ANNEXURE 7

Greater Hume Council

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Dear Michael

Culcairn Water Supply (SSWP190)
Detailed Application for Business Case Co-Funding

Thank you for your invitation to submit a detailed application for business case co-funding for the above named project under the Safe & Secure Water Program.

Greater Hume Council aims to deliver water supplies that meet relevant health and industry standards and the required levels of service. Upgrade of the water supply system in Culcairn has been identified as a key priority for maintaining a safe and secure water supply to that community and budget is included in Council's Delivery Program 2017-2021 and Operational Plan 2018-19. The Culcairn water supply upgrade project aligns with strategic priorities in our region and Council is firmly committed to the project.

Please find attached our application.

We look forward to working with you on this critical project.

Sincerely

Steven Pinnuck
General Manager
GREATER HUME COUNCIL

28 March 2019

Enc
- Detailed Application – Summary

Greater Hume Council

Culcairn Wastewater Management (SSWP190) Detailed Application for Business Case Co-Funding – Summary

Total Project Estimate	Phase 2 Estimate	Phase 2 Funding Request
$3.0 M	$0.2 M	$0.15 M

Project Scope

- Upgrade of the Culcairn water supply system to ensure a safe and secure drinking water supply to the Culcairn community. The proposed works include:
  - Construction of a new 1.5 ML storage reservoir designed to minimise short-circuiting and to deliver a level of service pressure that is consistent with current community expectations and industry standards. This will increase the effective useable storage capacity for Culcairn to the minimum industry standard of 1 x peak day demand.
  - Decommissioning of the existing Black St Reservoir (1 ML total volume, 0.35 ML effective volume); which will eliminate existing safety, water quality and other risks associated with structure.
  - Optimisation of water supply system arrangements to comply with levels of service that are in line with community expectations having regard to trunk infrastructure and system pressures.

Overview

This document provides a summary of Greater Hume Council's detailed application for business case co-funding for the Culcairn water supply project (SSWP190).

This document is broken into sections based on the assessment criteria for detailed applications, i.e.:

1. Strategic Assessment
2. Economic Assessment
3. Affordability
4. Deliverability

Within section 1 we have also addressed the specific points requested by the Technical Review Panel as follows:

- Clarify how the proposed works are differentiated from routine maintenance and/or like-for-like asset renewal.
- Justify proposed solutions by demonstrating alignment with Council's strategic planning such as an Integrated Water Cycle Management Strategy or similar, including an options assessment.

Items from the generic overview of requirements for detailed applications as provided on the DoI website are addressed within the relevant sections as appropriate.

1. Strategic Assessment

Introduction

The township of Culcairn is located in the Greater Hume Council (GHC) local government area midway between Albury and Wagga Wagga on the Olympic Highway. The town is an important supply centre for nearby towns and villages including, Morven, Gerogery, Henty and Walla Walla. The town has a population of 1,473 (2016 census) and is serviced by primary and high schools and a multipurpose hospital.

Culcairn is supplied with water from two bores drawing from an aquifer approximately 80 metres below ground level, south of the water treatment plant. The water is treated by aeration and disinfection (sodium hypochlorite). The Culcairn Water Treatment Plant is owned and operated by GHC and has a 2.5 ML/d peak production capacity. The GHC Joint Integrated Water Cycle Management (IWCM) identifies the Culcairn water treatment plant as having sufficient capacity to 2038.

The Culcairn Water Supply distribution system consists of approximately 4km of trunk rising mains, 17km reticulation mains and two reservoirs, Gordon Street reservoir (378 kL elevated) and Black Street reservoir (1000 kL standpipe). The Gordon Street reservoir has point to point telemetry with the water treatment plant which controls the relift pump to transfer water to the Culcairn township. The Black Street reservoir is then filled indirectly through the town's reticulation.

The Gordon Street reservoir was constructed in 1980 and comprises an elevated steel tank with conical bottom. Its top water level (TWL) is 22.7 m above ground level at 239.86 m AHD. Its bottom water level is 7.556 m below TWL, i.e. BWL is 232.03 m AHD. Pumping to the tank starts at 70% level, i.e. 237.32 m AHD. The tank has a separate inlet and outlet at top and bottom of the tank.

The Black Street reservoir was constructed in 1932 and comprises a reinforced concrete cylinder. The internal diameter of the tower is 7.6 m and total height is 23.8 m with TWL at 239.86 AHD. It has a common inlet and outlet.

System Analysis

Network pressure is maintained by gravity according to the levels in the reservoir. Static pressure is therefore usually maintained between approximately 20 m and 22 m based on the level in the Gordon St reservoir, with a minimum level of 15 m at which time the tank is empty.

GHC's minimum Level of Service for pressure in Culcairn is to maintain a minimum 12 m head when conveying 0.15 L/s/tenement. Achieving this level of service is likely to be marginal at bottom water level (15 m static head) in the Gordon St reservoir after peak demand network losses. It is noted GHC receives water pressure complaints during peak demand periods.

Taking low level in the Gordon St tank as the system level required for achieving the minimum Level of Service, it is evident that the majority of tank volume in the standpipe at Black St is dead storage. This limits the effective volume that can be delivered in the event of upstream headworks, WTP or trunk main failure. This is summarised below:

	Base of tank RL	Minimum supply RL	Maximum supply RL	*Dead volume*	Effective volume
Gordon St	~232 m	~232 m	239.86 m	-	0.38 ML
Black St	~217 m	~232 m	~239.86 m	*0.65 ML*	0.35 ML
Total					0.73 ML

Peak day demand at Culcairn in recent years is assessed at approximately 1.3 ML/d based on data from 2009-2019. Historical data is presented below and shows that demand has actually dropped over time (note there were restrictions in 2007/08 and 2008/09). This is attributed to water pricing, customer behaviour and increased use of recycled effluent from the Culcairn STP (since 2009/10).

