



Department of Agriculture and Water Resources

Technical Review of Derwent Park Stormwater Harvesting and Reuse Scheme Decommissioning

January 2019

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Executive summary

Introduction

GHD was engaged by the Australian Government Department of Agriculture and Water Resources (the Department) to complete an independent technical review of the Business Case provided by Glenorchy City Council (GCC, 2018), outlining the case for the decommissioning of the Derwent Park Stormwater Harvesting and Reuse Scheme.

The review assesses the validity and robustness of information, assumptions and conclusions contained in the Business Case, including claims regarding financial viability/sustainability of the Derwent Park Stormwater Harvesting and Reuse Scheme.

Overall completeness of the Business Case

Overall, GHD believe that the Business Case was comprehensive and provided an honest and complete assessment of the various issues that affected the success of the scheme. Each of the areas of information requested by the Department were largely addressed in the Business Case, noting that some areas were addressed more completely than others. Sufficient information was available for the GHD to undertake this review.

Extent to which the scheme met the objectives of the Funding Agreement

The objective of offsetting potable water use has only partially been achieved. Key considerations include:

- The reuse component from Stage 1 (WTP1) produced between 171.44 ML and 292.46 ML of treated stormwater over the five year period 2013–14 to 2017–18, compared to the Stage 1 objective of supplying up to 476 ML of treated stormwater per year.
- None of the additional treated stormwater from Stage 2 of the project was ever supplied to commercial customers, compared to the Stage 2 objective of supplying up to 1,000 ML per year.
- The absence of commercial clients for the scheme was a key risk for the project viability in achieving its objective of offsetting potable water use.
- A key factor in this was the cost of producing fit for purpose water, which ended up being significantly higher than the market price for potable water in Tasmania. Given the low price of potable water in Tasmania (around \$1 per kilolitre), it is difficult to envisage any project involving advanced water treatment processes being cost-competitive, and this should have been identified as a high risk during the project assessment and planning stage.
- The development of a similar water reuse scheme by the scheme's main customer (Nyrstar), which enabled Nyrstar to treat its own water to its desired quality, may have further affected the viability of the scheme.

The objective of reducing pollutants may have been met for the current scheme, but it is not clear to what extent it will continue to be met following decommissioning. Key considerations include:

- Given the lack of primary stormwater treatment (such as Gross Pollutant Traps (GPTs), sediment ponds or swales) or secondary stormwater treatment (such as wetlands or bioretention system), the remaining elements provide limited, if any, reduction in pollutant loads. It is for this reason that the Council's Business Case proposes the

installation of a GPT in Pit C3 to remove gross pollutants from the stormwater, noting that this has not yet occurred.

- We are not sure whether the proposed Ecosol trash rack is the most appropriate GPT for the application. The approximate capital cost of retrofitting a GPT to Pit C3 is likely to be in the order of \$100,000 to \$200,000, noting that the GPT will have substantial ongoing operation and maintenance costs that will need to be funded by Council.
- Without the proposed GPT, it is not clear how there could be any reduction in pollutant loads entering the Derwent River. Therefore the retrofitting of a GPT in Pit C3 (as a minimum) to capture gross pollutants during higher frequency flood events is required to ensure a reduction in pollutant loads. It is further noted that the efficiency of the GPT in removing gross pollutants relies on a regular maintenance program of cleaning.
- Without additional primary stormwater treatment (such as sediment ponds or swales) or secondary stormwater treatment (such as wetlands or bioretention system), it is not clear how the stormwater scheme would have the ability to remove nutrients such as nitrogen and phosphorous or total suspended solids (TSS) from the stormwater flow.
- The Council has indicated that the reduction of pollutants and improvement of stormwater quality is an ongoing objective for Council. It is also stated that it is committed to the continual monitoring of water quality within the urban catchment and working with local industrial businesses with the objective of minimising pollutants discharged into the urban drainage system. However, we regard this as standard practice, and therefore represents business as usual.
- Council has requested that funds realised from the sale of the decommissioned assets of the Treatment and Reuse Component are made available to Council to continue to achieve the project's objectives of mitigating flooding impacts and improving stormwater quality. However, our assessment is that Council's proposed approach appears to be based around funding staff, and as this is primarily an operations expense. It may not be considered an appropriate use of Australian Government funding unless the Council can provide further evidence of how their proposed actions differ from core business activities.

While flood mitigation has been provided as a key objective of the scheme, it is important to note that flood mitigation was never an objective of the Funding Agreement.

The Business Case did not directly address the specifics of clause 3.8 of the Funding Agreement, which relates to the termination of the agreement, and the conditions whereby the Department may recover part of the funding. It is understood that Council engaged with the Department prior to formally resolving ceasing to use the re-use component on 30 June 2018. This engagement is seen to meet the requirements under clause 3.8.1c. We further note that clause 3.8.2 does not provide any additional conditions or guidance to the Department on quantum of funds it requires Recipients to repay, other than the amount not exceeding the original grant.

Key design assumptions vs actual operating conditions

It was difficult to verify some of the assumed operating conditions listed in the Business Case from the Funding Application and other documents reviewed. Some of these assumptions may have been included in design documents not sighted as part of this review.

However, overall we believe the completion of an initial Business Case, including a rigorous analysis of key assumptions including operating costs, water sales and prices, as well as a Benefit Cost Analysis for the project would have helped both the Department and Council better understand the risks associated with the project.

Rationale for decommissioning

The rationale for decommissioning is well documented in the Business Case and appears to be justified given the broad range of issues facing the scheme, including:

- ASR System Dysfunction
- lack of temporary water storage, including problems with Pond C, storage tanks at the WTP, and Line A
- defective infrastructure works limiting water supply from the catchment, with design and construction defects attributable to the Contractor, LVC
- limited water supply from Humphreys Rivulet, in part due to licencing constraints
- poor raw water quality at Humphreys Rivulet and at Pond C
- unreliable and unnecessary alternative power supply
- operation constraints associated with treatment system operation and maintenance.

Council (and the appointed administrator) was pro-active in seeking to address the issues facing the scheme, including commissioning of an external review to identify potential operational savings and future options. Council was faced with significant ongoing operating losses, and as a result they did not have the luxury of time to fully explore future options. However, even if more time was available, there remained significant technical issues facing the viability of the scheme, as evidenced by the myriad of issues identified in the Business Case.

The final decision to cease operation of the re-use component was consistent with recommendations of the external review and appropriate given Council's financial situation.

Rationale for depreciation

The depreciation of Council assets has been subject to annual audits by The Tasmanian Auditor General Office.

The asset register (appendix IV of the Business Case) shows that the scheme was broken down into 194 different asset types, with each being applied a corresponding replacement value, useful life and written down value. We believe this represents a comprehensive calculation of depreciation.

The application of a straight-line depreciation method and Council's Standard Asset Types and Useful Life schedule is appropriate and consistent with local government accounting practices.

Terms for the disposal of assets

It is unclear from the Business Case exactly which assets will be sold and which will be retained, and the potential market value for these assets. This information will presumably be available once the report from the independent valuer is received.

It is possible that some items could be sold while continuing to be used for similar purposes outlined in the project's objectives. For example, if certain water treatment modules can be sold as discrete units. However in this case, it is unlikely that any purchaser would agree (without any incentive) to use the infrastructure for the project's objectives for a period, including to 30 April 2026. Any purchaser seeking to use the assets for a similar purpose would need to first be sure that the issues which impacted the scheme's viability could be overcome in a new setting (e.g. as part of different water treatment train).

Loss to the Department

The proposal presented by Council in the Business Case is that:

- the Department does not enforce the requirement in the Funding Agreement that Council repays the grant funds to the Commonwealth Government as a result of it ceasing to operate the Reuse Component, and
- any funds realised from the sale of the decommissioned assets of the Reuse Component are made available to Council to continue to achieve the project's objectives of mitigating flooding impacts and improving stormwater quality through reducing pollutants and conducting ongoing water monitoring.

