

Wastewater and non-drinking water strategy

Mundijong/Whitby

Prepared for the Serpentine Jarrahdale Shire

By Essential Environmental

September 2012



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EXECUTIVE SUMMARY

This report sets out the preferred strategy for provision of wastewater and non-drinking water services to the Mundijong/Whitby district structure plan area to supply non-drinking water for an ultimate population of 30,000 to 40,000 people.

The preferred strategy for delivery of wastewater and non-drinking water services to the study area is to construct a local wastewater treatment and recycling plant and provide a reticulated network to supply non-drinking water to private residences.

Sewerage and non-drinking water services would be operated by an alternative service provider (i.e. not the Water Corporation). Drinking water services could also be provided by this alternative service provider through a bulk supply arrangement with the Water Corporation, which would allow current and future residents to deal with a single provider for all their water needs and provide increased financial feasibility for the service provider.

An infill sewerage program is also recommended as a part of the wastewater/non-drinking water scheme to connect existing residences to the sewerage system with two key benefits:

1. The presence of a predictable sewerage base load from day one of operation provides an income from start up for the service provider.
2. The removal of septic tanks will positively contribute to the water quality of surface and groundwater systems in the Peel-Harvey catchment.

As noted in Essential Environmental (2012) the key success factors for the provision of a wastewater and non-drinking water scheme are cost and service provision. Two potential service providers are identified in section 3.1, these are Trillity Pty Ltd and Peel Water. Both have been contacted and provided with preliminary information and both have indicated that they are interested in proceeding with further investigations and development of a business case.

A summary of the key infrastructure requirements and approximate capital costs for the preferred strategy is provided in section 3.2 and it is expected that the 'headworks' cost per lot applied to recover infrastructure costs would be comparable to those applied by the Water Corporation.

- Proposed wastewater and non-drinking water service cost per lot - \$6,110-6,290
- Water Corporation business as usual service cost per lot - \$5,570 + site specific charges

Other important elements of the scheme are land and planning requirements, funding options and approvals.

Land requirements presented in section 3.3 are expected to be similar to the "business as usual" scenario through co-location of infrastructure. There will be minimal additional land required for wastewater treatment, however the amount is dependent on the technology selected.

The Shire together with the Western Australian Planning Commission will need to carefully administer the provisions of the Planning and Development Act and Local Government Act to facilitate provision of key infrastructure, access easements and land to facilitate implementation of the strategy as outlined in section 3.4. Specifically:

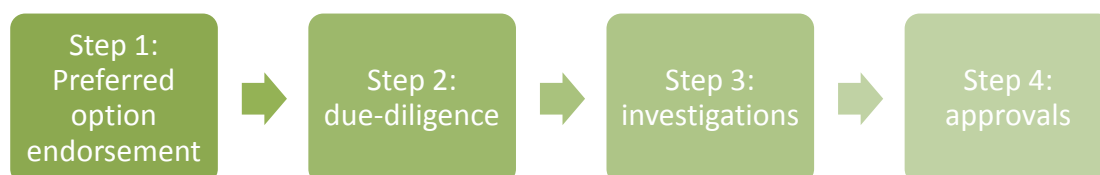
- Land will be required to accommodate key infrastructure as described above. This land will need to be appropriately zoned and tenured.

- It will be necessary to identify and protect corridors of land and/or easements throughout the development area to facilitate provision of main distribution pipes, local water networks and sewerage pump stations.
- Planning conditions will need to facilitate collection of any headworks charges and prefunding of distribution network by developers (if required).
- Local government will need to act in order to facilitate connection of existing properties to any infill sewerage scheme.

Possible contributions from developers as well as State or Federal Government grants are discussed in section 3.5 but the largest potential source of funding exists in the private funding of the scheme on the basis of expected returns from operating profit. It is identified that operating profits could be as high as \$9.2 M pa. With an expected annual return on investment of 10% it is reasonable to expect investment interest of up to \$90 M.

A summary of the required approvals for the strategy is provided in section 3.6 but it is expected that the service provider will be responsible for progressing with applications for approvals and that the Shire will take a less significant role at that stage.

In order to deliver the wastewater and non-drinking water scheme for Mundijong/Whitby, four steps are proposed as follows.



Step 1 requires Council to resolve to progress with development of a wastewater and non-drinking water scheme incorporating local wastewater treatment and recycling for distribution through a reticulated network.

Step 2 requires Council to resolve to work with and support a specific service provider to progress with development of detailed conceptual design and business case and to initiate discussions with developers.

Subsequent steps will be largely service provider led with a diminishing need for Shire involvement. A summary of the specific actions, outcomes and deadlines in relation to implementation of the proposed strategy is provided on page iii.

Recommendations

On the basis of this review, it is recommended that the Serpentine-Jarrahdale Shire:

1. endorse the delivery of a wastewater and non-drinking water scheme for Mundijong/Whitby based on the decentralised collection, treatment and distribution of wastewater through a third party service provider;
2. commence the implementation process through discussions with potential third party service providers to further examine the financial viability of the proposal and explore options for design and the timing of key infrastructure, with the aim of obtaining a commitment from one provider to operate the scheme;
3. Support investigations and necessary actions including infill sewerage and planning conditions; and
4. Support, as required, the necessary approvals for the scheme.

Step 1 – preferred option endorsement



Consider the outcomes of this report and resolve to progress with the preferred strategy to realise delivery of wastewater and non-drinking water services through a third party service provider.

Outcome:	Deadline
Council resolution to progress with development of a wastewater and non-drinking water scheme incorporating local wastewater treatment and recycling for distribution through a reticulated network.	October 2012

Step 2 – due-diligence



Commence discussions with potential service providers to confirm interest in the proposal and clarify expectations and preferred delivery arrangements.

Provide the preferred service provider with access to previous studies to facilitate their due-diligence process and develop funding model for investigation phase works.