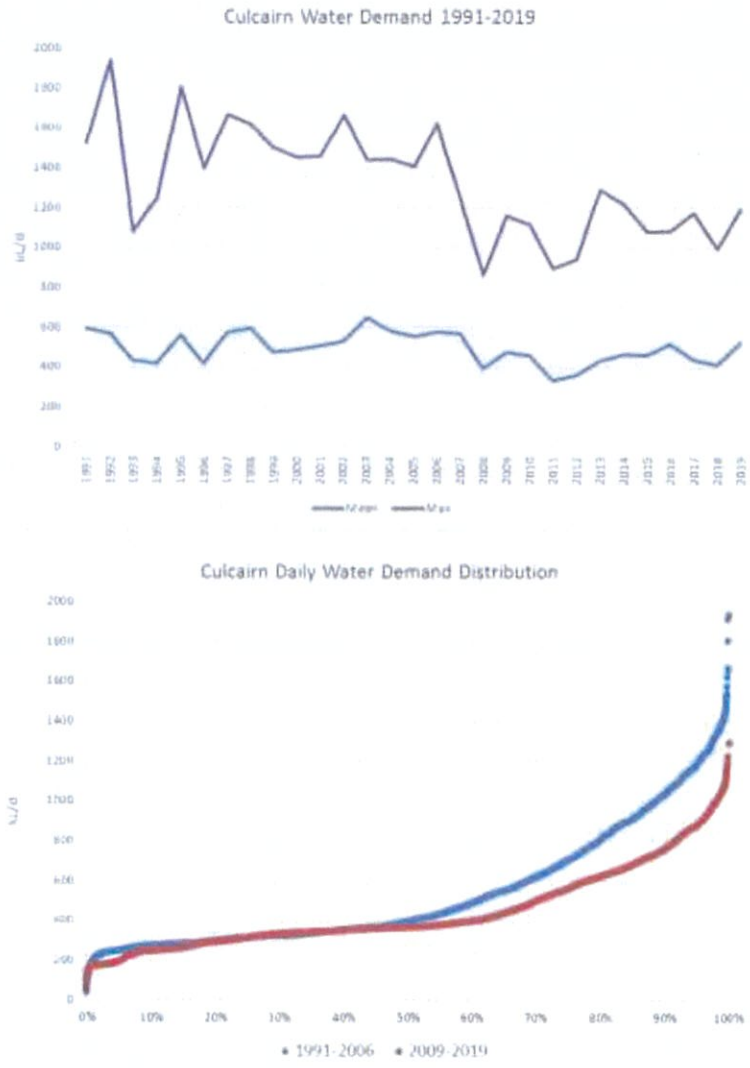

Figure 1: Culcairn Water Demand Data 1991 - 2019

The Culcairn recycled water scheme supplies the Billabong High School and Culcairn sportsground. As of March 2019 the recycled water storage had emptied due to dry conditions and high irrigation demand. Consequently, GHC was planning to supply town water for irrigation at these locations. As demand from these sites is approximately 230 kL/d, this increases the assessment of current peak day demand to 1.6 ML/d.

A further consideration in assessing peak day supply scenarios is supply for fire-fighting. GHC has a Level of Service objective for fire-fighting of 11 L/s. Supply over a 2-4 hr period at 11 L/s represents an additional 80 – 160 kL volume.

An overall assessment of peak day demand vs. effective reservoir volume therefore indicates a significant shortfall given a standard target of 24 hr treated water storage for emergency supply. The shortfall is assessed at between 0.75 ML and 1 ML depending on the allowances included.

The Culcairn water supply project hence aims to address the issue of insufficient volume being available at the required Level of Service for the Culcairn community (security of supply). Options for achieving this must consider the current age and condition of the Black St reservoir as discussed further below.

Risks & Issues

Level of Service / Security of Supply – Domestic and Fire Fighting

As outlined above, the Culcairn water system cannot supply an industry standard of 24 hr peak day demand at the minimum Level of Service (12 m head) in the event of headworks, WTP or trunk main failure. The shortfall is assessed at between 0.75 and 1.0 ML. This includes consideration of the Level of Service required for firefighting supply.

Meanwhile the Greater Hume Drought Management & Emergency Response Plan identifies that bulk water carting for emergency response would be expensive and probably not feasible.

Construction Standard & Safety Risks

A major consideration with any option to resolve Culcairn's water supply deficiencies is the age and condition of the Black St reservoir. The reservoir has been subject to significant leakage which is likely to have been accelerated by the introduction of chlorine to the town water supply around 2000. The reservoir has most recently been inspected and assessed by GHD, which found that the life of the structure could be extended by up to 10 years subject to (i) the structural load capacity of the Tower remaining adequate, (ii) future levels of leakage (the leakage is likely to increase over time) being acceptable, and (ii) all safety hazards (e.g. falling concrete debris) being adequately managed. However GHD also concluded that, if adopting a criteria for "serviceability limit state" in line with the design of new water retaining structures[1], the reservoir would be considered to be well beyond its service life. Further, in 10 years' time, the reservoir would be approximately twice the age of any new water retaining structure designed to the current standards.

Therefore, based on its standard of construction, retention of the reservoir as part of the solution to Culcairn's water supply deficiencies may not be practicable.

Drinking Water Quality & Public Health

A further consideration for improving Culcairn's water supply relates to the configuration of the Black St reservoir, which has a common inlet and outlet. This arrangement means there is significant short circuiting and lack of turnover of water in the tank, creating water quality issues including elevated risk of microbial contamination. This is highlighted as a key issue in GHC's drinking water quality improvement plan. Due to the age of the Black St reservoir, attaching new pipework may not be practicable.

Summary

In summary, the key drivers for the project that form the basis for funding eligibility are:

- Inadequate security of supply in view of industry standards for treated water storage volume (24 hr peak day demand) and Levels of Service required for domestic and fire-fighting services.

[1] i.e. no corrosion of reinforcement or major cracking or spalling within the design life of the structure (50 years)

- Outdated construction standard and OH&S issues (falling concrete) associated with key infrastructure (Black St reservoir) that forms in integral part of the current supply system. This exists in addition to the above supply deficiencies.
- Drinking water quality improvement requirements due to design of the Black St reservoir.

Options

The following options have been considered for the Culcairn water supply upgrade. The basis for options comparison is the provision of ~1.9 ML total treated water storage requirement for Culcairn, comprising:

- Peak demand excluding municipal irrigation = 1.3 ML
- Municipal irrigation demand = 0.23 ML
- Fire-fighting reserve = 0.16 ML
- Allowance for growth, nominal 30 years @ 0.5% p.a. = 0.21 ML.

The following options have been considered for the Culcairn water supply upgrade.

1. Do Nothing - rely on water carting in emergency to supplement existing storages.
2. Retain Black St reservoir (0.35 ML effective volume) and add additional 1.15 ML of effective treated water storage. Total effective treated water storage volume: 0.38 ML + 0.35 ML + 1.15 = 1.88 ML.
3. Retain Black St reservoir with pressure boosting and generator back up (up to 1 ML effective volume) and add an additional 0.5 ML new storage tank. Total effective treated water storage volume: 0.38 ML + 1 ML + 0.5 ML = 1.88 ML
4. Decommission Black St reservoir and install new tank with effective volume of 1.5 ML. Total treated storage volume: 0.38 ML + 1.5 ML = 1.88 ML.

Options Assessment

Option 1 provides a poor long term outcome for the Culcairn community noting the criticality of water supply to customers such as the hospital. Option 1 is below industry standard and does not support GHC's aim of delivering water to meet relevant health and industry standards and the required levels of service.