Under the above proposal the Department will not recoup any funds from its \$9.2 million investment, which can be viewed as a financial loss in the sense that the project objectives will not be fully met.

Value for money

The scheme produced a total of 1,169.25 ML of reuse water. From an Australian Government contribution of \$9.2 million, this represents a cost of \$7,868 per ML of water produced, excluding the significant capital and operational costs incurred by Council.

It is worth noting that when the project was assessed for Australian Government funding (GHD 2010), under Merit Criteria #2 (Cost-effectiveness of the project), it was noted that no Net Present Value (NPV) or Benefit Cost Analysis (BCA) had been undertaken to determine the expected economic return. Furthermore, the assessment noted that the capital cost estimates provided were not accompanied by costs for operation, maintenance, administration and monitoring, nor were the funding sources for these activities identified. The assessment suggested that the lack of detail around funding sources did not pose a risk to the Australian Government.

Learnings

There are some lessons that both the Australian Government and funding applicants can use to avoid similar issues on other projects. Some areas of potential learnings include:

- improved understanding of the technical risks associated with the ASR methodology
- the need for a rigorous assessment of likely operating costs, including maintenance, monitoring, chemical use, power etc.
- the need for a rigorous assessment of funding sources for operating costs, including analysis of potential customers and water sale prices
- the need to assess potential risks posed from the discontinuation of specialist parts and equipment
- the need for the Australian Government to potentially consider the stability of governance and financial position of applicants, when assessing funding applications
- the need for funding recipients to undertake rigorous probity checks on suppliers, and to understand their potential liability in the event of suppliers collapsing.

Table of contents

1	Introduction	8
1.1	Purpose of this report.....	8
1.2	Scope and limitations.....	8
1.3	Methodology.....	8
1.4	Assumptions.....	9
1.5	Declaration.....	9
2	Review areas	10
2.1	Overall completeness of the Business Case.....	10
2.2	Extent to which the project met the objectives of the Funding Agreement.....	11
2.3	Key design assumptions vs actual operating environment	18
2.4	Rationale for decommissioning	20
2.5	Rationale for depreciation	26
2.6	Terms for the disposal of assets	27
2.7	Loss to the Australian Government	28
2.8	Value for money from investment.....	28
2.9	Lessons learned.....	29
3	Conclusions.....	30
4	References.....	31

Table index

Table 1	Terms of Reference	10
Table 2	Total Reuse Water Production via WTP1	12
Table 3	Timeline.....	17
Table 4	Project assumptions vs actual operating conditions	18

Figure index

Figure 1	The Treatment and Reuse Components of the Scheme (from Section 2.4 of the Business Case)	15
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1 Introduction

1.1 Purpose of this report

This report provides an independent technical review of the Business Case provided by Glenorchy City Council (GCC, 2018), outlining the case for the decommissioning of the Derwent Park Stormwater Harvesting and Reuse Scheme.

1.2 Scope and limitations

The Australian Government Department of Agriculture and Water Resources (The Department) requested GHD to undertake a thorough review of the Business Case to verify the validity the robustness of information, assumptions and conclusions contained in the Business Case, including claims regarding financial viability/sustainability.

The Department broadly directed GHD to review the following areas, which will in-part inform any decision to require a repayment of funds received:

- overall completeness of the Business Case
- extent to which the project met the objectives of the Funding Agreement
- key design assumptions vs actual operating conditions
- rationale for decommissioning
- rationale for depreciation
- terms for the disposal of assets
- loss to the Department/Australian Government
- value for money from investment.

The above areas form the structure of this report.

1.3 Methodology

The assessment was based on a desktop analysis of information provided by the Council through the Department, as outlined below.

Review documents

GHD was provided with the following documents as part of this review:

Pre-construction

- Moonah Stormwater Harvesting Funding Application
- DEP's Letter of support
- Stormwater Re-use Plan Schematic
- Budget Cost Estimate
- Gant Charts (x2)
- Final Assessment Report (GHD)
- Final Funding Agreement

Post construction

- Milestone 6 and 7: Practical Completion
- Final Report (June 2016)
- Business Case: Derwent Park Stormwater Harvesting and Reuse Scheme Decommissioning
 - Appendix I - Scheme Locality Sheets
 - Appendix II – Independent review report (Permeate Partners)
 - Appendix III – Internal review report
 - Appendix IV – Asset register
 - Appendix V – Certification of the financial reports.

1.4 Assumptions

GHD's review is based on the following assumptions:

- information provided in the Business Case is correct, current and complete
- Council responses to specific GHD queries are correct and factual
- no relevant readily-available information has been withheld from the reviewers.

1.5 Declaration

GHD was previously commissioned to complete the following reports in relation to this project:

- Urban Water and Desalination Plan: Stormwater Harvesting and Reuse Project Assessment Phase 2 Assessment Report (May 2010).
- Hydrogeological Assessment (May 2011).
- Partial Stage 2 ASR Assessment Report (October 2011).
- Aquifer Storage and Recovery Stage 2 / Pre-commissioning assessment (January 2012).

No individuals involved in the preparation of these previous reports were involved in completing this current technical review.

2 Review areas

2.1 Overall completeness of the Business Case

The Department requested information from the Council on eight (8) areas regarding the operation of the scheme and the reasoning behind the decision to decommission the Reuse Component. This information was provided by the Council via the subsequent Business Case. Table 1 below lists the eight (8) areas of information requested, and the relevant sections of the Business Case where these are addressed.

Overall, GHD believe that the Business Case was comprehensive and provided an honest and complete assessment of the various issues that affected the success of the scheme. Each of the eight areas of information requested by the Department were largely addressed in the Business Case, noting that some areas were addressed more completely than others. GHD requested some further information from Council (via the Department) to address some minor information gaps.

GHD's technical assessment of the response provided by Council to each of the information requests is detailed in later sections of this report.

Table 1 Terms of Reference

No	Information requested	Relevant sections of Business Case	Page
1	Demonstrate the extent to which Council meets the project objectives of the Funding Agreement in the event of decommissioning; A.2.3 of the Schedule for project-specific objectives and A.1.1 for the broader program-level objectives.	PART 2A: PROJECT OBJECTIVES AND CHANGES IN CONDITIONS 3. Meeting project objectives	24
2	Compare the "before" operating condition key assumptions and the actual operating conditions "after".	PART 2A: PROJECT OBJECTIVES AND CHANGES IN CONDITIONS 4. Key Assumptions and Actual Conditions	28
3	Provide the rationale for decommissioning giving an account of the change in operating conditions – in terms of what has changed and the reasons for that change.	Part 2B: Rationale for Decommissioning	33
4	What are the implications, if any, for the other parts of the project?	PART 2D: OTHER REQUESTED INFORMATION 9. Impact on Other Parts of The scheme After Decommissioning (Flood Mitigation)	71
5	Provide a breakdown of the components of the scheme and the proportion of Australian Government funding in each.	PART 2D: OTHER REQUESTED INFORMATION 12. Breakdown of components	75

No	Information requested	Relevant sections of Business Case	Page
6	Demonstrate that all options have been explored in taking this forward, including independent review.	PART 2C: SCHEME REVIEWS AND OPTIONS TO KEEP SCHEME OPERATIONAL	60
7	Provide a detailed rationale for depreciation.	PART 2D: OTHER REQUESTED INFORMATION 11. Rationale for depreciation	24
8	Provide evidence of the independent reviews undertaken and the technical considerations.	6.2. External Reviews	73

2.2 Extent to which the project met the objectives of the Funding Agreement

Summary of response in Business Case

Section 3 of the Business Case outlines how the project performed in meeting the objectives of the Funding Agreement. The two objectives of the project stated in the Funding Agreement were to:

- reduce a total of up to 1,500 megalitres (ML) of potable water each year by harvesting, sufficiently treating and reusing stormwater and stored groundwater for open space irrigation and industrial purposes
- reduce pollutants from and improve the quality of, the stormwater which flows into the Derwent River.