Outcome:	Deadline
Council resolution to work with and support a specific service provider to progress with development of detailed conceptual design and business case and to initiate discussions with developers.	December 2012

Step 3 – investigations



Assist in preparation of detailed conceptual design and business case for endorsement by relevant authorities and subsequent approvals documentation for the preferred scheme (as required).

Confirm the preferred funding model of the service provider and assist in presenting this funding model to developers to obtain their support for the proposal.

Outcome:	Deadline
Developer support for proposed non-drinking water scheme and funding model	January 2013

Step 4 – approvals



Support applications for various approvals required to implement the scheme.

Apply relevant conditions to planning and development applications as required to implement the strategy.

Administer notices and controls to implement infill sewerage to existing lots.

Outcome:	Deadline
Approved wastewater and non-drinking water scheme ready for construction phase	August 2013

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1 INTRODUCTION

This report sets out the preferred strategy for provision of wastewater and non-drinking water services to the Mundijong/Whitby district structure plan area for an ultimate population of 30,000 to 40,000 people.

In April 2012, Essential Environmental presented a report to Council which provided a preliminary 'options assessment' for the provision of the proposed non-drinking water supply for Mundijong/Whitby. After discounting some options, the report considered the implementation and operational challenges as well as the community benefit and environmental impact of five options; bulk purchase of treated wastewater, decentralised supply, groundwater, sewer-mining, and business-as-usual (no non-drinking water supply).

The April 2012 report recommended that if the Shire was committed to the delivery of a non-drinking water supply for Mundijong/Whitby, it should consider the options of bulk purchase and decentralised supply in preference to supply from groundwater or via sewer mining.

This report provides a more detailed review of some of the issues associated with the development of a non-drinking water scheme including service provision, infrastructure, land, and planning requirements, funding options and approvals. It is recommended that the Shire pursue the supply of wastewater and non-drinking water services through a decentralised wastewater system that is operated by a third party provider; however it is noted that the bulk purchase of wastewater could provide a contingency supply. The report provides a 4-step process for the implementation of the wastewater and non-drinking water scheme and makes a recommendation for Council to commence this process as soon as possible.

2 NON-DRINKING WATER SUPPLY STRATEGY

As identified in the preliminary options assessment report (Essential Environmental, 2012), the key determinants of success of wastewater and non-drinking water schemes are cost and service provision. On the basis of these factors, Essential Environmental has identified a preferred strategy for the provision of non-drinking water to Mundijong/Whitby.

2.1 Preferred strategy

The preferred strategy for delivery of wastewater and non-drinking water services to the study area is to construct a local wastewater treatment and recycling plant and provide a reticulated network to supply non-drinking water to private residences.

Sewerage and non-drinking water services would be operated by an alternative service provider (i.e. not the Water Corporation). Drinking water services could also be provided by this alternative service provider through a bulk supply arrangement with the Water Corporation, which would allow current and future residents to deal with a single provider for all their water needs.

2.1.1 Wastewater and non-drinking water

Under the preferred option, locally collected and treated wastewater becomes the non-drinking water source and so the two elements are considered together by this report.

The option of sewer mining that was previously considered by GHD (2011) assumed that sewerage services would be provided by the Water Corporation in line with business as usual. The initial non-drinking water source was proposed to be groundwater and at a point of time in the future when sufficient sewer flow was present the non-drinking water source would switch to treated wastewater (topped up by groundwater as required). This option missed a number of opportunities:

1. There was no consideration of connecting existing properties to the sewerage system to provide an initial base load which would enable wastewater to be used as the non-drinking water source from day one.
2. The inclusion of business as usual sewerage (pumping to Byford and beyond) meant that 20% of sewer flow would have to be maintained, thus reducing the potential yield of non-drinking water.
3. The inclusion of business as usual sewerage (pumping to Byford and beyond) also meant that the potential savings from non-construction of pipeline and pumping station infrastructure were not realised.

In contrast to the “sewer mining” option, the preferred option is to provide a traditional sewerage network which terminates in a wastewater treatment and recycling plant rather than a pumping station. 100% of the treated wastewater is then available for treatment to supply non-drinking water demands and no large pumping stations or extended pipeline infrastructure is required.

An infill sewerage program is recommended as a part of the wastewater/non-drinking water scheme to connect existing residences to the sewerage system with two key benefits:

1. The presence of a predictable sewerage base load from day one of operation provides an income from day one for any service provider.
2. The removal of septic tanks will positively contribute to the water quality of surface and groundwater systems in the Peel-Harvey catchment.

This opportunity is consistent with the recommendations of the Environmental Protection Authority in the Water quality improvement plan for the rivers and estuary of the Peel-Harvey estuary – phosphorous management (2008) as outlined in Table 1.

Table 1: Recommended actions for implementation of the plan

Best management practice	EPA recommended action
Sewage management in existing homes, dwellings and wastewater treatment plants	Enforce full connection of all existing homes to reticulated sewerage within two years of sewerage system passing the property.

Source: *Water quality improvement plan for the rivers and estuary of the Peel-Harvey system – phosphorous management* (EPA 2008) – Table 8.

There are 141 properties known to have septic tanks in the Mundijong-Whitby postcode area that could be connected to the proposed wastewater treatment plant through an infill sewerage scheme (August 2012).

2.1.2 Drinking water

It is reasonable to assume that there is sufficient potable water to meet the needs of the Mundijong Whitby development in the Integrated Water Supply Scheme (IWSS) as a result of longer term sources being developed by the Water Corporation for the broader Perth metropolitan area.

The Water Corporation do not have any existing water servicing plans for the study area. It is noted that Water Corporation have commissioned a project investigating the future potable water supply strategy for the Mundijong Whitby area. It is not known at this stage what the status of this study is or when the investigation is expected to be completed. It is anticipated that the likely source for a future scheme will be from the Serpentine Main and Pipehead Dams via the existing gravity trunk main serving the Perth area and which runs to the south of the Study Area.

Drinking water will supplied from the Serpentine Main will need to be stored in reservoirs on site to provide the necessary operating pressures and ensure uninterrupted supply.