Option 2 requires the Black St reservoir to be retained, which as discussed is past its useful life on current standards, and presents OH&S risks (falling concrete debris) and drinking water quality risks.

Option 3 presents the same risks as Option 2 regarding ongoing OH&S and public health risks, but minimises current cost by reducing the additional storage volume requirement to be constructed. As Black St reservoir would still be retained, additional works would be required in future when the Black St reservoir must be ultimately decommissioned. This could be as soon as 10 years.

Option 4 addresses all project risks and issues and supports a long term safe and secure supply for Culcairn. Option 4 also enables optimisation of the water supply in that the new treated water storage can be optimally located with consideration of trunk infrastructure and system performance. The option requires no major additional investment for the long term.

Hence the preferred option for addressing the key project drivers is the construction of an additional 1.5 ML of treated water storage, designed to maintain the required level of service by incorporating pressure boosting as necessary, which also enables decommissioning of the Black St reservoir.

Strategic Planning Alignment

Local

The Culcairn water supply project is identified in GHC's Delivery Program 2017-2021 and Operational Plan 2018-19 amongst a range of forward planning documents as listed below:

- Joint *Integrated Water Cycle Management (IWCM) Strategy (2011)*:
  - Culcairn water supply system reservoir capacity identified as less than 1 x peak day demand being the minimum standard.
  - As the Culcairn recycled water scheme had been newly created, this issue was not resolved and left as a high priority data gap (i.e. "what is the new potable water peak day demand?"). In the absence of this the predicted 2038 peak day demand was 2.3 ML/d.
- *GHC Annual Report 2017-18 Drinking Water Management System August 2018:*
  - Improvement Plan Action 48 identifies Black Street reservoir as having a common inlet and common outlet pipe and dead water, noting that it is difficult to make modifications to the tank due to safety issues.
- *GHC Water Supply Asset Management Plan 2017:*
  - Identified Culcairn's water supply pressure as a known service performance deficiency.
- *Live A Greater Life Community Strategic Plan 2017 – 2030*:
  - Theme 4: Good infrastructure and facilities, outcomes include *3.1 Infrastructure and facilities meet the needs of our communities.*
- GHC *Delivery Program 2017-2021* and *Operational Plan 2018-19*:
  - Culcairn reservoir upgrade project listed for 2019/20 (draft).

Regional/State

The project's alignment with regional and state strategic priorities is demonstrated in the following examples. This generally relates to the need to support current and future liveability and lifestyle in Culcairn through the provision of reliable water that meets public health and expected levels of service:

- *Albury – Wodonga Regional Economic Development Strategy 2018 – 2022*:
  - Identifies the replacement of the Black St reservoir as a critical infrastructure required for the endowment of 'Liveability & Lifestyle'.
  - Also lists a priority action for GHC to identify and acquire suitable land for residential subdivision in Culcairn, construction of residential subdivisions in the northern part of the LGA being identified as essential for economic and social sustainability.
- *A 20-Year Economic Vision for Regional NSW*, July 2018:
  - The Albury-Wodonga economic region (including Albury, Federation, Greater Hume LGAs) is listed as a growth centre and hub for surrounding areas with lifestyle and employment attraction (particularly freight, logistics and distribution services). Forecast jobs growth in the economic region at between 10,000 and 14,000 to 2038.

- Premier's Priorities:
  - Alignment with *Creating Jobs* (supporting regional development); as well as *Delivering Infrastructure* (ensuring that the regions have the infrastructure they need to support a vibrant and productive economy).
- *Riverina Murray Regional Plan 2036*; and *Making it Happen in the Regions: Regional Development Framework 2017.*
  - Similar themes to above.
- *NSW State Infrastructure Strategy 2018-2038.*
  - Strategic objective: Support the growth, productivity and liveability of metropolitan and regional communities by ensuring that water security, quality and wastewater services protect public health and the environment.

2. Economic Assessment

As this application for funding is for the business case phase, a cost benefit analysis is not required. Notwithstanding this, the identified solution is preferred based on economic, environmental and social outcomes.

Benefits

- Meet minimum industry standards for treated water storage volume for emergency scenarios and ensure customers such as the hospital have the required security of supply.
- Provide a minimum level of service in terms of pressure and flow.
- Improve public safety and compliance with Safety at Height Legislation.
- Reduce drinking water quality (public health) risk to acceptable industry levels.
- Reduce future maintenance issues.
- Enable, rather than constrain the future growth in Culcairn.
- Support a regional community that is an important supply centre for nearby towns and villages including, Morven, Gerogery, Henty and Walla Walla.

Economic

The identified approach minimises ongoing costs of water supply management by enabling the optimisation of the existing water supply with consideration of trunk infrastructure and system performance. The preferred approach also requires no major additional investment for the long term.

It is noted that GHC's customer base has limited capacity to absorb increased water charges (operational expenditure) and that this has been carefully considered in the assessment of options described previously. The preferred option is considered the most cost-effective and minimises future customer cost while enabling optimal service delivery into the future.

Environmental

The project will address deficiencies within the current system and provide essential infrastructure that provides water supply to the community of Culcairn that in turn supports the surrounding regional townships. Works will be constructed in accordance with current engineering standards that minimise impacts on noise, traffic and the efficient use of materials and power. Environmental considerations will need to take into account noise, overshadowing, safety, traffic and construction related impacts.

Social

The project will improve the water supply security, level of service and water quality to existing and future customers. Community safety will also be improved in relation to operational staff access to heights and confined spaces, improved reliability and pressure, and fire response.

The upgrade will provide capacity for residential growth in Culcairn as a desirable town located midway between Albury Wodonga and Wagga Wagga. The proposed project will provide a robust, long term solution that has flexibility for future growth scenarios.

3. Affordability

Project Budget & Funding

The basis of the budget for business case funding is as follows:

• Decommissioning investigations for existing tank	$10,000
• Geotechnical investigations and reporting	$20,000
• Survey	$10,000
• Environmental Impact Assessment	$15,000
• Noise	$15,000
• Electrical	$10,000
• Network analysis	$20,000
• Concept Design	$30,000
• Reporting/business case	$10,000
• Contingency 30%	$42,000
• GST Allowance 10%	$18,000
Total Phase 2 Project Budget	**$200,000**

GHC's current budget operating revenue is ~$1.8M p.a. for water and $3.5M p.a. for combined water and wastewater. Therefore, a funding contribution of 75% is sought under the SSWP. Based on the current Phase 2 estimate of $0.2M and total project estimate of $3.0M, GHC would be required to co-fund $0.05M for Phase 2 and $0.75M for the overall project. GHC has capacity to fund these amounts from its Water Fund Reserves.