The Business Case Executive Summary included the following response to the 'Achievement of project objectives':

"The decision to cease the operation of the Reuse Component has not, and will not, compromise the effectiveness and success of the flood mitigation function of the scheme. The success of the Flood Mitigation Component demonstrated during the flooding event that hit Hobart in May 2018, in which Hobart City recorded more than 100mm of rain in a single day. During that event (which was of the most significant rain events of the past century), only minor flooding for a very short period (less than 1 hour) was observed at the intersection of the Brooker Highway and Derwent Park Road, which was one of the key areas targeted by the Flood Mitigation Component. Previously, that area flooded frequently, even in relatively minor rain events. The Flood Mitigation Component operates largely independently of the Reuse Component so is not impacted by the Reuse Component's decommissioning.

Another key project objective of reducing pollutants that flowed to the Derwent River through Stormwater has been successful and will continue despite the decommissioning of the Reuse Component. Council will carry out minor modifications to a junction pit and install a pollutant trap to improve stormwater quality. Council will also continue to conduct regular water monitoring and work with local businesses to reduce pollutants to ensure that the success of this objective is not compromised."

Meeting project objective (a): Reduce potable water use

From the *Final Report* (GCC, 2016), the project was constructed in two stages, with Stage 1 of the scheme related to all urban catchment runoff systems pertaining to the collection, treatment and supply to the boiler at the Nyrstar Roast Section. . Stage 2 of the scheme was

related to the construction of infrastructure to supply potable grade water to Nyrstar for general site use via their Header tanks.

The extent to which the objective to reduce potable water use was met is outlined in Section 3.1 and Section 3.1.1 of the Business Case. . It was intended that:

- On completion of Stage 1, the scheme's objective was to offset 476 ML of potable water currently used at the Nyrstar and the Moonah Primary School each year.
- On completion of Stage 2, the project would have the potential to offset an additional 1,000 ML of potable water per year, by supplying treated stormwater and groundwater to other potential users.

The above intentions were combined and summarised in the overall objective stated in Clause A2.2 of the Funding Agreement, to offset "a total of up to 1500 ML of potable water each year".

The Business Case included a summary of total reuse water production from the scheme via WTP1 (Stage 1) in Table 2 of Section 3.1.1 (shown in Table 2 below), which shows production of up to 292 ML of treated water per year over a five year period. No water was produced from WTP2 due to the lack of commercial clients.

Table 2 Total Reuse Water Production via WTP1

Financial year	Water Quantity (ML)
2013–14	191.10
2014–15	171.44
2015–16	292.46
2016–17	281.04
2017–18	233.23
Total	1,169.25

The Funding Agreement (Section A2.5) included a requirement for the recipient to use the completed Capital Works to achieve the project's objectives for 10 years after the expiry of the project period, i.e. from 30 June 2016 to 30 June 2026. Based on a maximum production of water reuse of 1,500 ML per year the facility could have produced a total of up to 15,000 ML (or 15 gegalitres (GL)) over the agreed operating period of 10 years. This represents a maximum upper limit.

In reality, the scheme produced just 1,169.25 ML of reuse water between 2013–14 and 2017–18, all from Stage 1. The amount of water produced following the expiry of the project period (June 2016), was 514.27 ML, which represents 3.4 per cent of the maximum water that could have been produced over the 10 year period.

The Business Case also notes that one of the key issues with the project delivery was the inadequate (or non-existent) business modelling and planning leading to an absence of commercial clients. . The ultimate outcome of the problems with the Treatment and Reuse Component was that Council was only able to secure one commercial client for the water from the Reuse Component, and this was limited to only one section of their site.

The Business Case also states that the market price for potable water in Tasmania is the lowest in Australia at around \$1.00 per kilolitre. Given this, Council was unable to increase the sale price of treated water to cover its cost of production to a point at which the Treatment and Reuse Component would be profitable.

Furthermore, the one commercial client (Nyrstar) that the scheme was able to supply had its own water treatment facilities which were capable of supplying water to the required standard, which was constructed after Council built WTP1.

Meeting project objective (b): Reduce pollutants

The extent to which this objective was met is outlined in Section 3.1 and Section 3.1.2 of the Business Case.

The Executive Summary of the Business Case suggests the scheme has achieved the objective of reducing pollutants flowing to the Derwent River by improving stormwater quality, although Section 3.1.2 does not provide information on the reduced pollutants flowing to the river from the final scheme with the Treatment and Reuse Component decommissioned. The Business Case states that to ensure that the water quality objective continues to be met, it is proposed that a GPT be installed at an existing junction pit on the Brooker Highway, known as Pit C3. . The Business Case also states that the reduction of pollutants and improvement of stormwater quality is an ongoing objective for Council, and that Council is committed to conducting ongoing water quality monitoring, and working with local businesses with the objective of minimising pollutants into the urban drainage system.

In the Executive Summary of the Business Case, Council makes the proposition: *"...That any funds realised from the sale of the decommissioned assets of the Reuse Component are made available to Council to continue to achieve the project's objectives of mitigating flooding impacts and improving stormwater quality through reducing pollutants and conducting ongoing water monitoring."*

Assessment of response

Meeting Objective (a): Reduce Potable Water Use

This objective has only partially been achieved, with the Reuse Component from Stage 1 (WTP1) producing between 171.44 ML and 292.46 ML of treated stormwater over the five year period 2013/14 to 2017/18 (Table 2 in the Business Case). . This compares to the Stage 1 objective of supplying up to 476 ML of treated stormwater per year. . The Business Case states that this water was supplied to Nyrstar, and it is not clear whether treated water was ever supplied to the Moonah Primary School (for toilet flushing and irrigation) as per the original intent for Stage 1.

The Business Case states that none of the additional treated stormwater from Stage 2 of the project was ever supplied to commercial customers, with a protracted negotiation process with Nyrstar to supply potable water from WTP2 ultimately failing to secure a supply agreement. . This compares to the Stage 2 objective of supplying up to 1,000 ML per year (stated in the Business Case).

The wording in the final Funding Agreement for Stage 2 was that *"Subject to the completion of its Stage Two activities and the rainfall conditions, the project may have the potential to offset an additional 476 megalitres of potable water per year by supplying treated stormwater and groundwater to the additional users as described above."* The 'additional users' specified in the Funding Agreement include *"...concrete plants; council recreational fields; Agricultural showgrounds; and other industrial sites located near or adjacent to the rising mains"*.

The absence of commercial clients for the scheme was a key risk for the project viability in achieving its objective of offsetting potable water use, which is indicative of the inadequate business modelling and planning undertaken for the scheme. . A key factor in this was the cost of producing fit for purpose water, which ended up being significantly higher than the market price for potable water in Tasmania. . Given the low price of potable water in Tasmania (around \$1 per kilolitre), it is difficult to envisage any project involving advanced water treatment processes being cost-competitive. . This should have been identified as a high risk during the project assessment and planning stage.

Also, the development of a similar water reuse scheme for the scheme's main customer (Nyrstar), which enabled Nyrstar to treat its own water to its desired quality, may have further affected the viability of the scheme, particularly its expanded scope.

Meeting Objective (b): Reduce pollutants

It is understood from the Business Case, and subsequent advice from Council, that Council is proposing to decommission the Treatment and Reuse Component of the Derwent Park Stormwater Harvesting and Reuse Scheme. . The Treatment and Reuse Components of the scheme are illustrated in Figure 1 below (from Section 2.4 of the Business Case).

Given the lack of primary stormwater treatment (such as GPTs, sediment ponds or swales) or secondary stormwater treatment (such as wetlands or bioretention system), the remaining elements provide limited, if any, reduction in pollutant loads. It is for this reason that the Council's Business Case proposes the installation of a GPT in Pit C3 to remove gross pollutants from the stormwater, noting that this has not yet occurred.