There is an opportunity for the alternative service provider to supply drinking water services. In this scenario the alternative service provider would bulk-purchase drinking water from the Water Corporation and operate the local storage and distribution networks that supply the future community. This could result in a single service and billing interface for the community and may substantially improve the business case for potential service providers.

2.2 Contingency strategy

Implementation of the preferred strategy relies on the financial viability and granting of necessary approvals for the use of recycled water by residents in a fit-for-purpose manner. While such schemes are known to be viable and have been implemented elsewhere, it is

important to note that there are not currently any fully commissioned and operating schemes of this type in Western Australia. Given the relative infancy of this strategy in the local context and the recent history of failed schemes, it is useful to consider a contingency supply strategy to provide the confidence that is required in order to require installation of the third pipe networks within early developments.

The contingency strategy is to provide a stand-alone non-drinking water service, tapping into regionally available water, wastewater and non-drinking water systems. It is possible that the scheme could be combined with bulk servicing arrangements to allow supply of drinking water and/or wastewater services to attract an alternative service provider.

Notwithstanding, service provision for water and wastewater would likely remain with the Water Corporation and there would be a need for a separate non-drinking water service provider. It is unlikely that a sufficiently rewarding business case could be established for an alternative provider to setup a new business in the area for non-drinking water alone. As such, the most viable candidate for service provision under this scenario would be the Shire because it already has a presence in the area and can draw upon existing systems, resources and relationships with the community to operate the scheme.

2.2.1 Non-drinking water

Under the contingency strategy non-drinking water would be sourced from the proposed 'peel pipeline' which will provide treated wastewater from regional wastewater treatment plants.

Peel Infrastructure Holdings Pty Ltd which was formed by the Peel Economic Development Unit, and is wholly owned by five Peel Local Governments - the Shire of Murray, Shire of Boddington, Shire of Waroona, City of Mandurah and Serpentine Jarrahdale Shire proposed a joint venture with the private sector to deliver treated wastewater to a variety of users. The proposal was that Peel Infrastructure Holdings ultimately own the proposed Nambeelup Wastewater Treatment Plant and associated pipe infrastructure to deliver treated wastewater from Gordon Road Wastewater Treatment Plant in Mandurah, to the Nambeelup Industrial Area and potentially other surrounding residential areas for fit-for-purpose use by multiple users including:

- Alcoa
- Harvey Water
- Local governments (as part owners)
- Mining industry

Proposals for the 'peel pipeline' project have been recently reviewed by the Regional Development Council. The Water Corporation are now involved and although stages one and two of the proposal remain relatively unchanged there is some uncertainty regarding ultimate ownership and governance arrangements for the infrastructure.

The currently proposed stages for the project are:

Stage one – Gordon Rd to Pinjarra

A pipeline will be constructed, delivering water from Gordon Road Wastewater Treatment Plant in Mandurah to the Alcoa refinery in Pinjarra. Sizing of the infrastructure will predominantly be focused on delivery of volumes appropriate to the Alcoa demand but will consider future demand also, in particular for Harvey Water who are the most likely and committed other user.

Stage two – Woodman Point to Wagerup

This stage will enable the addition of treated wastewater from Woodman Point to the scheme as well as delivery to Harvey Water and other users. The sizing of the infrastructure at this point will be dependent on demand.

Stage 2 of the peel pipeline proposal continues to present an opportunity for the purchase of bulk non-drinking water for use in Mundijong/Whitby at a relatively low cost. Economic analysis undertaken previously suggested that the fit-for-purpose water would be priced at \$0.30/kL for local government customers.

2.2.2 Wastewater

The contingency strategy does not include any local reuse of wastewater and so, like business as usual, would require connection to regional sewerage systems.

The Water Corporation have prepared a preliminary sewer servicing strategy for the Shire which is depicted in Figure 1. It is proposed for the Mundijong-Whitby area that, during the initial years of the development, collected wastewater will be pumped northwards to the Byford pump station via a new sewer main. However, this pump station has a limited capacity and will not have sufficient capacity to manage the ultimate wastewater load from the study area. The longer term plan is to redirect the collected wastewater via a new sewer main to the new East Rockingham wastewater treatment plant located on the coast.

Similar to the opportunity identified in the preferred strategy for bulk-purchase of drinking water, there may be an opportunity for an alternative service provider to supply wastewater services to improve the business case for potential third parties. Under this arrangement the alternative service provider would collect service charges for wastewater, operate the local sewer network and pumping stations and pay the Water Corporation under a bulk-disposal agreement. The key advantages of this arrangement would be improved viability of the business and opportunity to explore alternative recycling opportunities and disposal options as new water demands in local industries develop.

2.2.3 Drinking water

Drinking water supply for the contingency strategy is the same as that for the preferred strategy with services provided directly by the Water Corporation or through a bulk-supply arrangement via the alternative service provider.