4. Deliverability

Procurement Method

The overall project will be delivered based on a fully developed functional design and D&C specification. This is considered most advantageous given the project emphasis will be placed on documenting the preferred functional outcomes for the project, and water tank suppliers within the industry have developed proprietary systems that have been subject to technical development over many years. This will provide an opportunity for the provision of cost effective design solutions that may involve either concrete or steel construction. All works will be subject to peer review by suitably qualified engineers to make sure that serviceability requirements and durability of structures is achieved.

GHC has extensive experience in civil construction project management and supervision for similar works involving water supply infrastructure. GHC typically engages consultants to provide technical

support as required and local experience is available in the design and construction of both steel and concrete tanks under D&C documentation and delivery methodology. GHC also contracts out construction phase services from time to time depending on resource availability.

Construction of the project is currently planned to commence early 2020. This represents a 9-month timeframe available for completion of the concept design, business case, approvals and functional design and project documentation. This is achievable subject to the timing of funding being made available for Phase 2 and Phase 3.

Approvals

Under Division 24 'water supply systems' of State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP (ISEPP)), development for the purpose of water reservoir may be carried out with consent. The existing Black St tank site land is zoned RU5 (Village) under the Greater Hume LEP. It will be necessary to submit a development application (supported by an environmental assessment) for the works. This will be assessed under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Given the nature of the works it is not anticipated that approvals will be a significant constraint in the delivery of this project.

Implementation Risk & Stakeholder Management

A detailed risk register and risk management plan will be developed in Phase 2.

As the project mainly comprises civil construction with which GHC is familiar, the project is currently viewed as standard risk in terms of technical delivery (quality, construction program) and budget. Issues that will need special consideration include:

- Alignment of project design criteria with community level of service expectations.
- Geotechnical investigations.
- Noise assessments.
- Control of contractor QA deliverables with D&C projects.
- Demolition of existing structures.

Stakeholder engagement will be undertaken in line with GHC's *Stakeholder Engagement Policy* and a Stakeholder Engagement Plan will be developed at the commencement of Phase 2. For all Council major projects, a Community Engagement Toolkit is created to plan community engagement activities. This draws on IAP2 (International Association for Public Participation) principles including the spectrum of public participation (Inform-Consult-Involve-Collaborate-Empower). The level of engagement and associated strategies will vary depending on the community group or stakeholder concerned (e.g. general public vs. neighbours etc.).

5. Summary

In summary, the Culcairn water supply upgrade project is:

- Required based on current shortfalls against industry standards for treated water supply security, alongside GHC's Levels of service objectives for domestic and fire-fighting services.
- The preferred and most cost effective long term solution that also addresses safety and public health issues associated with outdated infrastructure.
- Is consistent with local and State strategies, and has been identified as a priority in GHC's forward planning.
- Deliverable; implementation risks are relatively well known and can be managed.

ANNEXURE 7

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Dear Michael

Jindera Wastewater Management (SSWP183)
Detailed Application for Business Case Co-Funding

Thank you for your invitation to submit a detailed application for business case co-funding for the above named project under the Safe & Secure Water Program.

Greater Hume Council aims to deliver sustainable wastewater services in line with best practice environmental and public health standards. The upgrade of the Jindera wastewater management system to current standards is hence a key priority for which there is firm commitment. The project is identified in Council's Integrated Water Cycle Management Strategy and forms part of our strategic planning, while also aligning with strategic priorities in our region.

Please find attached three documents that form our detailed application.

We look forward to working with you on this critical project.

Sincerely

Steven Pinnuck
General Manager
GREATER HUME COUNCIL

28 March 2019

Enc
- Detailed Application – Summary
- DoI Water correspondence regarding S60 approval process
- Scoping Study – Jindera STP Upgrade (GHD)

Greater Hume Council

Jindera Wastewater Management (SSWP183) Detailed Application for Business Case Co-Funding – Summary

Total Project Estimate	Phase 2 Estimate	Phase 2 Funding Request
$6.0M	$0.48M	$0.36M

Project Scope

- Upgrades to the existing wastewater management system: mechanical inlet works, rising main, desludging, aeration to increase organic treatment capacity.
- Transfer of secondary treated effluent to a new storage and irrigation site for agricultural reuse. Construction of approximately 100 ML of effluent storage - sized for full reuse via irrigation of pasture up to forecast 2038 flows (50th percentile wet year basis).
- Development of 30 ha of irrigated pasture on land adjacent to the storage. Estimated total land requirement for the storage and centre pivot irrigation ~48 ha. Purchase of the full site is included for long term security (with option to lease back to farmer for operation).

Overview

This document provides a summary of Greater Hume Council's detailed application for business case co-funding for the Jindera wastewater management project (SSWP183). Other attachments that also form part of the detailed application and need to be read in conjunction with this document, in particular the Scoping Study, are listed in the cover letter signed by the General Manager. Note that the Scoping Study provides additional detail that may not be included in this document. Where there is overlap this summary takes precedence, having been written specifically in response to the DoI invitation for detailed application letter dated 21 December 2018.

This document is broken into sections based on the assessment criteria for detailed applications,

i.e.:

1. Strategic Assessment
2. Economic Assessment
3. Affordability
4. Deliverability

Within each section we have also addressed the specific points requested by the Technical Review Panel, and/or highlighted relevant attachments regarding those points, as follows:

- Provide details that justify the need for the project and clarify that the proposed works meet SSWP eligibility requirements and are not only to cater for population growth: **Section 1**
- Demonstrate current capacity constraints that are causing an inability to meet environmental standards: **Section 1**
- Demonstrate alignment with Council's strategic planning such as an Integrated Water Cycle Management Strategy or similar, including options assessment: **Section 1**
- Clarify proposed ongoing engagement with DoI water on Section 60 approval: **Section 4**
- Re-examine and detail the estimated cost for the business case as they appear high: **Section 3**

Finally, items from the generic overview of requirements for detailed applications as provided on the DoI website are addressed within the relevant sections as appropriate, and/or the Scoping Study.

1. Strategic Assessment

Introduction

The township of Jindera is located approximately 15km north of Albury in the Greater Hume Council (GHC) local government area. Services in the township include a range of retail businesses, three schools (two primary and a K-12) and an aged care hostel.

The Jindera sewerage scheme was constructed in 1986 and is one of six townships provided with sewerage services in the GHC area, along with Culcairn, Henty, Holbrook, Walla Walla and Burrumbuttock. All wastewater is pumped 2.3 km to a sewage treatment plant (STP) northeast of the township, via the No. 1 pump station.

The STP consists of four treatment ponds in series with recirculation between the final and first ponds. Pond 1 has a small aspirator near the inlet and there is a coarse bar screen at the inlet that is manually cleaned.