A high-level assessment was undertaken of the proposed GPT installation described in Section 3.1.2 of the Business Case, noting that we did not have access to specific site details such as the existing pit and pipe dimensions and configuration, flow capacity, or potential pollutant loads.

We are not sure whether the proposed Ecosol trash rack shown in the Business Case is the most appropriate GPT for the application, with other products available that are more suited to retrofitting in stormwater pits. Notwithstanding this, the approximate capital cost of retrofitting a GPT to Pit C3 is likely to be of the order of \$100,000 to \$200,000, noting that the GPT will have substantial ongoing operation and maintenance costs that will need to be funded by Council.

In the absence of detailed water quality information or treatment modelling results, it is difficult to quantify the extent to which the remaining stormwater scheme components (i.e. considering the decommissioning of the advanced treatment system) will reduce pollutant loads in flows to the Derwent River. We have therefore made a conceptual assessment of the stormwater scheme following decommissioning of the Treatment and Reuse Component.

Without the proposed GPT, it is not clear how there could be any reduction in pollutant loads entering the Derwent River. . As such, it is critical that Council be required to retrofit a GPT in Pit C3 (as a minimum) to capture gross pollutants during higher frequency flood events. . It is noted that the efficiency of the GPT in removing gross pollutants relies on a regular maintenance program of cleaning.

Without additional primary stormwater treatment (such as sediment ponds or swales) or secondary stormwater treatment (such as wetlands or bioretention system), it is not clear how the stormwater scheme would have the ability to remove nutrients such as nitrogen and phosphorous or total suspended solids (TSS) from the stormwater flow. . The lack of an oil separator will also mean that there will be no reduction in stormwater contaminants such as hydrocarbons.

The Council has indicated in its Business Case that:

- the reduction of pollutants and improvement of stormwater quality is an ongoing objective for Council
- it is committed to the continual monitoring of water quality within the urban catchment and working with local industrial businesses with the objective of minimising pollutants discharged into the urban drainage system.

However, we regard this as standard practice, and therefore represents business as usual.

The Council has requested that funds realised from the sale of the decommissioned assets of the Treatment and Reuse Component be made available to Council to continue to achieve the project's objectives of mitigating flooding impacts and improving stormwater quality through reducing pollutants and conducting ongoing water monitoring. Our assessment is that Council's proposed approach appears to be based around funding staff. As this is primarily operations expenditure, it may not be considered an appropriate use of Australian Government funding.

It should be further noted that a significant proportion of the infrastructure will be unrecoverable as it is in-ground reticulation. Additionally, we did not have access to information from the independent valuation of the assets. It may be the case that the opportunity to recover funds through asset sales is extremely limited. It should be further noted that the limited market for such assets in Tasmania and freight costs to the mainland will further impact on the ability of the Council to realise the value of saleable assets.

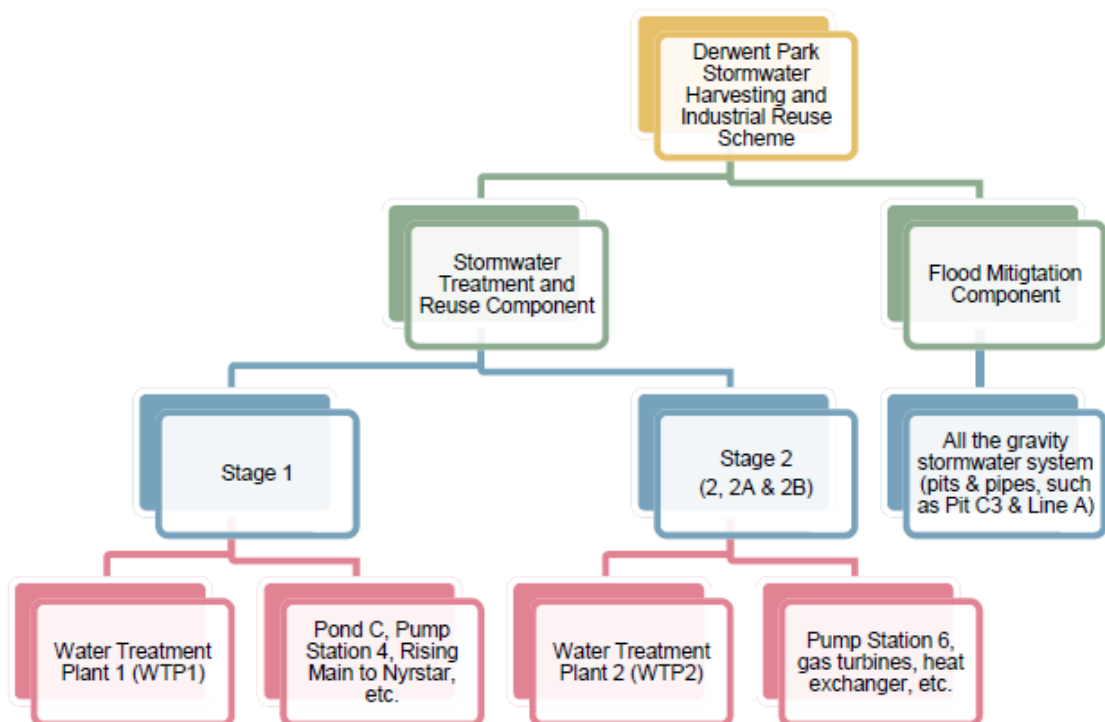


Figure 1 The Treatment and Reuse Components of the Scheme (from Section 2.4 of the Business Case)

Impacts of project scope change on meeting project objectives

Section 3.2 of the Business Case states that one of the main reasons that the project failed was the continual change in project scope, with the project evolving from a conventional

stormwater retention and reuse project to a more complex project involving an Aquifer Storage and Recharge (ASR) system and complex treatment systems.

It is noted that this project has evolved considerably from the proposed scheme that was originally assessed by GHD for the Department (GHD, 2010). That scheme involved filtering stormwater using a GPT and storing it in a new 22 ML underground storage under the school oval, before reusing it within the school for toilet flushing and irrigation, and pumping it to a new treatment plant for supply to the (Nyrstar) zinc smelter. . Overflows from the underground storage would be discharged to the existing stormwater system and GPT prior to discharging to Prince of Wales Bay. This appears to correspond with Stage 1 of the project, with the objective of supplying up to 476 ML of treated stormwater per year. . Importantly, the configuration of the final Stage 1 scheme appears to be quite different to the original proposal with:

- the removal of the GPT for primary stormwater treatment
- the replacement of the underground 22 ML storage with the 3.5 ML Retention Storage Pond C and the 1,950 mm diameter gravity main installed along an abandoned railway corridor located between Gormanston Rd and Central Ave (Line A)
- tertiary treatment of the stormwater at WTP1 to supply Nyrstar, as per the original proposal.

It is not clear how overflows from the final scheme are returned to the existing stormwater system or if there is an existing GPT, noting that Council has proposed a new GPT at Pit C3 to treat stormwater.

We consider that the increased complexity of the project as the scope evolved contributed significantly to the project risk, such that the final scheme was beyond the capability of Council to manage and operate. . It is not clear from the Business Case who set the direction for the changes in project scope, but the second stage of the scheme appears to have been far less successful than the first stage. It is possible that Stage 1 of the scheme would have been successful in offsetting potable demand and reducing pollutants flowing to the Derwent River.

Comments on project objectives under the Funding Agreement

While the Business Case states that *“The decision to cease the operation of the Reuse Component has not, and will not, compromise the effectiveness and success of the flood mitigation function of the scheme”*, it is important to note that flood mitigation was never an objective of the Funding Agreement. .

Comments on clause 3.8 Disposal of capital works

The Business Case did not directly address the specifics of clause 3.8 of the Funding Agreement, which relates to the termination of the agreement, and the conditions whereby the Department may recover part of the funding:

3.8 Disposal of capital works

3.8.1. Subject to clause 3.8.2, if, during the Term of this Agreement, including the period specified in Schedule 1 Item A.2.5, the Recipient:

- a. Disposes of Real Property, including the Capital Works (during or after completion); or***
 - b. ceases to use the completed Capital Works for the project's objectives,***
- the Recipient must:***
- c. notify the Department at least 30 days prior to either of these events occurring; and***

d. within 30 days of receiving a notice from the Department to make a payment under this clause 3.8.1, pay the Department the amount specified in that notice.