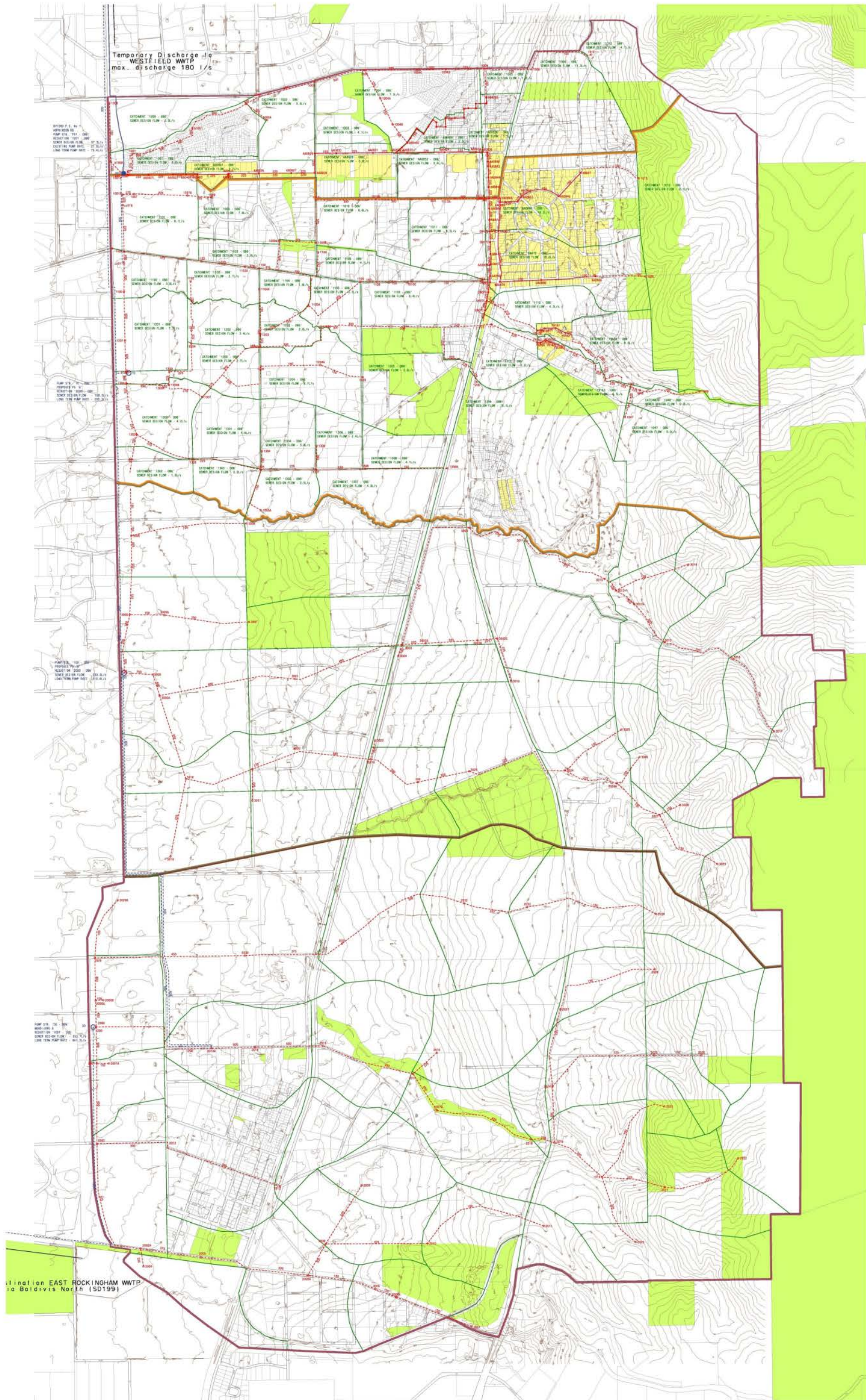


Figure 1 - Water Corporation wastewater planning

2.3 Business as usual

Should the Shire not wish to pursue a non-drinking water supply strategy, water and wastewater services would be provided to Mundijong/Whitby under a “business as usual” approach whereby these services are provided by the Water Corporation. Under this approach, no non-drinking water would be provided and so drinking water would be used for all non-potable uses, with the exception of public open space, which could be irrigated using available groundwater as outline below.

2.3.1 Public open space irrigation demand

Under a “business as usual” scenario, non-drinking water could be supplied from available groundwater for the irrigation of public open space. Mundijong-Whitby lies within the Byford 3 subarea of the serpentine groundwater management area. Recent groundwater allocation information from the Department of Water (Table 2) indicates that there is adequate groundwater available in the superficial aquifer to meet the estimated public open space irrigation demand (1.76 GL/year).

It is noted that while groundwater availability suggests that the total non-drinking water demand, including residential uses, (5.1 GL/year) could be satisfied from these sources. Previous studies discounted groundwater as the preferred source of non-drinking water due to higher capital costs than the preferred option or contingency plan outlined in this report.

Table 2: Groundwater availability in the Byford 3 sub-area (DoW 2012)

aquifer	total allocation	% allocated	Balance available for future licensing
Combined – Fractured Rock West – Fractured Rock	8,500 kL	91.76	700 kL
Perth – Cattamarra Coal Measures	1,130,000 kL	46.84	79,609 kL
Perth – Leederville	2,270,000 kL	81.33	183,522 kL
Perth – Superficial Swan	13,291,660 kL	7.38	11,768,420 kL
Perth – Yarragadee North	0 kL	0	0 kL

3 KEY ASPECTS OF THE STRATEGY

This section of the report discusses key considerations in regards to delivery of the wastewater and non-drinking water scheme, including service provision, infrastructure, land and planning requirements, funding options and approvals.

3.1 Service providers

There are two existing potential service providers which could be considered for delivery and operation of the non-drinking water scheme, other than the Shire.

3.1.1 Trility Pty Ltd (formerly United Utilities)

Trility Pty Ltd is a commercial business who provides water utility services throughout Australia. Trility currently operate over 60 treatment plants (including water, wastewater and water recycling) with a combined capacity of over 1,250 ML per day (approx. 456 GL/yr). Best described from material sourced directly from their website;

TRILITY is a market leader in water utility services across Australia, with water, wastewater and reuse portfolios in the municipal and industrial markets achieved by working in partnership with its clients and employees to deliver a complete range of water utility solutions including:

- *Asset management, operation, maintenance and customer service*
- *Project delivery, including finance, design and construction*
- *Innovative finance and contract packages ranging from Design, Build, Operate and Maintain (DBOM), Design Build and Operate (DBO), Operation and Maintenance (O&M), Alliance contracting and Public Private Partnerships (PPP)*
- *Tailored solutions from financial, engineering, technical, operational and environmental perspectives*
- *Development, implementation and operation of advanced control methodologies*
- *Extensive track record in complex municipal, industrial and resource water, wastewater, water re-use and desalination solutions*

Formerly, United Utilities Australia Pty Ltd at its inception in 1991, TRILITY supplies a range of water and wastewater treatment solutions. 3 million people benefit from our services, currently through 14 projects, across Australia.

