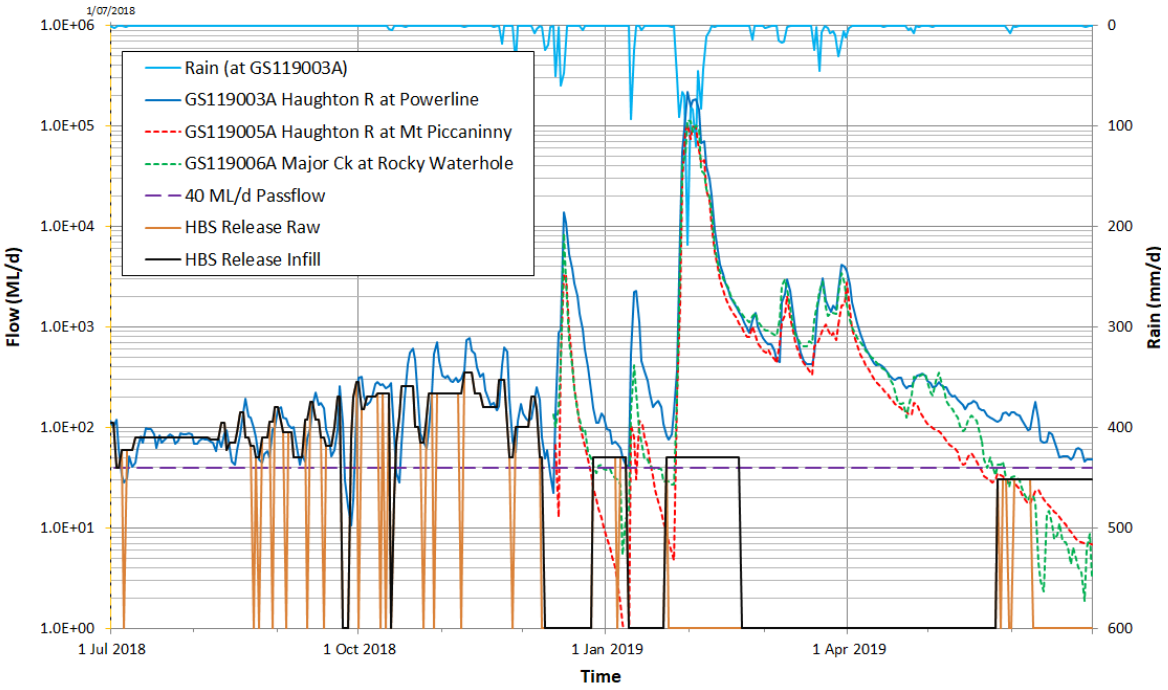

Figure 4-3 – Last Water Year (2018-19)

In summary, while there is no doubt that there is a level of inaccuracy associated with all data, the release and extraction data in Table 4.4 is considered of sufficient quality for the purposes of the assessment presented in this report.

4.6.5 Sensitivity to Missing Data Infilling Methodology

It is acknowledged that any method to estimate data on missing days in a data record is approximate. Review of the infilled data against flows at GS119003A indicates that many of the infilled days appear to be reasonable, but on some occasions the flow at GS119003A tends to indicate that an alternative value might be more appropriate.

For example Figure 4-2 shows that the infilling methodology has had little effect in this dry year, however Figure 4-3 shows that a number of days with missing data have been infilled in the last

water year. The infilled data over the July-Dec 2018 periods appears reasonable given the gauged flows at Powerline, however two sections of the infilling in 2019 may be an over-estimate:

- The infilled data is showing infilled releases through the peak of the February 2019 event ceasing at the first recorded zero release on about 20 February. There may be operational reasons why releases cannot be shut down instantly when local flows occur, but the infilled release does extend for some time. Sunwater may have ceased releasing at a date within this missing period, before the first recorded zero release on about 20 February.
- It is understood that Sunwater often holds a maintenance shutdown in the last weeks of the water year, which might mean that the infilled release over this period is an overestimate.

To gain an appreciation of the maximum possible effect of infilling missing days, a sensitivity analysis was conducted assuming the release was zero on every missing day of data, with the resultant annual release estimates presented in Table 4.5, and the resultant HZA efficiency in Table 4.6.

Review of Table 4.5 identifies that infilling data on missing days adds ~10% to the release volume. Table 4.5 also shows a summary of 2005-19 annual estimates provided by Sunwater for this review. The Sunwater data is similar to the non-infilled estimated releases, perhaps indicating that Sunwater obtained their totals by summing the data in their database with no adjustment for missing periods.

Table 4.5 – Sensitivity of Annual Releases – No Flow on Missing Days

Year	Gate Release (Vol Rel) Only (ML/a)	Release based on Valve Turns (ML/a)	Release based on Cumulative Meter Records - Overflow (ML/a)	Sunwater 2019 Release Estimate (ML/a)
2002/03	60,037	0		
2003/04	42,453	0		
2004/05	45,257	0		
2005/06	32,136	0		32,136
2006/07	31,556	0		31,556
2007/08	20,990	0		22,018
2008/09	19,101	1,142		19,101
2009/10	37,500	37,433		37,500
2010/11	4,690	4,725		4,735
2011/12	15,968	16,390		15,968
2012/13	27,590	27,127		26,873
2013/14	41,524	40,625		41,524
2014/15	46,835	46,250		46,835
2015/16	46,979	49,045		46,974
2016/17	29,292	27,986	27,769	29,292
2017/18	35,641	34,377	35,795	35,641
2018/19	19,850	19,031	24,509	19,850
Average (09-19)	30,587	30,299		30,519

Table 4.6 – Sensitivity of HZA Efficiency – No Flow on Missing Days

Year	Total Release (ML/d)	Total Extraction (ML/d)	Efficiency
2002/03	60,037	51,294	0.85
2003/04	42,453	42,586	1.00
2004/05	45,257	47,203	1.04
2005/06	32,136	33,994	1.06
2006/07	31,556	37,985	1.20
2007/08	20,990	30,157	1.44
2008/09	19,101	27,061	1.42
2009/10	37,500	35,572	0.95
2010/11	4,690	6,677	1.42
2011/12	15,968	20,387	1.28
2012/13	27,590	20,610	0.75
2013/14	41,524	29,668	0.71
2014/15	46,835	46,422	0.99
2015/16	46,979	47,031	1.00
2016/17	29,292	33,592	1.15
2017/18	35,641	43,814	1.23
2018/19	19,850	31,553	1.59
Average	**32,778**	**34,447**	**1.05**
Lowest Efficiency			**0.71**

With the efficiency in dry periods in this sensitivity case still being less that one, it does not appear that alternate methods of infilling missing data would substantially change the conclusions of this study.

It is noted that Sunwater have advised (in response to QCA Information Request FR40) that no record on a day means that no release was made. Review of the Powerline gauge data appears to indicate that releases were made on at least some of the days where no release is recorded in the database. Additionally, zero releases are commonly recorded in the database, it is only the odd day here and there with no recorded value.