3.8.2. However, The Department may not require the Recipient to make a payment under clause 3.8.1 that is greater than the amount of Funds provided to the Recipient by the Department under this Agreement for the acquisition of the relevant Real Property or the construction and completion of the relevant Capital Works.

GHD understands that Council met its obligation under 3.8.1c to notify the Department at least 30 days prior to ceasing to use the re-use component on 30 June 2018.

We also note that clause 3.8.2 does not provide any additional conditions or guidance to the Department on quantum of funds it requires Recipients to repay, other than the amount not exceeding the original grant.

Time which Recipient used Capital Works for the project's objectives post expiry of the project period

Clause A.2.5 of Schedule 1 of the Funding Agreement specified that the Recipient is required to use the completed Capital Works to achieve the project's objectives for 10 years after the expiry of the project period. . Under Clause A.2.1 of Schedule 1 of the final Funding Agreement, the project period commenced on the Date of this Agreement and ended on 30 April 2016.

The Business Case states that the Treatment and Reuse Component of the scheme ceased operation from 30 June 2018, meaning that treated water was produced for a period of 26 months after the expiry of the project period. This represents 21.67 per cent of the required 10 years period.

Table 3 below presents a timeline of relevant events from the beginning of the operating phase to the final decision to cease operating the re-use component.

Table 3 Timeline

Date	Activity
30 April 2016	Scheme commenced operating phase (expiry of the project period)
January 2017	Internal review of scheme operations commenced by Council engineering team, based on data collected during the first six months of operation.
February 2017	Tasmanian Government suspends Glenorchy City Council for six months and appoints a Commissioner.
July 2017	Permeate Partners was appointed to undertake an independent review and evaluation of the performance of the scheme to determine its long-term viability. Review based on data collected during the first 12 months of operation.
mid-2017	Independent consultant engaged to review the power usage of the Reuse Component. Advice indicates there were only negligible opportunities to save money by lowering electricity usage.
August 2017	Tasmanian Government extends suspension of Glenorchy City Council for a further six months
November 2017	Permeate Partners report completed
Data unknown	Based on advice from the Permeate Partners report, Council attempt to negotiate a higher water sale price with Nyrstar. However negotiations are unsuccessful.

January 2018	A new Council is elected and briefed on the difficult financial situation of the administration. Faced with the prospect of running out of cash during the 2019–20 financial year, Council increase rates by 12.5 per cent
May 2018	A further report on the scheme notes that the reuse component is continuing to run at a loss, and the upcoming need for a significant capital investment to replace a water treatment membrane. .
30 June 2018	In response to a Council resolution, the re-use component of the scheme ceases operation.

2.3 Key design assumptions vs actual operating environment

Summary of response in Business Case

Section 4 of the Business Case provides a comparison of key assumptions made during the scoping, design and construction of the scheme, with the actual conditions observed. The comparison is summarised in Table 3 of the Business Case. . This is reproduced in Table 4 below.

Table 4 Project assumptions vs actual operating conditions

Assumption	Actual
ASRs would be constructed to perform their functions as designed and to provide raw water storage.	ASRs were not constructed and installed to meet the expectation.
ASRs would be operated and maintained at a relatively low cost, with minimum monitoring requirement.	Monitoring and maintenance costs were higher than expected due to inadequate design and construction, and the water sampling requirements imposed by the Tasmanian Environmental Protection Agency Tasmania (EPA).
ASR design assumed that no tertiary treatment, particularly the Reverse Osmosis (RO) treatment, would be required for treating stormwater before 'recharging' the aquifer, and therefore the operating and maintenance costs for the storage and reuse system would be low.	Tertiary treatment was required to reach the water quality required for recharging, which significantly increases the operating cost.
The turbidity of the bore water from ASRs would be reduced gradually.	No turbidity reduction was observed, meaning there was no cost reduction in treating bore water.
Sufficient stormwater would be captured via various storage facilities (e.g. Pond C, Tank A and F, etc.) built as part of the scheme to ensure WTP1 can reach its maximum production (1.5ML/day).	Defective infrastructure (e.g. leaking) limited the amount of stormwater that could be temporarily stored which reduced the amount of treated water that could be produced.
Proper infrastructure, such as rising mains, would be built to convey the raw water from its sources to the WTP and then supply to the client(s).	Defective infrastructure limits the capacity of raw water supply, increased downtime of the WTP and reduced the efficiency of the Reuse Component.

Assumption	Actual
By having the second raw water intake from Humphreys Rivulet, sufficient water would be collected to ensure a maximum of 1,500 ML per annum of water could be extracted from the various source and supplied to the customer(s).	Both the quantity and quality of the raw water extracted from Humphreys Rivulet were lower than expected, which limited the amount of treated water that could be produced.
By having a group of gas-powered generators (gas-turbines) and associated infrastructure (transformers and heat exchangers), the Reuse Component would benefit from a cheaper power supply from the turbines. Water treatment efficiency would also be improved by harvesting the heat from the turbines to increase raw water permeability through the heat exchangers.	The inclusion of gas turbines was to meet the requirement of offsetting the carbon impact of the scheme's operation. However, council made this decision despite gas turbines being more expensive to operate and maintain than taking electricity from the power grid, even allowing for purchase of 100 per cent carbon offset electricity. The insignificant amount of benefit (e.g. less Reverse Osmosis (RO) power consumption) received from increased water permeability is not enough to cover the extra cost of operating these turbines. Such alternative power supply increased the operating cost (higher electricity cost) while added a large amount to the annual depreciation of the scheme.
By having the RO system designed and supplied by the same WPT manufacturer (GE Water), WTP2 would provide treated water meeting 'drinking water quality' by using a specific model of RO membrane through the project design life (10 years).	The WPT manufacturer (GE Water) discontinued the production of the RO membrane product, which was a critical component of WTP2 that was required to treat water to drinking water standard. The discontinuation of the RO membrane ultimately prevented Council from entering into a long-term water supply agreement with the Nyrstar.
WTPs would be operated as designed and be constructed to meet relevant standards/engineering specifications.	Due to poor design and construction, more frequent minor asset repairs and replacements were required than expected. These added additional maintenance cost and downtime. All these impacts limited the water production.
Chemical costs were calculated in the design stage and included in the total operating cost forecast model.	Higher chemical consumption and chemical cost than were forecast were encountered after the scheme was commissioned.
Scheme operation and maintenance costs were calculated in the design stage and included in the total operating cost forecast model.	Higher operation and maintenance costs than had been forecasted were encountered after the scheme was commissioned.
Electricity cost was calculated in the design stage and included in the total operating cost forecast model.	Higher electricity consumption (kW/kL) and costs than had been forecast were encountered after the scheme was commissioned.
Raw water quality from the Derwent Park/Springfield catchment would be of appropriate quality for treatment.	Various contaminants (e.g. oils and cement dust) were observed from the stormwater collected within the catchment. These had the potential to damage the components of the WTPs. This risk was increased significantly due to the failure to install a water

Assumption	Actual
	quality monitoring system (WQMS) at the raw water intake (PS4).
Site maintenance cost was calculated in the design stage and included in the total operating cost forecast.	The original site maintenance cost was underestimated and did not include the cost of maintaining satellites sites.
The Reuse Component would supply treated stormwater to multiple clients in addition to Nyrstar.	Only one client (Nyrstar) purchased treated water from the scheme.
Selling Price would be [REDACTED] [REDACTED] [REDACTED]	Due to the relatively low market price for potable water (around \$1.00/kL in 2017/18) from TasWater and the limited pool of end consumers, Council was unable to increase the sale price to make the Reuse Component break even.