TRILITY's capabilities cover the full life cycle of water, wastewater and water re-use projects, including project finance, Design and Construction (D&C), upgrades and refurbishments, Operations and Maintenance (O&M), asset management, utility services, laboratory testing, billing and client services.

TRILITY seek to identify principles for best practice and develop the right solution for each stakeholder and community. They foster involvement from industry specialists to develop responsible solutions and principles for all our clients and their communities. This innovative approach is what produces a sustainable competitive advantage for TRILITY.

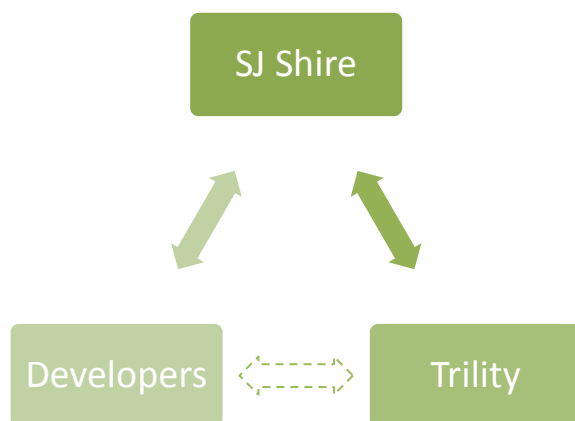
Preliminary discussions with Trility have indicated that they are interested in pursuing opportunities for decentralised water, wastewater and non-drinking water servicing in Mundijong-Whitby.

From these preliminary discussions, the preferred business model for Trility to become involved would be for the Shire to be the asset owner whilst Trility would be the license holder and operator of the scheme. Notwithstanding, it is understood that Trility may be able to attract third party investment in the scheme, potentially including an asset owner, through its existing connections and shareholder base.

Trility indicated that they would prefer to be jointly responsible (with the Shire) for the design of the scheme but would potentially fund investigation and design works themselves.

The infill sewerage program was seen as a key opportunity for building the business case. Maintaining Shire involvement was identified as a critical part of this because of their ability to 'mandate' connection of existing residences.

Key relationships in establishing the scheme will be between the Shire and Trility (scheme design and infill program), the Shire and developers (planning and development process), Trility and developers (customer charters, plumbing guidelines).



The actions required to establish a service provider and build the business case and scheme are outlined in section 4.

3.1.2 Peel Water

Peel Water has been established to provide water services to the Point Grey development where they will provide water and wastewater services including the supply of treated wastewater as non-drinking water to residences, similar to that which is proposed for Mundijong Whitby. Peel Water has recently been granted a water service provider license in Point Grey and will commence operations as the development proceeds. In their own words, sourced from their website:

Peel Water is Western Australia's newest licenced water service provider with exciting growth potential.

Peel Water is focused on delivering their customers high quality water services with a strong emphasis on innovative and sustainable technology solutions. They specialise in the area of servicing small to mid-size property development projects in a manner that recognises the importance of developers' cash flow requirements.

Peel Water has been granted a 25 year Licence by the Economic Regulation Authority of Western Australia (under the Water Services Licensing Act 1995) to provide potable water and sewerage services for the 3,500 dwelling land development project at Point Grey in the Shire of Murray.

Peel Water is a wholly owned subsidiary of Port Bouvard Limited, an award winning Western Australian premium property developer. As such we understand the importance that the delivery of reliable and cost-effective essential services has on achieving quality property development outcomes.

Peel Water is undertaking the entire design, procurement, construction, installation, operation and retailing of the water and wastewater services for the Point Grey community. Point Grey is a planned 3,500 dwelling urban land development on the Peel Inlet and Harvey Estuary in the Shire of Murray.

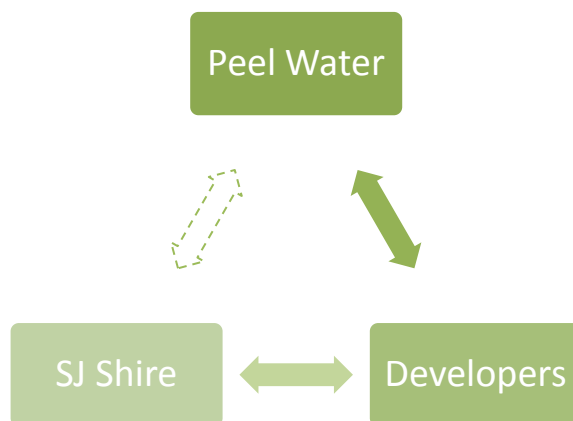
The approach at Point Grey embodies the concept of "Local Water - Local Source/Local Treatment/Local Reuse". The key aspects of the services being provided by Peel Water at Point Grey are:

- *Drinking water (potable water) will be supplied from the Upper Leederville Aquifer. Peel Water has obtained a licence from the Department of Water to extract approximately 300ML per annum using two production bores.*
- *The groundwater will be treated in the Water Treatment Plant (which is located centrally within the residential subdivision) through a treatment train process that includes Reverse Osmosis (RO) (to remove the dissolved salts) and Membrane Filtration (MF).*
- *All wastewater from the development will be directed to the Water Recycling Plant (located adjacent to the Water Treatment Plant) where it will be treated to a very high standard through a process involving a membrane bio-reactor (MBR), UV disinfection and chlorine disinfection. The recycled (non-potable) water will be reticulated back through the subdivision via a "3rd pipe" for irrigation on public open space and private residential gardens.*
- *The MBR has been designed to treat up to 1,000,000 litres of wastewater per day.*

Preliminary discussions with Peel Water have indicated that they can provide a cost effective servicing arrangement for Mundijong/Whitby that will provide high quality recycled water for use by future residences on their lawns and gardens as well as for irrigation of public open space areas.