As this operational practice is open to error, it is recommended that Sunwater institute new operational practices to require a release (including valve turns, cumulative meter read, overflow and gated release) to be definitively recorded on every day.

4.6.6 Overflows

When Sunwater provided the updated data for this review they highlighted that the Kavanagh 2017 tables included overflows as part of the total HBS releases. Sunwater suggested that overflows from HBS should not be included as part of the total supplemented inflows to Haughton Zone A.

Overflows occur when the Haughton Balancing Storage is a little higher than normal, and water spills over the spillway weir shown in Figure 3-1. Sunwater advise that they do take account of this in adjusting the gate valves. That is, if there is a small overflow they release less through the gates to compensate.

Overflows do contribute to the supplemented volume added to Haughton Zone A from the Haughton channel system. However if overflows are large volumes that occur in a short period of time, particularly in wet years, they may overflow Val Bird and Giru Weirs and be lost to the system, and thus some part of the overflows would not effectively contribute to Haughton Zone A.

Deciding on the appropriate extent of inclusion of overflows in the HBS release used to evaluate HZA Efficiency is not straightforward.

From a perusal of the historical records of overflows it appears that generally the overflows only occur for fairly short periods of time (see Figure 4-4), and thus it may be the case that much of this water overflows Giru Weir and is thus lost to the system. This review thus assumed that overflows provided 0% benefit to HZA users.

If a model is developed to analyse the system in more detail, overflows from the channel system to HZA can be included in the model, and the contribution of this overflow to system efficiency may be more accurately determined. However it is noted that overflows will perhaps only have a modest effect on performance in the dry periods of principal interest to this review.

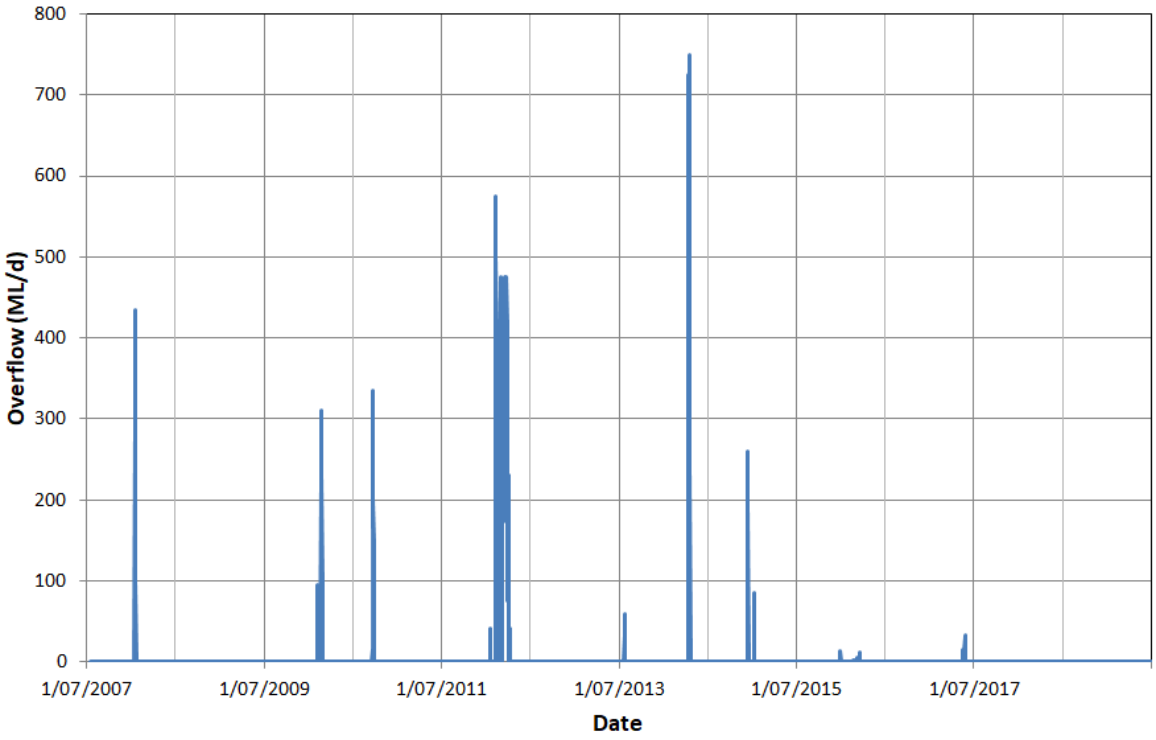

Figure 4-4 – Infilled Overflow Records

4.6.7 HZA Operational and Transmission Losses

Section 2.2.1 of the BDCG 4/11/19 submission states that 'the omission of scheme efficiencies and loss of water between the supplier and customer is a significant error". A number of losses associated with the GBGA are mentioned, including transmission losses, end of system losses at Healeys Lagoon and water expended in weed maintenance exercises.

There is no doubt that there are significant losses associated with delivery of water to users in the GBGA, particularly in dry periods. As discussed in Section 4.1, the HZA efficiency statistic is endeavouring to provide an indication of the likely relative contribution of HBS Releases and Non-HBS Release Sources to meeting HZA demands. It is the net effect of the Non-HBS Release sources which is of interest for the purposes of this assessment. That is, the net effect of rainfall, evaporation, seepage, storage, end of system losses, operational losses, surface-groundwater interaction, environmental requirements and other factors on the efficiency of the zone.

With the net effect of non-HBS Release sources being the quantum of interest to this study, is it not appropriate to make adjustments for any of the component parts of the non-HBS Release Source in the calculation of HZA Efficiency.

4.6.8 Weed

The issue of weed potentially blocking the gates or channel and thus influencing the data is raised in a number of the submissions

Weed blocking the channel will reduce the ability to release water but is unlikely to affect the measurement of that release. However weed getting tangled in the release gates may affect the recorded data. If weed does affect the recorded releases, it may mean that the recorded releases are higher than the actual release. The release gates tend to be a high flow location, and it is expected that the area would be regularly surveilled by Sunwater staff, and hence the extent of weed blocking in the gate area should be minimal.

The recorded releases based on valve turns has been compared to the recorded releases based on the meter (see Section 4.4, and also the flows at the Powerline gauge (see Section 4.6.3). Based on these checks the likelihood of weed causing major errors in the recorded release data is thought to be small.

4.6.9 Non-GBGA Haughton Zone A Usage

There are a small group of users with allocations from Haughton Zone A but who are not within the defined area of the GBGA. Sunwater have advised that these users divert water from the Haughton River immediately below where the releases from the HBS enter the Haughton River, i.e. above the users who are within the GBGA.

It has been suggested that the releases and usage for these customers should be excluded from the estimation of the efficiency of the GBGA.