Assessment of response

It was difficult to verify some of the assumed operating conditions listed above from the funding application and other documents reviewed. Some of these assumptions may have been included in design documents not sighted as part of this review. However, overall we believe the completion of an initial Business Case, including a rigorous analysis of key assumptions including operating costs, water sales and prices, as well as a Benefit Cost Analysis for the project would have helped both the Department and Council better understand the risks associated with the project.

2.4 Rationale for decommissioning

Summary of response in Business Case

Part 2B (Section 5) of the Business Case presents the rationale for decommissioning, giving an account of the change in operating conditions—in terms of what has changed and the reasons for that change:

- Section 5.1 details ASR System Dysfunction
- Section 5.2 details Lack of Temporary Water Storage, including problems with Pond C, storage tanks at the WTP, and Line A
- Section 5.3 details Defective Infrastructure Works Limiting Water Supply from the Catchment, with design and construction defects attributable to the Contractor, LVC
- Section 5.4 details the limited water supply from Humphreys Rivulet, in part due to licencing constraints
- Section 5.5 provides a summary of the water supply issues resulting from factors identified in Sections 5.2, 5.3 and 5.4
- Section 5.6 details issues with poor raw water quality at Humphreys Rivulet and at Pond C
- Section 5.7 details Unreliable and Unnecessary Alternative Power Supply
- Section 5.8 details operation constraints associated with treatment system operation and maintenance.

Assessment of response

The rationale for decommissioning is well documented in the Business Case and appears to be justified given the broad range of issues facing the scheme.

ASR System Dysfunction

The Business Case identified a number of key issues with the ASR system:

- high ASR monitoring expense
 - The Environmental Protection Notice (EPN) required expensive quarterly groundwater sampling.
 - An annual report was also required.
- ASR injection
 - Threshold quality limits were set in the EPN for the injection water by the EPA.
 - The original sand filtration basins thought suitable to meet the EPN were found not to be at commissioning, and subsequently Ultra Filtration (UF) and RO was required. This had significant cost implications and reduced the volume of recharge water.
 - Defective filtration media could not maintain the turbidity and therefore raw water had to be processed through the WTP before injection in the ASR bores. .
 - Additional treatment resulted in production cost of water increasing 200 per cent.
- ASR controllers failure
 - Injection system Programmable Logic Controllers (PLCs) failed. . They were found not to be suitable for commercial use and had a lifespan shorter than 12 months.
 - This caused a flooding risk and suspension of all ASR injection.
 - Additional costs to replace.
- ASR pump damage
 - Extraction pumps recorded a reduction in yield although high groundwater levels remained high a few months into the operation.
 - Shredded plastic was found in one bore, thought to be introduced during the bore installation process or the injection trial. .
 - The council was unsure of similar issues in the other bores, and therefore the ASR maintenance program was consequently increase form every two years to yearly (ie. a further operational cost increase).
- high ASR pump Maintenance costs
 - Retrieving bore pumps for maintenance was more expensive than expected, due to the size of the crane and requirement for a spotter, and removal of the logger conduit.
- incorrect ASR pump size
 - Extraction pumps were oversized, therefore they cycled on and off too often.
 - This increased maintenance costs and pump wear and tear.
- no turbidity reduction but lower water availability in ASR's.
 - Water extracted from the bores had a high turbidity – this did not clear up over time (24 months).
 - Additional treatment therefore required and subsequently a lower than expected recovery rate and higher production costs.

- reduced water feed from ASR's
 - ASR ceased for two years due to the operational issues outlined above. Therefore groundwater availability reduced and subsequently a reduction of treated water production.

Many of these operational issues are typical for ASR schemes. . A key consideration is therefore identifying key risks and subsequently allowing suitable contingency to allow the scheme to be developed in a stage approach. . A staged approach for ASR scheme development is common, due to many uncertainties commonly associated with these schemes.

For an ASR scheme such as this, it would be expected that a structured development program be used, and it would be expected that it would be staged consistent with the Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) Managed Aquifer Recharge (NRMMC, July 2009).

It is recognised that there are many factors that will impact the successful implementation of an ASR scheme (ie, environmental, hydrogeological, health, regulatory and political), and in some cases the risks of certain factors can only be estimated prior to full scale development. For this reason, many ASR schemes are often developed slowly with extensive trialling and a staged development, as risks are addressed and resolved, and the economic and technical viability of the scheme becomes more certain.

Within this context, the Australian Guidelines for Water Recycling proposes a four-stage process to develop Managed Aquifer Recharge (MAR) projects (including ASR), which includes a number of risk assessments. These risk assessment are primarily designed to ensure protection of human health and the environment. However, the risk assessment also includes the consideration of all issues commonly encountered in ASR schemes, such as the local hydrogeology and aquifer suitability for ASR, clogging, biofouling and precipitation, bore construction, treatment requirements, etc). . The risk stages (ie. Entry Level Risk Assessment and Maximal Risk Assessments) allow key project risks to be identified, and where necessary further investigated as the project develops, to therefore to inform investment decisions (i.e. business cases) and communicate with regulators.

Even if the Australian Guidelines for Water Recycling, or an equivalent process, had been followed during the planning of the ASR scheme, then the key issues identified above would most likely not have been possible to completely mitigate at the planning stage. . As is the nature of ASR schemes, some issues and factors can only be identified and further assessed during the development and trialling of the scheme.

Some issues may have been better resolved or investigated at the planning or design phase, however this is difficult to assess without a detailed review of the risk assessments completed as part of the design phase of the project, or knowledge of any project timing constraints. .

A number of detailed observations are outlined below from our review.

High ASR Monitoring Expense.

It would have been reasonable to include an allowance for some level of groundwater quality monitoring at and around the scheme. . Confirmation with the regulatory authorities on the scope and frequency is not always possible in the required timeframes, and assumptions may have needed to be made depending on the time frames to investigate and implement the scheme.

ASR Injection

Source water quality is a key risk for most ASRs and it is assumed a reasonable level of assessment was completed on the quality of the source water. . In this case, the issues appear to be more around the failure of the treatment system and design (i.e. the sand filtration basins).

ASR Pump Damage due to shredded plastic

This type of issue, although difficult to predict, could be potentially avoided by additional quality control during the construction and trialling phase. The bores should be developed properly following construction and signed off as part of the bore construction contract. In addition, it is often prudent to include a downhole camera bore inspection, as part of the practical completion process, to ensure the bore construction is as specified and the bore is suitably developed prior to commencement of ASR activities.

If the plastic was associated with the injection trial, specifications that the pipework is flushed or cleaned following construction may limit this risk and it is considered reasonable that some filtration system should have been used during the injection trials.

Incorrect ASR pump size

As part of the pump sizing process, it is assumed that some production bore pumping tests were completed to assess the sustainable bore yield and relative drawdown. Due to the common variability in aquifer parameters over relatively small areas, it is often prudent to complete some flow testing following each bore construction and then tailor the pump for the individual production bore. This testing may be as simple as yield and level monitoring during the final bore development or a rapid step test with a test pump. This additional work has cost implications; however it avoids the over or under sizing pumps, and the operation cost implications associated with this over the project life. An individual bore testing approach could have been considered for this project, depending on project timing and procurement processes (i.e. there needs to be more flexibility in the bore construction and equipment specifications) to minimise the over-sizing of the submersible pumps.

No turbidity reduction but lower Water Availability in ASR's

This is potentially a production bore construction issue. The bore screens and associated gravel pack may need to be individually designed based on the grading of the sediments intersected during drilling of each bore. In addition, the bore development phase during construction should be undertaken until clear and clean water is produced from the bore under the minimum bore construction requirements. If the bore does not clear up during the development phase, it is an indication of potential issues with bore construction or design.