Effluent from the final pond is discharged to an 8.5 ha unlined "evaporation" area adjacent to the ponds comprising 4 bays divided by levee banks. There is an overflow pipe from the final bay to Bowna Creek to the west.

Figure 1 Aerial Photograph Showing Treatment Ponds and Disposal Area

The site was registered as a Wildlife Refuge in 1990 under the *National Parks & Wildlife Act 1974*, however there has been no active environmental management of the disposal area, which is subject to significant periodic algal blooms.

The site previously operated under an Environmental Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act) however this was surrendered in 2002. The EPL did not permit discharge to any location other than the evaporation area.

Water balance calculations based on current flows indicate a significant proportion of annual inflows (greater than 50%) cannot be accounted for by evaporation. Hence a majority of flow is being discharged to groundwater and/or Bowna Creek.

Risks & Issues

Environment and Public Health Standards

The existing system constructed in 1986 pre-dates a range of regulatory requirements and guidelines and as such does not meet current day standards for wastewater management.

As described in the *NSW Water and Sewerage Strategic Business Planning Guidelines (2011),* local water utilities should manage sewerage activities to minimise pollution of the environment and promote ecological sustainability; and improve effluent management practices by such means as improving effluent quality, relocating discharges to less sensitive areas, or re-using effluent to reduce discharge volumes.

The key issues with the existing system relate to the method of discharge and quality of effluent routinely discharged to groundwater and/or overflowing to the creek.

The disposal area is not lined and based on climate data cannot provide full evaporation. Current annual flow is estimated at 100 ML/yr. Water balance calculations show that in an average year, approximately 50 ML/yr evaporation is achievable if the disposal area is fully wetted. Consequently, some 50% of current flow is disposed by means other than evaporation. As the disposal area is often not fully wet (see Figure 1), the proportion evaporated must be less than 50 ML/yr and it is likely that the majority of effluent is in fact not evaporated. This is evidenced by the lack of salinity accumulation in the disposal area. The Scoping Study (Appendix F) provides the results of some recent sampling (March 2019) and shows that the effluent conductivity in the evaporation area ranges 600 – 800 µS/cm, which is only marginally higher if not similar to the raw wastewater salinity. If full evaporation disposal was occurring, salinity would be expected to be several orders of magnitude higher. Hence, based on the information above, salt (and therefore effluent) is continuously being leached to groundwater. The disposal area is also located within approximately 60 m of Bowna Creek and 20-30 m of two farm dams, which is marginal when compared to buffer requirements for single household domestic wastewater disposal system[1]. Bowna Creek is an ephemeral creek which flows into the Hume Reservoir and is part of a drinking water catchment.

In addition to the above, the current system does not provide tertiary treatment for nutrient removal, nor filtration or disinfection. The *National Water Quality Management Strategy (NWQMS) Guidelines for Sewerage Systems: Effluent Management (1997)* highlight that any land based effluent application system should be designed to utilise water and nutrients in a sustainable way with minimum impacts on soil, surface waters, groundwater, and ecosystems at or near the application site. The Guidelines list nutrient removal as "commonly required" with infiltration-based disposal systems. This requirement could now be considered a minimum, particularly in view of the precautionary principle (see *NWQMS Guidelines for groundwater quality protection in Australia, 2013*).

Given the close proximity of the disposal area to surface waters, and the fact that any overflows from the disposal area discharge directly to Bowna Creek, effluent quality in relation to surface water discharge is also of concern. Risks to surface water include elevated nutrient levels, suspended solids, salt, ammonia, algae seeding and altered flow characteristics. For discharges to streams, the *NWQMS Guidelines for Sewerage Systems: Effluent Management* list nutrient removal following secondary treatment as "commonly required" for ecosystem protection, as well as disinfection if protection of primary contact recreation or raw water for drinking water supply is applicable. More

[1] e.g. see http://www.olg.nsw.gov.au/sites/default/files/Easy-septic-guide.pdf

recently, the *NWQMS Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000* ("ANZECC guidelines") are relevant. The ANZECC guidelines provide default biological, physico-chemical and toxicant "trigger values" (above which there is environmental harm or impact) for waterways depending on the ecosystem and its conservation value. For aquatic ecosystem protection in a "slightly to moderately disturbed" ecosystem (upland stream>150 m altitude), the trigger values for total phosphorous (TP), total nitrogen (TN) and ammonia are 0.02 mg/L, 0.25 mg/L and 0.013 mg/L respectively. This compares to a current typical effluent quality of 8 mg/L and 20 mg/L for TP and TN respectively; and Bowna Creek being subject to very low flows often offers little dilution. A further effluent quality issue is the algal concentration, with recent effluent sampling (refer Scoping Study) indicating over 2 million cells/mL blue green algae, including >1,9 million cells/mL *Microcystis*. This compares to an ANZECC water quality objective of <11,500 cells/mL *Microcystis* for livestock drinking, and a guideline limit of 15,000 – 20,000 total cells/mL for recreational contact.

The ANZECC guidelines also state that groundwater should be managed in such a way that when it comes to the surface, whether from natural seepages or from bores, it will not cause the established water quality objectives for these waters to be exceeded.

To meet current standards then, noting further that Bowna Creek flows into Lake Hume 11 km downstream, discharges from the Jindera STP would be expected to have a minimum level of treatment comprising nutrient removal and effluent polishing[2], with the suitability of any discharge still to be subject to ecological impact assessment.

Capacity Constraints

It is evident that the existing system has insufficient capacity to achieve treatment which meets current environmental standards. Assessing the system holistically, this can be viewed in two distinct ways that inform options for improvement:

a) The treatment plant is inadequate to achieve suitable effluent quality for discharge to ground and/or surface water (assuming this remains acceptable) – as per the discussion above; or

b) The land application system is inadequate for sustainable disposal of secondary treated effluent from the existing pond treatment system.

Evaluation of the second approach enables the capacity deficit to be demonstrated. The minimum area for full evaporation at current flows is estimated at 18 ha (fully lined), i.e. approximately double the existing area. Given the original design capacity for the plant was for 240 kL/d, which is close to the current flow of 250 kL/d, it is evident that the existing system was not designed for full evaporation. This is demonstrated by the lack of constructed lining and inclusion of a central drainage channel and overflow pipe to creek in the original works, and evidenced by salinity tests.

An alternative to evaporation is reuse of effluent via irrigation (evapotranspiration), allowing beneficial use of water and nutrients. As highlighted in the *NWQMS Guidelines for Sewerage Systems: Effluent Management*, there is a decreasing order of preference in waste management as follows:

1. Waste minimisation
2. Recycling
3. Reuse
4. Treatment to reduce potential degrading impacts discharge to the environment.
5. Discharge to the environment

[2] e.g. 0.5 mg/L TP, 5 mg/L TN and low ammonia, with filtration/disinfection

Effluent reuse, rather than discharge, is therefore more consistent with a best practice approach. The irrigation area required for full irrigation at current flows has been estimated at 15 ha, in conjunction with a 50 ML storage dam to contain flows during times when irrigation is not feasible (i.e. outside the irrigation season).