It is not simple to make this adjustment, as it would be necessary to remove both the portion of the release for these users and a portion of the transmission losses associated with these users. However, operational and transmission losses usually increase with conveyance distance. With these users being immediately next to the HBS release location, it is likely that the losses required to deliver their allocation would be lower than that for the average user in the GBGA. Adjusting the release and extraction data for these users may thus decrease the average efficiency of supply below that estimated in Table 4.4.

It is thus considered that including releases and usage for the non-GBGA Haughton Zone A users is reasonable in calculating the HZA efficiency, and that the calculated HZA efficiency provides a reasonable conservative indication of the GBGA efficiency.

4.6.10 Temporary Trades

It has been suggested that the releases and extractions should be adjusted to reflect the volume of temporary trades that occurs from time to time. Sunwater provided their records of temporary trades from about 2003 to 2019. The net temporary trades into HZA is tabulated below.

Table 4.7 – Temporary Trades into HZA

Year	Net Temporary Transfer to HZA (ML/a)
2003/04	5,210
2004/05	8,798
2005/06	2,683
2006/07	2,616
2007/08	5,110
2008/09	1,665
2009/10	2,499
2010/11	262
2011/12	1,212
2012/13	-19
2013/14	-1,103
2014/15	7,013
2015/16	10,290
2016/17	4,788
2017/18	9,236
2018/19	5,232
Average	**4,093**

Table 4.7 shows that, on average, temporary trades are made into Haughton Zone A, but occasionally there is a net trade out of Haughton Zone A.

Adjusting the release and extraction data to remove temporary trades is not simple, as it would be necessary to remove both the portion of the release for usage that results from the temporary trade and a portion of the transmission losses associated with this release. The relationship of transmission and operational losses with the volume of water delivered along natural channels is complex, but in general there is a considerable loss to deliver a small volume of water along creek channels to users, and the percentage of transmission loss typically decreases with higher deliveries.

With Table 4.7 showing that usually temporary transfers increases water deliveries in Haughton Zone A, adjusting the release and extraction data to account for temporary transfers may decrease the average efficiency of supply below that estimated in Table 4.4.

Additionally, temporary transfers are part of the scheme operation rules, a benefit that can be used by any allocation holder in the scheme. Excluding the effect of temporary transfers from calculation of efficiency may thus provide a biased appreciation of efficiency.

It is thus considered that including releases and usage associated with Temporary Transfers is reasonable in calculating the efficiency of Haughton Zone A.

5 Other Issues

Section 4 has focused on estimating the relative contribution of supplemented releases from the Haughton Balancing Storage compared to other water sources in meeting the demands of Haughton Zone A users.

The analysis presented in Section 4 is considered to be of acceptable quality for the purposes of this study. The review of release and extraction data indicates that GBGA irrigators are receiving little contribution from Non-HBS Release Sources in dry periods, The conclusion of the Water Solutions Sept 2019 report is thus unchanged, that is, that there does not appear to be a strong hydrologic basis for differential pricing of GBGA MP users (that is, increasing unit prices for other Burdekin distribution system MP users to be able to provide a discount for GBGA MP users).

Based on consideration of the various factors discussed in this report it is also considered unlikely that a more detailed analysis will identify a substantially different conclusion. However unlikely is not the same as impossible.

The submissions received on the draft QCA report raise a number of other hydrology related issues that should be considered if a more detailed assessment is conducted to assist deliberations in future price paths. Some brief comments on these issues, for consideration in future assessments, are provided in the sub-sections below.

5.1 Modelling

The methodology applied in Section 4 has a number of issues as discussed in that section, and many of these issues could be more robustly addressed through development of a detailed hydrologic model[3].

If a more detailed modelling study is undertaken to assist with alternate apportionment of costs in future price paths it is strongly recommended that the study addresses the issues raised in this report, the Water Solutions Sept 2019 report, and in the submissions made on the QCA Draft Report. The compared scenarios should be assessed to a common set of benchmarks, including allocation performance, surface flow environmental performance, and groundwater level performance.

Further, it is strongly recommended that the study is independently peer reviewed, by both a surface water specialist and a ground water specialist. Detailed peer review should be undertaken at at least three project stages - the project scoping stage, the model configuration and calibration stage, and model simulation stage.

This will provide the best chance that the study will be of an appropriate standard to be able to inform deliberations in the next pricing review.

5.2 Groundwater

An issue raised in a number of the submissions is the importance of considering groundwater processes in the assessment of supply from non-HBS Release Sources. This is supported, and to

[3] It is noted that the submissions on the draft QCA report, and Water Solutions Sept 2019, have identified a number of issues with the execution of the modelling presented in the OD Hydrology Report. However the hydrologic modelling approach itself is an appropriate technique, and could be applied as part of a more detailed assessment of the relative contribution of HBS releases to meeting HZA demands.

this end some comments on issues associated with groundwater is provided in the sections below.

5.2.1 Rising Groundwater

Page 2 of the cover letter of the BDCG submission raises rising groundwater as an issue for consideration by the QCA. The letter indicates that DNRME have notified the Burdekin District Cane Growers Limited of this issue, and that a report on the issue is being prepared. The submission recommends that the QCA considers a pricing reduction to serve as an incentive to take groundwater to reduce the potential issues associated with rising groundwater.

The DNRME project assessing rising groundwater is described at the following web page. An initial discussion paper on the project was released in 2017 (DNRM 2017d).

https://www.dnrme.qld.gov.au/land-water/initiatives/lower-burdekin-project

Future modelling of the GBGA should consider the impacts of rising groundwater. There may be a number of operational changes that can be made to limit HBS releases in times of high groundwater levels, although this may have significant impacts on users who extract direct from surface water. Careful consideration of the environmental, social and economic benefits and impacts of alternate operational strategies is recommended.

5.2.2 Surface-Groundwater Interaction

The aquifer associated with the GBGA is very tightly associated with surface water, and this close association has been recognized legislatively, with water in the GBGA aquifer defined as being water in the watercourse by the Water Plan for the Burdekin Basin. This very close association is perhaps why Sunwater chose to commission a daily surface water balance type model to be developed by OD Hydrology.

While a daily surface water balance modelling approach is considered a reasonable methodology to analyse issues such as operation rules, allocation performance, scheme yield and environmental performance, groundwater effects are important in this catchment. It is of benefit to obtain expert groundwater advice to assist in developing a model that adequately reflects the interactions of the surface water scheme with closely associated groundwater reserves.

Water Solutions Sept 2019 identified a number of concerns with the OH Hydrology report that pertain to its modelling of groundwater and the interaction with surface water, such as a poor explanation of key parameters such as aquifer porosity and the weir-groundwater interchange rates, the lack of evapo-transpiration losses from groundwater, the simplified groundwater interchange procedure, and the poor calibration against bore records. (These limitations are part of the reason why the previous review concluded that there was significant concern in using the results of this model to inform pricing.) The submissions have identified a number of additional issues, such as the selection of bores used to inform the model calibration. All of these groundwater related issues should be considered if a detailed modelling study is conducted in the future.