Similar to the servicing arrangement for the Point Grey development and subject to the various required approvals, Peel Water would facilitate the production of recycled water via the installation of a centralised wastewater treatment plant. The plant would treat the wastewater from all residences and businesses and then redistribute the recycled water throughout the development via a third pipe irrigation scheme. A groundwater allocation would be obtained from the Department of Water to supplement the recycled water scheme and ensure there is adequate supply all year round.

Peel Water have indicated that they would prefer that all assets would be owned and operated by themselves as the licensed service provider. Key relationships in establishing the scheme will be between Peel Water and developers (scheme design, customer charters and plumbing guidelines) and the Shire and developers (planning and development process). Peel Water is not currently in a position to be able to fund investigation and preliminary scheme design works (expected to cost around \$150-200,000). However, they would specify their preferred engineering consultants to undertake the works. It is expected that a fully designed and approved scheme could be provided within 18 months. More detailed information on this process is provided in section 4.



The infill sewerage program was again seen as a key opportunity and the Shire’s involvement in the delivering the program was seen as an important factor and benefit.

3.1.3 *The Shire as licensed service provider*

The Shire has expressed a preference to not become the licensed service provider. However, should the recommended option not be viable for any reason, it is considered that bulk purchase of treated wastewater from the Peel pipeline and delivery of a stand-alone non-drinking water service (identified as the contingency option) would be unlikely to attract a commercial service provider.

It is therefore recommended that the Shire agree to become the “provider of last resort” to ensure the contingency strategy remains valid so that the Mundijong/Whitby district structure plan area can ultimately be supplied with non-drinking water.

3.2 Infrastructure

There are a number of specific infrastructure requirements for the supply of wastewater and non-drinking water services to Mundijong/Whitby. Both the preferred and contingency options propose dual supply systems, with drinking and non-drinking water supplied by separate pipe networks. The dual distribution networks will be identical for both options.

GHD has previously undertaken an assessment of the preliminary infrastructure requirements for the options which were under consideration in their integrated water management study. The GHD study considered sewer mining, which has the same non-drinking water distribution infrastructure as for the current strategy and can therefore be used as a starting point to understand likely infrastructure requirements. As per the GHD findings, the distribution systems will need to include storage tanks, main distribution pipes and pumping stations for both drinking and non-drinking water systems.

In addition to this infrastructure, the preferred strategy will require construction of a wastewater collection system and a treatment/recycling plant. There are a number of wastewater treatment and recycling technologies available which can achieve efficient treatment for reuse applications.

With regards to the contingency strategy, the recycled wastewater supplied by the Peel pipeline should be “fit-for-purpose” and it is assumed that it will not require construction of a treatment plant.

In the absence of site specific analysis of wastewater conveyance systems, it is reasonable to assume that the standard headworks cost applied by Water Corporation is a satisfactory estimate of wastewater conveyance cost for the study area.

If all drinking water and in-house non-drinking water is ultimately disposed of via the wastewater system, it is estimated that the annual wastewater volume will be 3.24 GL. Under the preferred strategy all wastewater will be available for treatment and potential recycling as non-drinking water. While, this volume is approximately equal to the total residential non-drinking water demand (3.42 GL), it is noted that demand is seasonal and will vary as the area develops over time. As such, it is likely that additional infrastructure may be required to augment the non-drinking water supply in response to summer demand and staging. Further detailed analysis will be required during design of the scheme infrastructure to determine additional infrastructure requirements.

With the excess summer water demand for non-drinking water as described above, it is possible that public open space will need to be irrigated from local groundwater using stand-alone bores.

Table 3 presents a summary of the key infrastructure requirements and approximate capital costs for the preferred strategy. These costs do not include local lead in infrastructure for each development or internal networks for drinking water, non-drinking water or wastewater services.

Table 3: Other infrastructure and indicative capital cost (Adapted from GHD 2007 and EE 2012)

	Details	Approximate capital cost	Notes
Wastewater collection	Wastewater conveyance system (main sewers, branch sewers and local pump stations)	\$23,000,000	Assume conveyance costs as per standard WC headworks
Wastewater recycling / NDW treatment	10ML/d wastewater recovery plant (oxidation ditch, membrane batch reactor, disinfection)	\$32,000,000	Decentralised system only
Non-drinking water distribution	220L/sec, 80m primary pump station 2 x 7.5ML ground level storage tank 50L/sec, 15m booster pump station Piped distribution network	\$59,000,000	
POS Irrigation	30 x 20m POS bores 10 x 50m POS bores	\$2,000,000	Also required for business as usual
Drinking water distribution	1,200m of 450mm water distribution pipe 2 x 3ML ground level storage tank 5 L/sec, 20m booster pump station Piped distribution network	\$21,000,000	

In a business as usual scenario “conveyance assets” (main distribution/collection pipes, pump stations and storage facilities) for drinking water and wastewater are incorporated into the Water Corporation’s headworks charges and are therefore paid by developers on a \$/lot basis.

For comparative purposes:

- The Water Corporation’s standard headworks charge for drinking water (in 2012-13) is \$4074 per lot/dwelling, which would equate to approximately \$68,000,000 across the study area. Using the assumptions adopted by GHD, if this water headworks charge was reduced proportional to the estimated demand (significantly less with NDW scheme) then the equivalent headworks charge would be approximately \$18,000,000.
- The Water Corporation’s standard headworks charge for sewerage (in 2012-12) is \$1,347 per lot/dwelling, which equates to approximately \$23,000,000.
- The actual cost of a BAU scheme for the Mundijong/Whitby Area may be higher if the Water Corporation considers the area “non-standard”.

It is understood that the cost of wastewater conveyance in a business as usual scenario is likely to include significant additional costs due to the relative remoteness of the site and the need to pump wastewater over long distances and ultimately build a new wastewater treatment plant at Rockingham to cope with the subregional demand.