Lack of Temporary Water Storage

The Business Case identified three main components of temporary water storage, and the key issues with each of them:

- Pond C:
 - Designed as part of Stage 1 to store stormwater collected from the catchment, filter the water through the sand filtration media, and then either pump to WTP1 or reinject back to the ASR system.
 - Major construction defects caused by LandVision Civil Pty Ltd (LVC), the Contractor engaged to design and construct the works, led to significant leakage of water into the surrounding soil, thereby reducing the expected raw water supply.

- To rectify the issue, the entire liner of Pond C having to be replaced, noting that there were still substantial leaks from Pond C following the liner replacement.
- Storage Tanks at WTP:
 - Designed as part of Stage 2, Tank A (with 8 ML capacity) and Tank F (with 5 ML capacity), were designed to provide temporary raw water storage extracted from either the ASR system, Pond C (PS4) or Humphreys Rivulet (PS6).
 - Due to limited amount of raw water available from the stormwater catchment and Humphreys Rivulet, 13 ML tank capacity was rarely utilised.
- Reticulation Retention – Line A:
 - A 1,950mm diameter gravity main delivered as part of Stage 1, Line A was designed to temporarily hold stormwater collected from the catchment.
 - Problems with installation method with the pipes resulted in leakage at the pipe joints when sufficient water was present within the pipes.

The common theme in the above works appears to be failures at the construction stage, and ensuring that works were constructed to design specifications. It is assumed that a project of this size and complexity would have had a construction quality management plan completed which included an Inspection and Testing Plan (ITP) for specific technical criteria, such as compaction. An ITP may have identified specific issues with works (particularly for Pond C) before construction was completed.

Defective Infrastructure Works Limiting Water Supply from the Catchment

The Business Case identified defects with the following infrastructure works, which appear to have been largely attributable to LandVision Civil Pty Ltd (LVC), the Contractor engaged to design and construct the works:

- undersized Syphon Line between Pond C and Line A
- rising main to Nyrrstar
- rising main 4.

The Business Case states that LVC's performance of works under its contracts with Council was of a poor standard, with numerous serious design and construction defects and failures which contributed significantly to the additional construction expenses and unforeseen operating costs of the scheme. LVC subsequently entered into administration and liquidated at a creditor's meeting. The winding up of LVC meant that its defective works could not be rectified in accordance with its contractual obligations.

The defects in LVC's works are clearly one of the key contributing factors to the failure of the scheme. As part of this review, Council was asked what probity checks it made on LandVision Civil before awarding the contract. Council provided the following response:

"Before awarding the contract, Council engaged an independent chartered accountant to produce a financial viability report. The report was to check the financial health and stability of the business (LVC). The report found that LVC posed some viability risks and recommended a number of risk mitigation strategies, including requesting personal financial and performance guarantee from the directors of the company, minimising advance payments, audit and regular financial monitoring etc. As a result, LVC was requested to provide Council with an additional 5% bank guarantee, before starting the work".

This indicates that Council undertook the appropriate due diligence before awarding the contracts to LVC, but that the risk mitigation approach appears to have failed, possibly as a result of other projects that LVC was delivering for other clients.

Limited Water Supply from Humphreys Rivulet

The Business Case states that after the lack of raw water from the stormwater catchment and ASR system was identified, an additional raw water extraction point was constructed at Humphreys Rivulet as part of Stage 2. This included obtaining a water licence that set limits on diverting water from the rivulet, including during dry periods. It is not clear from the Business Case whether the limited water supply from Humphreys Rivulet was due to lower than expected flows in the rivulet, or constraints set by the extraction licence.

It is also not clear from the Business Case whether any water resource assessment was undertaken as part of the project planning of potential yield from Humphreys Rivulet. Such an assessment could potentially have indicated the incidence of lower flows in the rivulet at times when supplementary supply was required.

It is noted that one of the other key constraints in the use of the supply was the quality of the water, with the high turbidity of the flow at times making it unsuitable for treatment (discussed further below).

Poor Raw Water Quality

A 20 meters long by 5 meters wide sand filtration basin was constructed at the PS6 raw water intake from Humphreys Rivulet to provide filtration of the raw water prior to pumping to Tanks A and F. A similar sand filtration basin was also constructed at the PS4 raw water intake at Pond C. The Business Case notes that due to either insufficient design or the clogging from fine sediments carried by the raw water (or both), the permeability of the sand filtration systems did not function as expected (i.e. the sand was not filtering the water to the required quality and its permeability dropped dramatically after commissioning).

It is noted that this is a typical problem with the construction of sand filters, which is usually addressed through some of primary or secondary treatment (i.e. GPT, sediment ponds, swale etc.). The removal of sediments from the source water is dependent on a well-designed pre-treatment train with appropriate hydraulic efficiency and length (i.e. by using baffles and/or inlet/outlet locations to prevent short-circuiting) to maximise sediment drop out.

Another issue appears to have been that the raw stormwater entering Pond C (and from there PS4) contained industrial contaminants such as paint, oil and cement, which had the potential to cause permanent damage to the WTP's UF and RO membranes. It is noted that no oil separator was included in the scheme design, which could have provided some level of protection to the WTP membranes. It is not clear why this was omitted, given the reasonably good appreciation of the types of industry located in the stormwater catchment.

The Business Case also notes that a Water Quality Monitoring Station (WQMS) that was originally located at PS4 was moved to PS6, to address the turbidity concerns at the Humphreys Rivulet extraction point. The WQMS monitors a range of water quality parameters, including hydrocarbons and turbidity, and was intended to shut down PS4 in the event of stormwater contamination by hydrocarbons. It is not clear why the WQMS was removed from PS4, given the critical role it played in protecting the WTP membranes from contaminated stormwater collected in Pond C. While increasing the scheme cost, the preferred solution would have been to retain the WQMS at PS4 to shut down pumping in the event of hydrocarbon contamination, and install an additional WQMS at PS6 to shut down pumping in the event of high turbidity events.

Unreliable and Unnecessary Alternative Power Supply

In order to meet the NUWDP objective of not increasing greenhouse gas emissions, the scheme included an alternative power supply comprising gas-powered turbines at the WTP. Following commissioning it was found that the WTP power consumption was lower than

anticipated, resulting in the gas turbine generation capacity being over-sized. The cost of producing power using the gas turbines was also found to be much higher than the design estimate, with an actual cost of [REDACTED]. This compares to between \$0.23 and \$0.26 per kilolitre using power from the grid. An additional unexpected cost associated with the alternative power supply was the annual maintenance budget of up to \$10,000, which included changing the filters and bearings.

It is noted that the scheme is located in Tasmania, which sources over 90 per cent of its power from hydroelectric power stations, with the remainder from gas or wind farms. A small component of the annual power demand is also sourced from the Basslink interconnector that connects the Tasmanian power system to the Victorian power system. In 2016–17, around 89 per cent of the State’s power was sourced from hydroelectricity or wind power, eight per cent from gas generation, with the remaining four per cent imported from Victoria via Basslink (OTTER, 2018). Given the very low greenhouse gas emissions from the Tasmanian power supply, it is not clear why the decision was made to implement an alternative power supply.

Operation Constraints

The following operating constraints associated with the Treatment and Reuse Component of the scheme were encountered during the operating phase of the scheme, which limited its ability to be operated efficiently and effectively:

- WTP2 RO membrane discontinued
- instrument failures
- higher chemical consumption cost than expected
- higher WTP operation cost
- higher power usage than expected
- no water quality monitoring at Pond C
- high site maintenance costs
- total operating and maintenance cost.

It is noted that some of the above issues are typical of any advanced water treatment process as part of the commissioning and optimisation process, and are not unique to this project. Generally, it is appropriate to assume conservatively high operation and maintenance costs at the planning and design stage to allow for any unexpected costs that may arise during commissioning. During the commissioning period, specific processes can be optimised, with the example for this scheme being the high dosing rate of Sodium Metabisulphite (SMBS) for the WTP being reduced by around half.

2.5 Rationale for depreciation

Summary of response in Business Case

Section 11 of the Business Case outlines the rationale for depreciation, while Appendix IV provides the asset register, including asset replacement value, written-down value (as of 30 June 2017), annual depreciation, and asset life.