5.2.3 Groundwater Australia Report

A report by Groundwater Australia (GA) is included in the BDCG submission. A few comments on this report for consideration in future studies follow:

- S3.1 – This section indicates that salt impacts can arise from seawater intrusion or from upwelling. In s6.2 the report indicates that the GBGA aquifer overlies and is surrounded by unfavourable sediments. It thus appears that salt may enter the GBGA aquifer from three directions: from the sea, from surrounding sediments, or from below. The development of objectives associated with limiting saltwater intrusion into the aquifer would likely need to consider all three potential sources.
- Figure 2 shows a very narrow area for the GBGA aquifer essentially confined to the area directly below the Haughton River and Ironbark Creek channels. Figure 3 shows an alternate estimate of the aquifer area, extending further from the channels. OD Hydrology assumed an aquifer area of 50 km^2, which appears to be much larger than that indicated on Figure 2 or 3. It will be important to use appropriate areas for the GBGA aquifer/s if a detailed model is developed.
- Page 51 indicates GA used depths of 8m and 6m used as average depths of the Haughton River and Healeys Lagoon aquifer, while OD Hydrology used a flat average depth of 8m for the entire GBGA aquifer.
- Section 3.3 highlights that the supplementary supply from the Burdekin River essentially eliminated risks to water supply security and the risk of seawater intrusion. This is key benefit of the HBS Releases that should be appropriately considered in future analyses.

5.2.4 Historical Aquifer Yield Estimates

Section 3.2 of the GA Report indicates that the quoted historical annual groundwater yield of 19,700 ML/a was based on the estimated storage volume in the aquifer and weirs. The aquifer storage volume was originally estimated in 1967 at 12,300 ML and updated in 1971 to 13,600 ML, and then increased to 19,700 ML by adding the weir storage.

It is highlighted that the yield of a water supply system, whether surface water or groundwater based, does not typically equal the combined storage in that system. The size of storages, be that a subsurface aquifer or a surface storage, does affect the yield and security of a scheme, but other factors (such as climatic variability, rainfall, evaporation, losses, pattern of demand, operation rules, restriction rules) are also key.

Review of the 1967 report identified that the 10,000 acre feet estimate (12,300ML) is not actually the size of the groundwater storage. Rather, the volume assumed able to be extracted was estimated at 66% of the total aquifer storage volume. This estimate is based on three key assumptions: that river flows are sufficient to refill this volume every year; that a 66% reduction in aquifer level does not lead to an unacceptable risk of saltwater intrusion; and that there are no environmental flow requirements. Additionally, there have been many other changes to system operation since the 1967 and 1971 estimates were made, with some of these summarised in BRIA's 5/12/2019 submission.

In summary, the 1967-71 19,700 ML/a estimate is not considered to be a reasonable estimate of the yield available from Non-HBS Release sources under current conditions. Future modelling of the GBGA, if undertaken, should assist in providing an updated yield and performance estimate considering current operations and infrastructure and the system's surface and groundwater characteristics.

5.3 Differential Pricing

A number of the submissions raise potentially significant different methodologies for distributing costs between users, such as re-defining GBA allocation as a lower performance priority group or charging less if the user has additional costs to pump the water to their end use. BRIA's submission also includes an alternative tariff adjustment methodology for GBA users.

Such options have significant implications and would need to be fully scoped before being considered. Sunwater and users may wish to consider the benefits and implications of such approaches in their submission to the next pricing review.

5.4 Unsupplemented Use and Full Use of Entitlements

There are roughly 400 unsupplemented water extraction licences in the Haughton Basin according to the data provided online by the Queensland government[4]. These licences are scattered across the catchment and source water from both surface water and groundwater sources[5]. Not every licence in the database has a nominal entitlement, but the sum of the ones that do total ~130,000 ML/a of permitted water extraction plus ~550 ha of area based licences. These licenses operate under a variety of conditions and thresholds. The water-harvesters on Major Creek, mentioned on pg 17 of the BDCG 4/11/19 submission, are some of the unsupplemented users in the Haughton catchment.

Unsupplemented use in the Haughton catchment is a component of the net non-HBS Release Sources, that is, unsupplemented use in the catchment will tend to reduce the water available to assist in meeting BHWSS Haughton Zone A allocation demands. The historical effect of unsupplemented use on HZA efficiency is thus included by default in the historical data calculations presented in Section 4.

It is noted that historical use of unsupplemented licences may not represent full use of these entitlements, and if unsupplemented entitlements are more fully activated in the future this will reduce the water available from non-HBS Release sources available to supply BHWSS Haughton Zone A allocations.

Similarly, the historical usage of BHWSS Haughton Zone A allocations over 2002 to 2019 may not represent the potential full use of those entitlements.

Demands in the future on the Haughton catchment may thus be larger than they are now. Larger unsupplemented and supplemented demands on the Haughton catchment will tend to increase the requirement for releases from HBS and reduce the HZA Efficiency.

Should more detailed modelling be undertaken, it is recommended that the potential effects of full use of entitlements of both supplemented and unsupplemented water authorities is considered.

[4] See https://www.data.qld.gov.au/dataset/water-entitlements/resource/a512e9a8-c374-4416-a77d-1be85f3c796e?truncate=30&inner_span=True

[5] Note not all groundwater aquifers accessed by approved licences in the catchment might be recharged from Haughton catchment rainfall.

6 Conclusions

Following on from Water Solutions' initial advice summarised in the report "Rural Irrigation Price Review 2020-24 – Assessment of Hydrologic Factors", this report provides additional advice to assist with pricing for the Giru Benefitted Groundwater Area (GBGA), in response to hydrologic issues raised in submissions on the draft QCA report.

A major issue raised in the submissions was concerns about the accuracy of the extraction and release data used to provide an indication of the likely contribution of 'natural' flows to meeting GBGA demands.

This assessment thus included an independent review of available source records on releases from Haughton Balancing Storage (HBS) and extractions from Haughton Zone A (HZA). The efficiency of HBS releases in meeting HZA demands was used to provide an indication of the likely relative contribution of HBS Releases and Non-HBS Release Sources to meeting GBGA demands.

It is highlighted that Non-HBS Release Sources includes all other processes which affect water availability in Haughton Zone A, including, for example: rainfall on the Haughton River Catchment, leading to surface flow in the Haughton River and recharge to the GBGA aquifer, less licenced unsupplemented diversion from the catchment, plus supplementation by Haughton Zone A infrastructure (including Val Bird Weir, Giru Weir and Healeys Lagoon Pump Station), and subject to a range of operational losses and environmental requirements.

The source release and extraction data were obtained and reviewed, and updated estimates of annual releases and extractions derived. The resultant recomputed minimum annual efficiency over the period of available data (2002/03 to 2018/19) was 0.66, with the average efficiency 0.99.

A range of complicating issues associated with interpreting the data and the estimation of releases, extractions and efficiencies were assessed. While all data comes with a level of uncertainty, it is concluded that the data may be used to inform this assessment.