The cost of “at source” treatment and wastewater treatment systems (i.e. water and wastewater treatment plants) is not included in Water Corporation headworks charges and therefore has not been included in the equivalent “headworks” cost for the proposed NDW schemes. In other words; a meaningful comparison of costs does not consider the cost of the proposed wastewater treatment plant because this cost would not ordinarily be covered by headworks charges as wastewater treatment plants are usually funded through other mechanisms.

While these costs are preliminary due to the uncertainty regarding site specific Water Corporation headworks costs, it is useful to consider the equivalent cost of “conveyance assets” for the business as usual vs. the preferred strategy. As illustrated in Table 4 the equivalent headworks cost for the preferred strategy is similar to that which would be incurred under the “business as usual” scenario, should only standard headworks charges be charged (although this is considered unlikely). Possible funding arrangements for infrastructure are discussed in section 3.5.

Table 4 – Equivalent “headworks” costs

Option	Drinking Water	Wastewater	Non-Drinking Water	Total	Water services cost per Lot/dwelling
Business as usual	\$68 M (Standard WC headworks) + site specific charges	\$23 M (Standard WC headworks) + site specific charges	\$2 M (POS Bores)	\$93 M + site specific charges	\$5,570 + site specific charges

Option	Drinking Water	Wastewater	Non-Drinking Water	Total	Water services cost per Lot/dwelling
Proposed NDW scheme	\$18 M - \$21 M (est DW distribution or reduced WC headworks)	\$23 M (conveyance system)	\$61 M (NDW distribution + POS Bores)	\$102 M - \$105 M	\$6110 - \$6,290

3.3 Land

By co-locating storage and distribution infrastructure of drinking water and non-drinking water schemes, land requirements for the preferred and contingency strategies should be similar to that which would be expected for a “business as usual” scenario.

Dedicated land allocation will be required for provision of storage tanks and the proposed wastewater treatment / recycling plant; however, this is not expected to be substantial and the final land area and buffers required for the wastewater treatment / recycling plant will be determined by the technology selected. The requirement could be as small as a single one hectare site with no buffers required.

From previous studies undertaken by GHD, approximately 5 hectares of land would be required for storage reservoirs and pumping stations in one or two locations.

Other infrastructure will generally be located in road reserves and public open space. Depending on the layout of public open space and design of the sewerage network it may be necessary to provide small parcels of land in key locations to accommodate local wastewater pump stations.

3.4 Planning

The Shire together with the Western Australian Planning Commission will need to carefully administer the provisions of the Planning and Development Act and Local Government Act to facilitate provision of key infrastructure, access easements and land to facilitate implementation of the strategy. Specifically:

- Land will be required to accommodate key infrastructure as described above. The tenure and zoning of this land will need to reflect its long-term use.
- It will be necessary to identify and protect corridors of land and/or easements throughout the development area to facilitate provision of main distribution pipes, local water networks and sewerage pump stations.
- Planning conditions will need to facilitate collection of any headworks charges and prefunding of distribution network by developers (if required).
- Local government will need to act in order to facilitate connection of existing properties to any infill sewerage scheme.

The ability of the Shire to administer the necessary development controls will largely determine the success of the strategy.

3.5 Funding

The proposed non-drinking water scheme will require significant capital investment. There are a variety of possible funding sources to be investigated. The following provides a summary of potential sources but is not exhaustive. Funding programs are periodic in nature and the most appropriate programs will need to be identified and targeted at later stages of scheme definition.

3.5.1 Developer contributions

In a “business as usual” scenario, land development costs include a contribution toward water and wastewater infrastructure.

The minimum contribution for a development serviced by the Water Corporation is the standard per-lot headworks charge to cover the cost of conveyance systems and installation of local “reticulation” infrastructure within the development. Where a development requires specific permanent or temporary infrastructure to be installed, the development is often required to “prefund” this infrastructure or provide it in addition to the ordinary headworks charge. The infrastructure required to service the study area is significant, and it is likely that there would be significant costs incurred on top of that which is covered by the standard contributions arrangements.

Equivalent arrangements to that which would be incurred by developers under a “business as usual” scenario would provide a significant source of capital and funding for the infrastructure required to implement a non-drinking water scheme. There is a strong case that an appropriate headworks charge should be higher than the standard charges due to the remoteness of the site to existing services and the additional benefits afforded by provision of a non-drinking water scheme. Notwithstanding, it is necessary to consider that additional costs will be incurred by the developers from installation of a non-drinking water reticulation network within their landholding. As such, an appropriate headworks charge will need to be established that considers the viability of land developments, and therefore the overall scheme.

If the cost of distribution infrastructure was recovered using the equivalent headworks costs estimated in Section 3.2, then the capital investment contributed through developer contributions would be between \$102- \$105 M.

It will be necessary for the Shire and the proposed service provider to engage with developers and determine a reasonable arrangement for infrastructure contributions in order to finalise the financial viability of the scheme.

3.5.2 Federal Government funding

There are no Federal Government funding programs currently advertising for submissions, however there are a number of programs which could potentially be sources of funding for elements of the proposed scheme, in particular; the infill sewerage program.

Commonwealth financial assistance grants (general purpose) to local government are provided under the *Local government (financial assistance) act 1995*. The funding is distributed on behalf of the Department of Regional Australia, Local Government, Arts and Sport by the Western Australian Local Government Grants Commission.

Commonwealth regional development Australia fund is a competitive grants program managed by the Department of Regional Australia, Local Government, Arts and Sport. The program is open to local government bodies and incorporated not-for-profit organisations for

projects that identify and invest in regional priorities. Eligible organisations can apply for funding for 'investment ready' projects. Grants are available from \$500,000 and \$15 million.

Community action grants are a small grants component of the Australian Government's Caring for our Country initiative that aims to help local community groups take action to conserve and protect their natural environment. Community action grants are managed by the Department of Sustainability, Environment, Water, Populations and Communities and are targeted towards established local community-based organisations that are successfully delivering projects to support sustainable farming or protect and enhance the natural environment, such as the health of the Ramsar-listed Peel-Harvey Estuary.