Summary

In summary, the key drivers for the project that form the basis for funding eligibility are the interrelated issues of performance against current environmental and public health standards, and inadequate system capacity in view of current standards. This is a function of the plant having been constructed in the mid-1980's well before the various standards quoted above existed.

The Scoping Study provides details of the proposed solution which has been selected based on a multi-criteria assessment. The preferred approach involves full reuse in accordance with the *Environmental Guideline: Use of Effluent by Irrigation (DEC, 2004)*; *NSW Guidelines for Recycled Water Management Systems (2015)*; and the *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) (2006)*.

The Scoping Study also includes a detailed summary of the ongoing population (and industrial) growth being experienced in Jindera (3.5% p.a. growth in residential connections over the past 5 years), with flows forecast to double to 550 kL/d in a 20-year timeframe. Population growth is not included here as a primary driver for the upgrade but is noted as context, i.e. it determines the sizing of infrastructure required for full reuse (50th percentile wet year basis) at 2038 flows. The Scoping Study also provides detailed analysis of the organic treatment capacity of the oxidation pond to inform an overall approach.

The information provided in this section indicates that the current performance risks and issues associated with the operation of the STP are non-compliant with current guidelines and standard practice, irrespective of the additional issues arising from population growth.

Strategic Planning Alignment

Local

The Jindera wastewater management project is identified in the GHC Joint Integrated Water Cycle Management (IWCM) Strategy, specifically in the supplementary report *Draft Technical Note Simplified Strategy (HydroScience Consulting, June 2011)*. Based on the options assessed at the time, the identified option was to abandon the oxidation ponds and construct an activated sludge plant. This option has been included in the current Scoping Study with updated cost estimates and evaluated as part of the multi-criteria assessment. Full reuse by irrigation was not specifically assessed previously.

Specific examples of project alignment with GHC's forward planning documents and activities are provided below:

- Joint *Integrated Water Cycle Management (IWCM) Strategy (2011)*:
  - Jindera STP upgrade originally earmarked for major upgrade within ~5 years.
- *GHC Fit for the Future Assessment of Water Supply and Sewerage* (HydroScience, 2015):
  - Jindera sewage treatment plant and reuse scheme identified as significant capital works required for 2020 in Council's 30-year capital program.
  - Council's intention to apply for funding is noted.

- *Live A Greater Life Community Strategic Plan 2017 – 2030*:
  - Theme 4: Good infrastructure and facilities, outcomes include:
    - 3.1 Infrastructure and facilities meet the needs of our communities.
    - 3.3 We minimise the impact on the environment.
  - Jindera is noted as the fastest growing town in the GHC area, with its proximity to the north of Albury making it a popular destination for people wanting a rural lifestyle close to a major regional centre.
- GHC *Wastewater Asset Management Plan 2017*
  - Identifies capital expenditure needed in 2020/21 for Jindera STP upgrade.
- GHC *Delivery Program 2017-2021* and *Operational Plan 2018-19*:
  - Jindera STP upgrade project listed for 2020/21.

As described in detail in the Scoping Study, the need for the Jindera wastewater management project has increased since the IWCM Strategy due to accelerated population growth as well as light industrial activity. This growth is expected to continue given Jindera's proximity to Albury-Wodonga, which is projected to increase from approximately 96,000 to 129,000[3] people over the next 20 years.

Regional/State

The project's alignment with regional and state strategic priorities is demonstrated in the following examples and centre on Jindera's key position in the Albury Wodonga region, which has some of the highest forecast economic growth in regional NSW, supported by employment and lifestyle opportunities:

- *Albury – Wodonga Regional Economic Development Strategy 2018 – 2022*:
  - Highlights the need for affordable housing, lifestyle blocks, access to services and strong communities to increase the attractiveness of the region to skilled workers.
  - Jindera Industrial Estate listed as a major industrial precinct of importance in the region, with growth potential particularly in transport and logistics.
  - Upgrade of the Jindera wastewater treatment facility listed as critical infrastructure for "Liveability & Lifestyle appeal" and a strategic priority under the "Attract and retain talent to sustain the supply of skilled labour by improving liveability throughout the region" objective.
- *A 20-Year Economic Vision for Regional NSW*, July 2018:
  - The Albury-Wodonga economic region (including Albury, Federation, Greater Hume LGAs) is listed as a growth centre and hub for surrounding areas with lifestyle and employment attraction (particularly freight, logistics and distribution services). Forecast jobs growth in the economic region at between 10,000 and 14,000 to 2038.
- Premier's Priorities:
  - Alignment with *Creating Jobs* (supporting regional development); as well as *Delivering Infrastructure* (ensuring that the regions have the infrastructure they need to support a vibrant and productive economy).

[3] Source: https://home.id.com.au/

- *Riverina Murray Regional Plan 2036*; and *Making it Happen in the Regions: Regional Development Framework 2017.*
  - Similar themes to above.
- *NSW State Infrastructure Strategy 2018-2038.*
  - Strategic objective: Support the growth, productivity and liveability of metropolitan and regional communities by ensuring that water security, quality and wastewater services protect public health and the environment.

2. Economic Assessment

The economic assessment of options is presented in the Scoping Study and informs a full multi-criteria assessment (MCA). As the application for funding is for the business case phase, a cost benefit analysis is not required.

A number of options were developed through the Scoping Study that cover a range of treatment, reuse and effluent discharge scenarios to deliver different levels of benefit, as follows:

- Option 1 (base case): Upgrade pond capacity + retain current effluent disposal system.
- Option 2: Upgrade pond capacity + implement partial reuse (municipal irrigation).
- Option 3: Upgrade pond capacity + full reuse (agricultural).
- Option 4: New biological nutrient removal plant at STP site + discharge to creek.
- Option 5: Upgrade pond capacity + full reuse (agricultural + municipal irrigation).

The MCA was used to assess options on economic, social, environmental and technical criteria reflecting the major risks/issues and benefits identified. Each criterion was allocated a percentage in accordance with its relative importance relative to project outcomes and then allocated a score relative to the base case being Option 1. The output of the MCA is an overall weighted score for each option. The net present cost calculations assumed a 7% discount rate.