The key conclusion of the Water Solutions Sept 2019 report regarding the GBGA is thus confirmed. That is, that review of release and extraction data indicates that GBGA irrigators are receiving little contribution from non-HBS Release sources in dry periods, and thus that there does not appear to be a strong hydrologic basis for differential pricing of GBGA MP users (that is, increasing unit prices for other Burdekin distribution system MP users to be able to provide a discount for GBGA MP users). It is thus recommended Haughton Zone A (including the GBGA) is considered to be fully part of the Burdekin Haughton Channel Distribution System, with all MP allocations in this distribution system paying the same price.

Lastly, based on consideration of the various factors discussed in this report, it is considered unlikely that a more detailed analysis will identify a substantially different conclusion to the above. However unlikely is not the same as impossible. A more detailed assessment may be undertaken to inform deliberations in future price reviews. Such assessment, if undertaken, should consider the issues raised in this report, the WS Sept 2019 report, and the submissions received on the draft QCA report.

7 References

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Hon Glenn Butcher MP
Minister for Regional Development and Manufacturing
Minister for Water

Queensland Government

Our ref: MC21/2058
CTS 09530/21

19 MAY 2021

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Mr Robert Stockham
Mr Steven Pilla
Giru Benefited Area Committee
PO Box 70
GIRU QLD 4809

Email: stockhamcons@bigpond.com

Dear Mr Stockham and Mr Pilla

Thank you for your letter dated 9 April 2021 regarding irrigation water pricing.

I am pleased I was able to facilitate the meeting on 9 April 2021 between yourself, the Giru Benefited Area (GBA) stakeholders, colleagues from the Minister's Office (Ms Frances Stewart and Mr Adam Obeid), Sunwater and Mr Trevor Dann, Director, Economics and Governance from the Department of Regional Development, Manufacturing and Water. I understand you and other GBA stakeholders provided a very informative presentation on the history and layout of the GBA section of the Burdekin Haughton distribution scheme and the pricing matters referred to in your correspondence to this office.

I acknowledge the matters you have raised, including the complex history of irrigation pricing. I also note the Queensland Competition Authority's (QCA) decision not to acknowledge the natural yield concept for GBA (and therefore not recommend continuation of the discount) is of concern to you.

Having regard to the issues raised, it remains the preferred approach that these matters be considered as part of the next review of irrigation pricing by the QCA. As mentioned previously, the QCA process is a holistic one, taking into account a range of submissions, views and factors, rather than looking at individual issues in isolation. I would expect the arguments you have raised in relation to what you describe as the 19,700 megalitres of 'pre-dam yield' will be considered by government as part of its consideration of policy settings for the next review by the QCA. The Queensland Farmers' Federation, including CANEGROWERS, are consulted on the policy settings for each QCA review and you will be made aware once those discussions commence again so that you can be included in these consultations.

While I appreciate a review of these issues through the next QCA process does not provide an immediate avenue in which to have the pre-dam yield concept reconsidered, the Palaszczuk Government's election commitment to provide an automatically applied 15 per cent discount on 2021-22 to 2023-24 irrigation prices will result in GBA irrigators paying less for water over the next three years than if the discount decision had not been made. A further discount of 35 per cent will apply to eligible irrigators. These discounts are in addition to the Government's decision in 2020-21 to freeze or drop prices.

Following the Palaszczuk Government's decision to freeze (or decrease) irrigation prices for the 2020-21 financial year in response to the COVID-19 pandemic, the discounts for 2021-22 to 2023-24 will be applied to the QCA recommended price path for 2020-21 to 2022-23.

Subject to final Ministerial approval of the prices for 2021–22 to 2023–24, the irrigation water prices charged by Sunwater for GBA customers as a consequence of the election commitment on discount irrigation prices will be as follows:

		2019-20 ($/ML)	2020-21 ($/ML)	2021-22 ($/ML)	2022-23 ($/ML)	2023-24 ($/ML)
QCA Recommended Prices	Fixed (Part A+C)		24.21	27.18	30.28	33.50
	Volumetric (Part B+D)		15.70	16.05	16.42	16.79
Actual/Proposed Prices	Fixed (Part A+C)	21.35	21.35	20.58	23.10	25.74
	Volumetric (Part B+D)	15.36	15.15	13.35	13.64	13.96

The government is pleased to be able to deliver this initiative and the Department is firmly focussed on implementation of this commitment to discount water prices over the next three years, commencing on 1 July 2021.

In relation to the issues you have raised regarding location specific cost information, I have asked Sunwater to meet with you as soon as possible to discuss the matters raised around their costs and cost allocation methodology for the Burdekin Haughton distribution scheme. These are matters that can be discussed now with Sunwater ahead of the next review of irrigation water pricing by the QCA.

We are currently considering the Minister's schedule and availability to travel to the Burdekin region in the coming months and it is certainly our intention to meet with irrigators when he is in the region.

To discuss any issues regarding implementation of the government's election commitment, please contact Mr Trevor Dann, Director, Economics and Governance, Department of Regional Development, Manufacturing and Water on 3137 4285.

Yours sincerely

IAN HUTCHEON
Chief of Staff
Office of the Minister for Regional Development and Manufacturing and Minister for Water

Giru Benefited Area Committee
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Good Morning

The GBA Irrigators Committee would like to object to Sunwater draft QCA pricing August 2023.

We believe Sunwater should take into account the following differences in Water Supply Service and costing for the GBA Vs the rest of the BRIA channel scheme.

1. The level of service to the GBA is significantly different to the channel irrigators.

GBA: **-Customers are responsible for locating pumps and pump chases to take water**
(Cost of accessing water via bore installation or river suction and associated electricity is additional cost to GBA irrigators)
- No Guarantee of the quality or availability of water to bores in GBA.
- No PFE

Channel Irrigators
-Sunwater transports water to their offtakes via a physical connection to Sunwater's infrastructure.
(there is no access cost to channel irrigators as water <u>delivery is included in their sunwater fees</u> and 80% of customers have water delivered under pressure and do not incur any additional electricity costs.)

2. The QCA was in error in its finding that there is no material difference in the cost of delivery to the GBA compared to the BRIA channel system. The additional pricing information now obtained by GBA reveals a substantial difference in the cost of delivery between the BRIA channel system and the GBA.

<u>Sunwater Supplied Cost of Supply 5 Years Average 2012-2016</u>

GBA	**$11.32 / ML ***
Channel	**$42.36 /ML**

<u>Sunwater 2015 Feedback from NSP Consultation</u>

Cost of Supply GBA 5 Year Average 2010/11-2014/2015

GBA	**$12.88 /ML**

3. The QCA assessment did not fully consider the significance of imported temporary allocation into the GBA on the "releases versus metered usage" information in its findings regarding existence of natural yield and cost of supply.