For all fixed assets Council applied a straight-line depreciation method, and estimated useful life.

Assessment of response

The Tasmanian Auditor General Office has undertaken annual audits of the annual depreciation of all Council assets, including those associated with this scheme. GHD is not aware of any issues raised through these audits.

The asset register (appendix IV of the Business Case) shows that the scheme was broken down into 194 different asset types, with each being applied a corresponding replacement value, useful life and written down value. This represents a comprehensive calculation of depreciation.

The application of a straight-line depreciation method and Council's Standard Asset Types and Useful Life schedule is appropriate and consistent with local government accounting practices.

2.6 Terms for the disposal of assets

The Department asked GHD to review the terms of any intended disposal arrangement, and for instance, whether the Recipient intends to:

- dispose the Capital Works to another party who will agree to use the Capital Works for the project's objectives for a period, including to 30 April 2026
- continue operating the Capital Works for the project's objectives, notwithstanding any Disposal to another party.

Summary of response in Business Case

Council's resolution to cease the operation of the Reuse Component also included the following resolutions in respect to the assets which remain in the scheme:

- Council approved the preservation of non-critical assets of the Derwent Park Stormwater Harvesting and Reuse Scheme, including Stage 2 UF membranes, gas turbines and heat exchanger
- Council approved the engagement of an independent valuer to estimate the market value and residual value of the scheme and to review the current asset depreciation of the scheme.

Assessment of response

It is unclear from the Business Case exactly which assets will be sold and which will be retained, and the potential market value for these assets. This information will presumably be available once the report from the independent valuer is received.

It is possible that some items could be sold while continuing to be used for similar purposes outlined in the project's objectives. For example, if certain water treatment modules can be sold as discrete units. However in this case, it is unlikely that any purchaser would agree (without any incentive) to use the infrastructure for the project's objectives for a period, including to 30 April 2026. Any purchaser seeking to use the assets for a similar purpose would need to first be sure that the issues which impacted the scheme's viability could be overcome in a new setting (e.g. as part of different water treatment train).

As discussed in section 2.2, the Council intends to modify and continue to use the remaining assets for achieving the project objective relating to pollutant reduction. However, without retaining the Reuse Component of the scheme, the project Objective relating to the supply of potable water cannot be met.

2.7 Loss to the Australian Government

The Department asked GHD to consider possible losses to the department / Australian Government as a result of any cessation/disposal of assets.

Summary of response in Business Case

The proposal presented by Council in the Business Case is that:

- the Department does not enforce the requirement in the Funding Agreement that Council repays the grant funds to the Australian Government as a result of it ceasing to operate the Reuse Component, and
- any funds realised from the sale of the decommissioned assets of the Reuse Component are made available to Council to continue to achieve the project's objectives of mitigating flooding impacts and improving stormwater quality through reducing pollutants and conducting ongoing water monitoring.

Assessment of response

Under the above proposal the Department will not recoup any funds from its \$9.2 million investment, which can be viewed as a financial loss in the sense that the project objectives will not be fully met.

2.8 Value for money from investment

The Department asked GHD to determine whether, notwithstanding any cessation/disposal, the department can be reasonably satisfied that the project has delivered any value for money objectives.

GHD note that the Funding Agreement mentions 'value for money' in the following clauses:

- Clause 2.1.1: The Recipient must carry out the project: diligently, effectively and to a high standard, consistent with achieving best value for money.
- Clause A.2.7: In performing the project, the Recipient is required to complete the following project management activities: b. ensure that each procurement process that the Recipient undertakes in relation to the project is undertaken in a manner that procures the product/service that represents the best value for money.

Summary of response in Business Case

The scheme produced a total of 1,169.25 ML of reuse water. From a Australian Government contribution of \$9.2 million, this represents a cost of \$7,868 per ML of water produced, excluding the significant capital and operational costs incurred by Council.

Once decommissioned the scheme will potentially provide some residual benefit in the form of pollutant reduction and flood mitigation.

Assessment of response

Given the very limited extent to which the scheme achieved the project objectives, the Department's investment of \$9.2 million has not delivered value for money.

It is worth noting that when the project was assessed for Australian Government funding (GHD 2010), under Merit Criteria #2 (Cost-effectiveness of the project), it was noted that no Net Present Value (NPV) or Benefit Cost Analysis (BCA) had been undertaken to determine the expected economic return. Furthermore the assessment noted that the capital cost estimates

provided were not accompanied by costs for operation, maintenance, administration and monitoring, nor were the funding sources for these activities identified.

2.9 Lessons learned

Both the Australian Government and funding applicants can use the lessons learned from this project's overall failure to avoid similar issues on other projects. Some areas of potential learnings include:

- improved understanding of the technical risks associated with the ASR methodology
- the need for a rigorous assessment of likely operating costs, including maintenance, monitoring, chemical use, power etc.
- the need to assess potential risks posed from the discontinuation of specialist parts and equipment
- the need for the Australian Government to potentially consider the stability of governance and financial position of funding applicants when assessing applications
- the need for funding recipients to undertake rigorous probity checks on suppliers, and to understand their potential liability in the event of suppliers collapsing
- the need for a rigorous assessment of funding sources for operating costs, including analysis of potential customers and water sale prices
- the consideration of the inter-relationship of projects funded by the Australian Government, particularly where these have the possibility of creating competitive supply issues.

We understand the Department is already implementing a number of these lessons learned in its programs. For example, under the Murray Darling Basin Water Infrastructure Program, tenderers are subject to financial viability assessments. The program also considers tenderers project management, management and administrative expertise and experience, including organisational governance structures. (Request for Tenders 2018–2778 and 2018–28582)

3 Conclusions

Overall, GHD believe that the Business Case provided by Glenorchy City Council (GCC, 2018) was comprehensive, and provided an honest and complete assessment of the various issues which impacted on the success of the scheme. On that basis, we have not identified any issues which would lead us to question the validity and robustness of information, assumptions and conclusions contained in the business case, including claims regarding financial viability/sustainability.

The project objective of offsetting potable water use has only partially been achieved. While the objective of reducing pollutants may have been met for the current scheme, it is not clear to what extent it will continue to be met following decommissioning. While flood mitigation has been provided as a key objective of the scheme, it is important to note that flood mitigation was never an objective of the Funding Agreement.

In hindsight we believe the completion of an initial Business Case, including a rigorous analysis of key assumptions including operating costs, water sales and prices, as well as a Benefit Cost Analysis for the project would have helped both the Department and Council better understand the risks associated with the project. A comparison of the “before” operating condition key assumptions and the actual operating conditions “after” project completion is therefore almost impossible given the limited evidence of adequate planning for the project.

The rationale for decommissioning is well documented in the Business Case and appears to be justified given the broad range of issues facing the scheme. We consider that the Council has demonstrated that it has considered all options for the future of the scheme, and that the Council’s decision to decommission is reasonable given the circumstances. The Council has provided evidence of engaging suitably qualified independent reviewers, primarily through Permeate Partners.

It is unclear from the Business Case exactly which assets will be sold and which will be retained, and the potential market value for these assets. We note, however, that a significant proportion of the infrastructure will be unrecoverable as it is in-ground reticulation. This information will presumably be available once the report from the independent valuer is received.

Given the very limited extent to which the scheme achieved the project objectives, the Department’s investment of \$9.2 million has delivered limited, if any, value for money. Consideration of the lessons learned from this project’s overall failure may help prevent this situation from reoccurring.

4 References

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NRMMC/ EPHC / NHMRC (2009) Australian Guidelines for Water Recycling: Managing health and Environmental Risks (Phase 2). Managed Aquifer Recharge July 2009

GHD

180 Lonsdale Street
Melbourne VIC 3000

T: 61 3 8687 8000 F: 61 3 8687 8111 E: melmail@ghd.com

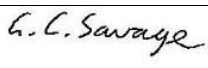
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