A summary of the criteria and weightings is provided below:

Multi-Criteria Assessment – Criteria, Weightings and Descriptions

Quantitative Aspects	Weighting	Comment
Economic Criteria - Quantitative		
Net Present Cost ($)	15.0%	Net present cost
Cost to the Customer ($)	15.0%	Accounts for different impact of capex (co-funded) and opex (not funded)

Qualitative Aspects	Weighting	Comment
Environmental Criteria - Environmental Impacts & Sustainability		
Impact on water quality in receiving environment - surface water	10.0%	Potential impact on surface waters e.g. elevated nutrients, suspended solids, salt, ammonia, algae seeding, altered flow characteristics
Impact on water quality in receiving environment - groundwater	10.0%	Potential impact to groundwater quality (e.g. nitrate) and beneficial uses
Waste Hierarchy and value of end uses	10.0%	Addresses waste hierarchy - avoidance of waste/disposal, reuse of nutrients, substitution of potable uses
Social Criteria - Customers and Community		
Supports growth in township. Flexibility/Scalability (i.e. able to be upgraded or increase capacity in future, supporting local economy)	15.0%	Ability to modify the upgraded plant to accommodate new industry and regulatory changes e.g. ability to support regional growth, meet future environmental regulations etc.
Amenity impacts on the local community & private land owners	10.0%	e.g. Suspended solids and algae to waterway, odour from overloaded ponds, sewer spills, noise, traffic movements
Technical Criteria - Project Delivery & Ongoing Operation		
Constraints to construction/delivery (e.g. land purchase, vegetation impacts, planning, recycled water management)	5.0%	Ability to delivery project against required timeframes to stakeholder satisfaction (excludes environmental best practice considerations already accounted for above)
Operation complexity (infrastructure) and robustness	5.0%	Reliability of the equipment, asset or strategy (i.e. technical complexity and O&M requirements, ease of operability), resilience of the process (i.e. robustness, impact of failure, ability to recover after upsets)
Asset Life (new components)	5.0%	Expected asset life for major CAPEX items

Based on the multi criteria assessment the preferred approach is *Option 3: upgrade pond capacity with full agricultural reuse*. This option utilises the existing pond system while also providing flexibility and security for the growth of Jindera. A summary of the benefits is provided below:

Economic

The identified approach minimises ongoing costs of wastewater management by retaining the current low-maintenance oxidation pond system and utilising agricultural reuse appropriate to the rural setting. Agricultural reuse represents a sustainable method of effluent disposal and provides potential revenue from farming thereby creating future economic benefit and maximising the value extracted from the available water resource.

Environmental

The option will address deficiencies with the current disposal system, i.e. discharges of secondary treated effluent to groundwater via the "evaporation" area and overflows to Bowna Creek.

The identified option also provides fit-for-purpose treatment which does not require nutrient removal or chemical addition. Conversely, nutrients are beneficially reused as a valuable resource for agriculture. The option is consistent with a best practice approach to wastewater management when considering the waste hierarchy (see *NWQMS Guidelines for Sewerage Systems: Effluent Management).*

Social

The option provides capacity for residential growth in Jindera as a desirable satellite town to Albury Wodonga. The proposed project will provide a robust, long term solution that has flexibility for future growth scenarios.

3. Affordability

Project Budget & Funding

The breakdown of cost estimates for all options is provided in the Scoping Study. The cost estimates were compiled by GHD based on extrapolation of recent similar project pricing, industry unit rates and GHD experience. The *NSW Reference Rates Manual: Valuation of water supply, sewerage and stormwater assets* was also used (adjusted to 2018 pricing). A 20% allowance for survey, investigation, design and project management was added to all items where not already included in reference rates. A contingency of 30% was then applied to all items as appropriate for the feasibility stage. Costs were also reviewed in light of DoI Water comments on the draft Scoping Study. The costs are believed to be appropriately conservative for this stage of the project with concept design still to be undertaken in Phase 2.

GHC has budget allocated in 2020/21 to deliver the project subject to co-funding and it is the major expenditure item for wastewater in the capital program. GHC's current budget operating revenue is $1.7M p.a. for wastewater and $3.5M p.a. for combined water and wastewater. Therefore, a funding contribution of 75% is sought under the SSWP. Based on the current project estimate of $6.0M, GHC would be required to co-fund $1.5M, which will be sourced from its sewerage fund reserve.

It is noted that GHC's customer base has limited capacity to absorb increased wastewater charges (operational expenditure) and that this has been carefully considered in the assessment of options described previously. The preferred option was determined to be the most cost-effective of acceptable alternatives through the MCA.

Phase 2 Funding Estimate

As requested in the invitation for detailed application letter, the business case phase budget has been reviewed. It is understood that the estimate may appear high however the detailed breakdown provided in Appendix E of the Scoping Study and reproduced overleaf illustrates the extent of investigations expected to be required in the next phase. The following points are noted:

- The project will require S60 approval and the concept design will need to be completed to a level where only minimal further investigation is required. An environmental impact assessment will need to be undertaken in Phase 2 and a number of technical investigations, as well as a high degree of consultation, will be required.
- The works will involve the identification and acquisition of a suitable greenfield site for storage and reuse. Therefore, the level of investigation increases when compared to a single brownfield site. This relates to the need to assess multiple sites (2-3 sites) and the variety of investigations required (valuations, environmental, heritage, irrigation, geotechnical/dams, survey etc.).
- Having selected the preferred reuse site, there are also multiple design elements requiring detailed investigations, with the project incorporating transfer pipelines, STP upgrade, dam construction and irrigation (with associated recycled water management system requirements).

The *NSW Reference Rates Manual: Valuation of water supply, sewerage and stormwater assets* provides the following typical allowances for survey, investigation, design and project management (SID):

- Water and sewerage mains 10%
- Service reservoirs, pumping stations 15%
- Water or sewage treatment works 20%

The Phase 2 estimate presented in the Scoping Study equates to 8% of the estimated total project budget. Given the extent of investigation that will have been undertaken in Phase 2, the subsequent detailed design cost is not expected to exceed that of Phase 2; giving a projected total SID amount in the order of 15% (or less) of total project cost. This appears acceptable when compared to the typical rates presented above.