4. There was no comparison made in the Final Report between the efficiency of metered usage versus releases to the rest of the scheme. Metered usage versus releases was presented in reports in several ways for the Haughton Zone A, yet nowhere was there the same detailed information for the BRIA channel system. A comparison of this metered usage versus releases reveals significant difference in the efficiency levels of Haughton Zone A to the rest of the BRIA Channel system (see attached table 2). Such a comparison would find the efficiency of the GBA to be almost double that of the BRIA.

Sunwater has provided, after a request, information that shows their inability to provide the same level of service to the GBA as the BRIA channel system. Also attached (see Schedule 1) is the Sunwater cost data for water delivery which demonstrates that the cost of supply to the GBA is significantly less than cost involved in supplying customers in the BRIA channel system. We strongly believe there is no justification for any price increase in water charges to the GBA.

Level of Service

Sunwater has identified four main differences in service level to the GBA:

- Cost of delivery
- Distribution losses
- Peak flow entitlement (PFE)
- Monitoring and maintenance costs.

The GBA has a supplemented supply where water is dumped in bulk into the existing Haughton River and Healys Lagoon from which it also recharges the GBA aquifer. Access to this water is by private infrastructure paid for and maintained at considerable expense by irrigators in the GBA. There is no guarantee of supply, no PFE for this supply of water.

The cost of access is considerable with either open water or bores. Open water is accessed from the river with difficulty and using costly suction and pump infrastructure at risk from constant seasonal flood damage. Bore access requires substantial costs to install with regular maintenance required and limited yield of each bore requires numerous bores per farm to provide sufficient irrigation capacity.

Open water in the Haughton river requires lifting (pumping) by an average of 6m to the bank and then often large distances to the farm. Average Electricity costs for Bores and open water $30-35/Ml.

BRIA farms have water delivered to the highest point on the farm with an offtake supplied by Sunwater and therefore minimal input is required by the BRIA irrigator to access this water. Water is mostly delivered at a positive head pressure requiring little or no electricity for access. Average Electricity costs $0-6/Ml.

Based on the information provided by Sunwater supplied costs (see Schedule 1) and metered usage the GBAC has calculated a difference in "direct operating costs and non-routine costs attributed to the GBA and Burdekin channel" for the period of 2012 to 2016. (*Note, exclusions apply to these figures and variations may occur). This evidence indicates that cost to Sunwater to supply water to the GBA Groundwater is *$11.32/ML while the channel irrigator cost of supply is *$42.36/ML (Please see attached table 1 for estimated pricing). The difference in pricing for supply of water to each area is a clear indicator of the different level of service provided by Sunwater to the GBA and BRIA. This has resulted in a different pricing structure for each region.

Haughton Zone A usage VS GBA Usage (Temporary water Allocation Imports)

Measurements of water releases vs metered usage were used as a pillar for the reason for increasing the price of GBA water. Between the Haughton balancing storage release point on the Haughton river and the GBA Area is a large area of cane grown without GBA permanent water allocation. Due to insufficient permanent water allocation these non-GBA irrigators import a significant volume of temporary water allocation each year into the Haughton Zone A. The QCA failed to grasp the significance of temporary allocation brought into the Haughton Zone A on releases vs usage. An inflow of non-

Haughton Zone A temporary allocation which attracts full BRIA channel rates is brought into the Haughton Zone A and represents an average of over 20% of the Total annual usage (approx. 6500Ml). This usage was included as part of the overall usage used in some reports to demonstrate an excess usage above the 20 500Ml supplementation and negatively distorted the efficiency of the Haughton Zone A/ GBA system.

In conclusion we do not believe there is any justification for changing the long standing water price difference between the GBA and the BRIA channel system. The evidence provided shows there is no basis to any claim that fees paid by BRIA channel irrigators in any way subsidise the GBA irrigators. We ask that the water price recommendations for GBA be rejected as they were based on flawed information.

GBAC appreciates your thorough consideration of the matters raised in this correspondence and look forward to your response.

This correspondence and its content is supported and endorsed by all cane growing collectives in the Burdekin region, Canegrowers Burdekin Ltd (CBL), Pioneer Canegrowers Limited, Kalamia Canegrowers Organisation Limited, Agforce Cane Limited, who represent more than 80% of the farmers in the Burdekin region.

Yours faithfully,

Robert Stockham
GBA Committee Chair r

On behalf of the Giru Benefitted Area Committee

Enclosed:
- Table 1. Groundwater cost of supply
- Table 2. Giru VS BRIA Efficiency Table
- Schedule 1. Request for information: Giru Benefitted Area (GBA) and Burdekin Channel cost data
- Schedule 2. Request for information: Service Standards Burdekin Haughton
- Schedule 3. Cost of supply data from NSP 2015 feedback information

Table 1 Groundwater cost of supply GBA VS Burdekin Channel Irrigators

Giru Groundwater Area ($'000, nominal)							
	2012	**2013**	**2014**	**2015**	**2016**	**Total**	**Average**
Non-routine work							
R&E	92	4	1	222	2		
Non-routine work Total	92	4	1	222	2		
Routine work							
Corrective	31	44	61	52	32		
Operations	173	221	237	220	190		
Preventative	57	61	51	56	53		
Routine work Total	261	327	349	327	274		
Total	352	331	350	549	276		
TOTAL (x$1000)	352	331	350	549	276	1858	371.6
ML TOTAL Usage	20387	20610	29668	46422	47031	164118	32823.6
$/ML							**$11.32***
Burdekin Channel ($'000, nominal)							
	2012	**2013**	**2014**	**2015**	**2016**	**Total**	**Average**
Non-routine work							
Corrective	13						
Operations	24	0	11	7			
R&E	2945	1,811	1,293	908	1,323		
Non-routine work Total	2982	1,811	1,304	915	1,323		
Routine work							
Corrective	2241	2,855	2,115	2,339	1,899		
Operations	3973	4,367	4,623	4,110	3,871		
Preventative	2695	2,294	2,432	2,902	3,184		
Routine work Total	8909	9,516	9,171	9,351	8,955		
Total	11891	11,327	10,475	10,265	10,278		
TOTAL (x$1000)	11891	11327	10475	10265	10278	54236	10847.2
ML TOTAL Usage	177813	198997	270037	341548	292114	1280509	256101.8
$/ML							**$42.36***

Table 2 Efficiency Comparison between Combined BRIA and Haughton Zone A

						HAUGHTON ZONE A		
	COMBINED	BRIA					Total	
						Diversion	Water Use	
		Total				from	Haughton	
Year	Diversion	Water			Year	Balancing	Zone A	
		Use				Storage	SW & GW	
						(ML)	(ML)	
2006/07	386216	275338	71%		2006/07	31,556	37,984	120%
2007/08	328870	216690	66%		2007/08	22,018	30,742	140%
2008/09	301473	182031	60%		2008/09	19,101	27,061	142%
2009/10	391870	258057	66%		2009/10	38,465	35,571	92%
2010/11	119308	65621	55%		2010/11	5,872	6,677	114%
2011/12	282687	177813	63%		2011/12	29,603	20,387	69%
2012/13	324270	198997	61%		2012/13	26,873	20,610	77%
2013/14	459554	270037	59%		2013/14	44,671	29,668	66%
2014/15	481063	341548	71%		2014/15	47,405	46,422	98%
2015/16	402133	292114	73%		2015/16	47,019	47,031	100%
Average	**347744**	**227825**	**66%**		**Average**	**31,258**	**30,215**	**97%**

Schedule 1

sunwater

Request for information

Giru Benefitted Area (GBA) and Burdekin Channel cost data

Direct cost, customer and megalitre (ML) data for Giru Benefitted Area (GBA) and Burdekin Channel is provided below. However, the GBA and Burdekin channel costs cannot be looked at in isolation at the sub-scheme level when considering the true cost of getting water to GBA.

A more correct estimate would apportion some of the Burdekin channel costs to GBA, to reflect that water is transported through Burdekin Channel to reach the GBA, but Sunwater does not have an allocation methodology or measurement to assign these costs between sub-schemes.

Examples of shared costs, and other notes accompanying the data are outlined below:

- the cost summaries below only include the direct operating and non-routine costs attributed to GBA and Burdekin Channel
  - electricity is excluded, as it is a significant cost in the Burdekin Channel sub-schemes, but benefits customers in the Giru Benefitted Area
  - indirect and corporate overhead costs are excluded, as these are allocated separately using Sunwater's cost allocation methodology.
- many costs in the data below are incurred in other Burdekin Channel sub-schemes, but benefit GBA customers. Due to the range of costs with shared benefits, Sunwater cautions against making an outright $/ml comparison. Costs with shared benefits include (but may not be limited to):
  - aquatic weed control maintenance in the Haughton Main Channel (HMC) channel
  - access road maintenance costs (i.e. costs associated with access roads along HMC reg 1 to 6, and Haughton Balance storage (as this is used to supply GBA))
  - vegetation control (i.e. slashing of the channel system and/or noxious weed management, as this includes works along HMC reg 1 to 6, and the Haughton storage (which are used to supply GBA), and weed control around the weirs in that area)
  - weir costs (i.e. Val Bird and Giru weirs are critical assets to store the diverted water for the GBA area, and Clare weir costs are beneficial as this is the stored supply for TFPS, supplying HMC)
  - BFD costs (i.e. the Burdekin River is the source of water supply to the HMC (from a supplementary point of view, also remembering Haughton river also supplies (un-supplemented) water to the GBA customers), so BFD also benefits GBA).
- drainage scheme costs have been excluded

- in the tables below, Burdekin Channel costs is comprised of all other sub-scheme groups including: Burd Distr Pooled, Barratta System, Barratta System Drain, Clare System, Clare System Drain, Dalbeg System, Dalbeg System Drain, Elliot Mc & P/Stn, Elliot Sys (L'Hardt), Elliot Sys(L'Rdt)Drn, Haughton Mc & Pstns, Haughton System, Haughton System Drain, Millaroo System, and Millaroo System Drain. Glady's Lagoon is included within Burdekin Channel, for the purposes of this comparison.

Table 1 Number of customers and water allocation entitlements

Tariff/Billing Group	# customers	ML
Burdekin Channel	172	278,859
Giru Groundwater Area	73	39,037
Glady's Lagoon - Other than from natural yield	1	800

Table 2 Giru Groundwater Area ($'000, nominal)

	2012	2013	2014	2015	2016	2017	2018	2019
Non-routine work								
R&E	92	4	1	222	2	816	110	25
Non-routine work Total	*92*	*4*	*1*	*222*	*2*	*816*	*110*	*25*
Routine work								
Corrective	31	44	61	52	32	29	69	59
Operations	173	221	237	220	190	155	152	127
Preventative	57	61	51	56	53	57	49	33
Routine work Total	*261*	*327*	*349*	*327*	*274*	*242*	*270*	*219*
Total	**352**	**331**	**350**	**549**	**276**	**1,058**	**381**	**244**

Table 3 Burdekin Channel ($'000, nominal)

	2012	2013	2014	2015	2016	2017	2018	2019
Non-routine work								
Corrective	13					95	59	
Operations	24	0	11	7		2		
R&E	2,945	1,811	1,293	908	1,323	857	1,851	1,823
Non-routine work Total	*2,982*	*1,811*	*1,304*	*915*	*1,323*	*953*	*1,910*	*1,823*
Routine work								
Corrective	2,241	2,855	2,115	2,339	1,899	1,656	1,517	2,101
Operations	3,973	4,367	4,623	4,110	3,871	3,757	4,338	5,785
Preventative	2,695	2,294	2,432	2,902	3,184	2,804	1,747	2,208
Routine work Total	8,909	9,516	9,171	9,351	8,955	8,217	7,603	10,095
Total	11,891	11,327	10,475	10,265	10,278	9,170	9,513	11,917

Schedule 2

sunwater

Request for information

Service standards in Burdekin Haughton DS

Please explain the different service standards between GBA and Burdekin Channel.

There are four main differences in service level to the GBA:

- cost of delivery
- distribution losses
- peak flow entitlement
- monitoring and maintenance costs.

These are explained below.

Cost of delivery

There are periods in a water year when Sunwater operates the Tom Fenwick pump station at a lower capacity, as it is not providing additional supplemented supply to be diverted into the Haughton river for GBA customers.

In dry periods, Sunwater pumps water into the Haughton Channel system and storage for the provision of water to both channel and GBA customers.

However, when there is a wet weather event there can be extended periods (sometimes months) where there is natural flow in the Haughton River. During these periods, Sunwater may not need to use extra pumping capacity to maintain supply to the GBA customers as the rain and extended natural flows in the river maintains the height of ponded areas of the Haughton, enabling customers to access their entitlements.

Supply to Burdekin Channel customers, however, requires Sunwater to pump water from the Burdekin River into the channels. During the same periods of wet weather, the channel systems may not be required for short periods (typically 5-10 days) while customers farms are wet from the rain. However, once the rain has drained away customers recommence irrigating and require Sunwater to pump water into the channels. A shutdown of pumping for a rain event typically only last between 5-10 days.

Distribution losses

Burdekin Channel deliveries experience a relatively constant level of distribution losses across the channel system. The channel system is clay lined and therefore has limited seepage losses. The Burdekin channel system typically operates between 75%-85% efficiency.

GBA deliveries are subject to channel distribution losses, but as water is delivered via a natural river system (the Haughton River), deliveries are also subject to much higher and highly variable distribution losses. The distribution efficiency of the river system is highly variable, depending on factors including wetted area of the riverbed, current groundwater levels and presence of natural flows. As a rule of thumb, natural watercourses can operate at efficiencies

as low as 60% and this is further exasperated by low participation of GBA customers in Water Ordering in accordance with the Burdekin Haughton Water Supply Scheme Rules and Targets.