Jindera Wastewater Management Project Phase 2 Estimate

Item				Total
Consultation on Option(s) & Approvals				
DOI - S60 approval - review scoping study, concept design				$3,500
EPA - EPA Licencing requirements				$3,500
Others - Planning Focus Meeting				$3,500
Potential landowners for purchase				$4,000
Community				$5,000
Confirm STP site legal access arrangements				$600
Site Selection	*Site 1*	*Site 2*	*Site 3*	
EOI pack preparation & advertising				$6,000
Site valuations	$2,000	$2,000	$2,000	$6,000
Scope/manage investigations (based on preliminary layouts)				$10,000
Level survey (GPS), Dial Before You Dig	$3,000	$3,000		$6,000
Cultural Heritage desktop assessment	$3,500	$3,500	$3,500	$10,500
Flora/fauna impact assessment	$5,000	$5,000	$5,000	$15,000
Preliminary flood review	$1,000	$1,000	$1,000	$3,000
Irrigation - EM surveys	$3,000	$3,000		$6,000
Irrigation – Land Capability Assessments including soil testing	$10,000	$10,000		$20,000
Preliminary boreholes/testing for dam construction	$10,000	$10,000		$20,000
Scoping of electrical requirements (power supply)	$900	$900		$1,800
Review pipeline alignments (field investigation)	$1,800	$1,800		$3,600
Final site selection / comparative assessment	-	-		$9,500
Site boundary survey, subdivision application if applicable	$10,000			$10,000
Concept Design (Selected Site)				
Feature survey - site				$15,000
Feature survey – pipeline to storage site				$15,000
STP site works concept design, electrical scoping				$8,000
Transfer/pipelines concept design (incl. sewer rising main to STP)				$8,000
Additional detailed geotechnical investigation for final site				$15,000
Storage concept design incl. earthworks balance				$12,000
Irrigation - water, nutrient and salinity balances				$8,000
Irrigation functional design				$10,000
Recycled Water Management Plan - system flowchart, CCPs				$6,000
Recycled Water Management Plan - risk assessment workshop				$8,000
Concept plans (layout sketches)				$10,000
Final concept plans (layout drawings) and reporting				$19,000
Environmental Impact Assessment				
Detailed approvals scoping				$8,000
Soils				Incl.
Groundwater / hydrogeological investigation				$8,000
Surface Water				Incl.
Air quality (odour impact assessment including modelling)				$5,000
Noise / Vibration				$5,000
Flora and Fauna – detailed survey/investigation				$15,000
Heritage – detailed survey/investigation				$20,000
Waste disposal				Incl.
Access / Traffic				$1,000
Flood impact assessment				$5,000
"Wildlife Refuge" - future strategy				$10,000
Final reporting				$9,500
Business Case Development				
Build Business Case document from various investigations				$19,000
Possible further investigation of municipal irrigation options				TBC
Independent review of budget estimates				$8,000
Final cost estimates & economic analysis				$5,000
			Subtotal	**$400,000**
			Contingency (20%)	$80,000
			Total	**$480,000**

4. Deliverability

Procurement Method

The overall project will be delivered as "construction of a detailed design" which is the basis for the S60 approval process adopted. This is considered most advantageous given the nature of the works (primarily civil construction) and provides certainty over the form of design to support consultation and environmental approvals. The project will likely be split into a number of tender packages comprising similar works to optimise tender pricing and use of local contractors. GHC has extensive experience in civil construction project management and supervision for similar works involving earthworks, pipelines and pump stations. GHC also contracts out construction phase services from time to time which will be considered depending on resource availability.

The current program for construction around summer 2020/21 represents a ~20-month timeframe for completion of the concept design, business case, approvals and detailed design. This is achievable subject to timely acquisition of the reuse/irrigation site and confirmation of the final approvals pathway with relevant agencies.

Approvals

Planning and environmental approval requirements are outlined in Section 6 of the Scoping Study. Key points include:

- Modification of water or sewage treatment works, and water recycling schemes - approval required under Section 60 of the *Local Government Act 1993* (LG Act).
- Environmental Protection Licence (EPL) – a new EPL is expected to be required under the *Protection of the Environment Operations Act 1997* (POEO Act) on account of the design capacity exceeding 2500 persons equivalent.
- Environmental impact assessment - works at the STP site appear permissible with GHC the determining authority under the *Environmental Planning and Assessment Act 1979* (EP&A Act), through a Review of Environmental Factors (REF). The level of assessment for the reuse/storage site will be subject to its location/zoning, anticipated environmental impacts and further consultation with the relevant agencies.
- Wildlife Refuge status under Section 68 the *National Parks and Wildlife Act 1974* (NPW Act) - the project does not require works within the evaporation area however the STP itself is included in the footprint of the proclaimed refuge, consultation with NSW Office of Environment and Heritage (OEH) (NSW National Parks and Wildlife Service) will be required.

It is noted that there are separate approvals under Section 60 for water recycling schemes and water and sewerage treatment works. The relationship between the two approval pathways has yet to be finalised and it is noted that the major component of works, the winter storage, could potentially be classified as either 'treatment' or 'recycling'.

Consultation with DoI Water regarding S60 approval is ongoing and the draft Scoping Study was provided for comment in December 2018. Based on DoI feedback received January 2019 a number of alterations were made to the Scoping Study including an update of flow projections and cost estimates. Some points provided by DoI Water which do not affect the outcome of the Scoping Study will be addressed in the next phase as the concept design is refined.

In relation to S60 endorsement of the Scoping Study, DoI Water has advised it does not have any objection to proceeding to the concept design phase.

Implementation Risk & Stakeholder Management

A detailed risk register and risk management plan will be developed in Phase 2.

As the project mainly comprises civil construction with which GHC is familiar, and a number of local contractors are available, the project is currently viewed as standard risk in terms of technical delivery (quality, construction program) and budget. Issues that will need special consideration include geotechnical conditions for dam construction and vegetation and cultural heritage impacts associated with pipeline construction.

At this stage of the project the key implementation risk relates to the identification and availability of suitable land for reuse/storage, and potential neighbour concerns once a site is identified. To manage this risk, the process of site investigation/selection will be initiated early through an expressions of interest process. It is also noted that a wide radius around the STP has been allowed for in options development. In the unlikely event a suitable site cannot be identified options will need to be re-evaluated.

Stakeholder engagement will be undertaken in line with GHC's *Stakeholder Engagement Policy* and a Stakeholder Engagement Plan will be developed at the commencement of Phase 2. For all Council major projects, a Community Engagement Toolkit is created to plan community engagement activities. This draws on IAP2 (International Association for Public Participation) principles including the spectrum of public participation (Inform-Consult-Involve-Collaborate-Empower). The level of engagement and associated strategies will vary depending on the community group or stakeholder concerned (e.g. general public vs. neighbours etc.). While engagement for project implementation has yet to commence, it is noted that the project was initially identified in the IWCM Strategy and endorsed by a Project Reference Group at the time.

5. Summary

In summary, the Jindera wastewater management project is:

- Required based on current shortfalls against contemporary health and environmental standards.
- Consistent with local and State strategies, and has been identified as a priority project by GHC including in its IWCM Strategy.
- The preferred and most cost effective solution based on MCA analysis.
- Deliverable; implementation risks are relatively well known and can be managed through an effective program of investigations and appropriate stakeholder management.

Additional information and analysis is provided in the Scoping Study.