Peak flow entitlements

Burdekin Haughton Water Supply Scheme was originally designed (pump stations and channel size) to deliver the following service levels:

- old areas (Clare, Millaroo and Dalbeg Sections)– 61 mm in 15 days
- new areas (Barratta, Haughton and Elliot)–75 mm watering on 80 percent of the useable soil area in 12 days at an efficiency of 70 percent.

Peak Flow Entitlements were formed based on the scheme design standards and with consideration of the following assumptions:

- anticipated mix of cropping
- extent of fallow land during period of peak demand
- estimated area to be served.

Subsequent changes to land use, area to be served and capacity expansion (i.e. additional pump stations and modification of channel sizes and efficiencies) led to adjustments to peak flow entitlements. At periods of peak demand, Burdekin Channel customers have a peak flow entitlement (PFE). The purpose of PFEs is to apportion a maximum flow rate that customers can extract water from the channel system during peak demand periods, ensuring all customers have equitable access to water. Sunwater monitors the cumulative customer demands daily and implements PFE restrictions if the cumulative demand approaches levels that pose a risk to meeting customer orders. This is a critical operational control to ensure Sunwater can meet its obligations for supply of high and medium priority water to our customers as per their contracts. PFEs are determined by the section application rates in Table 1.

Table 1 Section application rates.

Section Application Rate Area		
Barratta	100 mm over 12 days	90% suitable area
Mona Park	0.027 m3/s (27 L/s)	Not based on area
Haughton	75 mm over 12 days	80% suitable area
Elliot	75 mm over 12 days	80% suitable area
Clare	Proportion of Pump Station capacity	100% gross area
Millaroo	Proportion of Pump Station capacity	100% gross area
Dalbeg	Proportion of Pump Station capacity	100% gross area

Pump and Channel capacities have a direct link to the amount of PFE available.

GBA customers do not have PFEs as the supply to the sub scheme was provided to supplement groundwater during periods of no natural flow in the Haughton River. Over time some customers have transitioned to accessing predominately surface water in the sub-scheme which results in more frequent releases from the channel system to maintain operating levels in the Giru and Val Bird Weirs. During periods of peak demand, in the event of no excess capacity, their access can be reduced to zero.

GBA customers are aware of the potential for the Haughton Zone A diversion to be closed (zero release) or the possibility of severely restricted releases during periods of peak demand on the

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Haughton Main Channel in accordance with the Burdekin Haughton Water Supply Scheme Rules and Targets.

With the release of the QCA's final recommendations, customers have questioned if Sunwater will provide a PFE to GBA customers, as they are now transitioning to lower bound prices equivalent to the Burdekin channel customers.

Sunwater notes that, with current levels of infrastructure and operational rules, we would be unable to provide PFEs to both tariff groups, without reducing the level of PFE currently provided to Burdekin Channel customers.

Monitoring and management costs of GBA

The two tariff groups require significantly different levels of management and maintenance, due to the higher level of mechanical intervention and close proximity of customer offtakes in Burdekin Channel.

To maintain optimum capacity in the Burdekin Channel requires more surveillance to ensure:

- regulating gates are working
- flow is being maintained
- customers are taking/not-taking in accordance with water orders.

The higher surveillance is required as the consequences of having problems in the channel system are more immediate and have a greater impact (on both costs and service delivery) than in the GBA system.

During those times that water is being provided to the GBA through the channel system (when natural flows in the Haughton River are inadequate), the GBA also benefits from the additional maintenance and surveillance required on the channel system.

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Schedule 3

GBA COST OF SUPPLY FROM 2015 NSP INFORMATION

Sunwater Supplied Useage Data						TOTAL
	2010-11	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**5 year**
Ground water	**2,477**	**8,751**	**10,537**	**13,972**	**17,850**	**53,587**
Allocation Water Usage	2,477	8,751	10,537	13,972	17,850	
Other Water Usage						
River water	**4,351**	**11,824**	**10,073**	**15,815**	**28,572**	**70,635**
Allocation Water Usage	4,201	11,636	10,073	15,696	28,572	
Other Water Usage	150	189		120		
Unknown offtake						
Allocation Water Usage						
Total	**6,827**	**20,575**	**20,610**	**29,788**	**46,422**	**124,222**

Costing Information from
Sunwater 2015 Feedback from NSP Consultation

						5 yr total
GBA Sunwater cost calculation	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2010-2015**
Total Usage ML	6827	20575	20610	29788	46422	**124,222**
NSP 2015GBA cost	$320,00	$320,00	$320,00	$320,00	$320,00	**$1,600,00**
Information	0	0	0	0	0	**0**
Cost of Supply per ML	$46.9	$15.6	$15.5	$10.7	$6.9	**$12.88**

(Note 2010-11 was extreme wet year with very low water usage)

		[illegible]
Burdekin Bulk & Distribution	SunWater to justify/clarify the $320k GBA costs being transferred from Bulk Water to Distribution service contract.	• Giru Benefitted Area is part of the irrigation scheme and has been identified for transfer under the LMA process (see doc#03.01.05.01 "LMA Core Assets Burdekin" in the data room). • Previously, SunWater had incorrectly categorised GBA costs under the Bulk service contract in our SAP financial system. • GBA is clearly an irrigation asset and SunWater has budgeted the costs associated with GBA in 2015 under the Distribution service contract. • The $320k budget is broken down as follows: o $210k operations o $65k preventive o $45k corrective

<table>
<tr><th>Service Contract</th><th>Question/Comment</th><th>Response</th></tr>
<tr><td>Burdekin Bulk & Distribution</td><td>Further breakup of GBA costs requested.</td><td>

The budget allowance for the adjustment for GBA was estimated based on the last five years of costs.
This is an adjustment made to the budgets of Bulk and Channel at the service contract level to allow for the transfer of the GBA assets planned under LMA.
The figures provided below do not represent a budget for GBA that SunWater will be managing to. SunWater will continue to manage to the total service contract QCA targets at the activity level.
The breakdown of costs for GBA for the past five years (including 2014 forecast) at the sub-activity level was as follows:

<table>
<tr><td>OH&S</td><td>4</td></tr>
<tr><td>Enviro Mgt</td><td>13</td></tr>
<tr><td>Water Mgt</td><td>2</td></tr>
<tr><td>Scheme Mgt</td><td>38</td></tr>
<tr><td>Sched/Deliver</td><td>132</td></tr>
<tr><td>Metering</td><td>15</td></tr>
<tr><td>Electricity</td><td>6</td></tr>
<tr><td>Operations</td><td>210</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Condition Monitoring</td><td>37</td></tr>
<tr><td>Servicing</td><td>17</td></tr>
<tr><td>Weed Control</td><td>11</td></tr>
<tr><td>Preventive</td><td>65</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Sched Corr Maint</td><td>43</td></tr>
<tr><td>Emergency Maint</td><td>2</td></tr>
<tr><td>Corrective</td><td>45</td></tr>
</table>
</td></tr>
<tr><td>Burdekin</td><td>SunWater electricity</td><td>This project is proposed at this stage which will</td></tr>
</table>