On-ground funding is available as a part of the Australian Government's Caring for our Country initiative from the South West Catchment Council for projects and specifically of interest to this project is the funding program's target in relation to protecting coastal hotspots (Peel-Harvey catchment). The target is to address the threats contributing to poor or declining water quality of priority coastal hotspots through implementing on-ground management actions identified in the Peel Inlet and Harvey Estuary Water Quality Improvement Plan (WQIP).

The program seeks projects that will implement best management practices/on-ground actions identified in the WQIP that improves declining or poor water quality in the catchment.

3.5.3 State Government funding

Local government support grants are available from Lotterywest to help create better facilities and opportunities for communities. Grants are provided for Local Government Authorities towards a very wide range of purposes. Grants may be provided for projects that have broad community benefit and meet all other Lotterywest requirements. Examples of such projects might be events and celebrations, community and recreation centres, specific programs directed at people with special needs etc. Core local government activities are not eligible for grants.

3.5.4 Private investment

Aside from possible contributions from developers the largest potential source of funding exists in private funding of the scheme on the basis of expected returns from operating profit.

To assess the magnitude of the business case which could be considered, the preliminary estimates of ongoing operating costs can be compared against expected revenue using service and usage charges that are currently applied by the Water Corporation. These service charges equate to approximately \$19.1 M/year (see table 5).

From the discussion in Section 3.2 the capital cost of key infrastructure for a decentralised system is estimated to be \$140 M. If we consider that annual operating costs are likely to be less than 2% (\$2.8 M pa), depreciation of assets over 40 years (\$3.5M pa), and bulk drinking water is supplied at a rate of 187 c/kL (\$3.55 M pa) then the total operating cost would be approximately \$9.9 M pa.

Based on these numbers, operating profit could be as high as \$9.2 M per annum and with an annual return on investment of 10%, it is reasonable that with a solid business case, investment interest of up to \$90 M could be anticipated.

Table 5 – expected revenue (based on current Water Corporation charges)

Revenue Source	Rate	Estimate for MW
Service Charges		(16693 Lots)
Wastewater	\$725 per household	\$12.1 M
Drinking Water	\$188 per household	\$3.1 M
Non-Drinking Water	\$100 per household	\$1.7 M
Usage		(1.9 GL /yr)
Drinking Water	119.2 c/KL	\$2.2 M
Non-Drinking Water		
Total Revenue		\$19.1 M /yr

3.6 Approvals

The approvals process for the proposed wastewater and non-drinking water strategy is relatively straight-forward and well documented with each approval linked to a single approval agency and focussed on specific elements of the scheme. There are a number of supporting documents required but each approval agency provides guidelines and templates to assist in their development. These are outlined in table 6.

Table 6 – Summary of approvals required for a wastewater recycling scheme

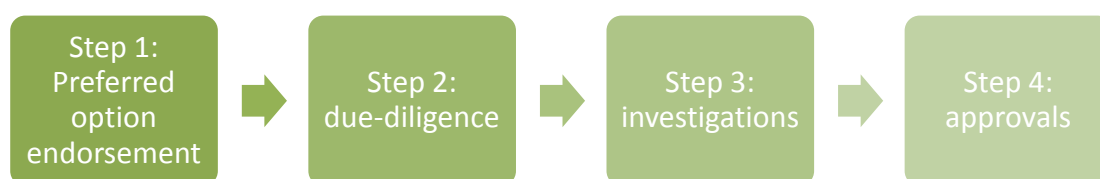
Scheme element	Approval required	Authority	Supporting documentation
Provision of water supply services	License to provide water supply services (potable and non-potable) and sewerage services	Economic Regulation Authority	<ul style="list-style-type: none"> Corporate and financial information Customer service charter Construction schedule Asset management plan
Supply of recycled wastewater	Recycled water scheme approval	Department of Health	<ul style="list-style-type: none"> Recycled water quality management plan
Construction of a wastewater treatment plant	Part V works approval	Department of Environment and Conservation	<ul style="list-style-type: none"> Proponent scoping document
Operation of a wastewater treatment plant	License to operate (operating volumes >100 m ³ /day) Registration (operating volumes 20-100 m ³ /day)	Department of Environment and Conservation	<ul style="list-style-type: none"> Nutrient and irrigation management plan
Irrigation of public open space with groundwater	26 License to construct a bore 5C license to abstract water	Department of Water	<ul style="list-style-type: none"> Hydrological assessment

4 IMPLEMENTATION

The preferred strategy is for the delivery of wastewater and non-drinking water services through decentralised wastewater collection, treatment and distribution system operated by a third party service provider. In order to realise this strategy the Shire will need to assist in the delivery of the scheme through careful management of planning controls, liaison and negotiation with developers and through formal support of the proposal to obtain the necessary approvals. Consideration should also be given to the option for the service provider to supply drinking water also, under bulk purchase from the Water Corporation.

If a fully decentralised system and alternatives considered by the third party prove to be unviable then the Shire has the option of pursuing the Bulk Supply option.

Key tasks / steps for the Shire in realising the preferred strategy are:



These steps are outlined below.



Step 1 – Preferred option endorsement

In order that development can proceed with minimal delay including proper considerations of the infrastructure and other requirements associated with provision of non-drinking water services it is essential that agreement to progress with the preferred option is reached immediately so that discussions with service providers can commence.

This step requires Council to resolve to progress with development of a wastewater and non-drinking water scheme incorporating local wastewater treatment and recycling for distribution through a reticulated network.

Action

Consider the outcomes of this report and resolve to progress with the preferred strategy to realise delivery of wastewater and non-drinking water services through a third party service provider.

Outcome

Council resolution to progress with development of a wastewater and non-drinking water scheme incorporating local wastewater treatment and recycling for distribution through a third pipe.

Deadline

August 2012

Step 2 – Due-diligence



The primary objective for this step is the selection of a preferred service provider. This decision should take into consideration the information provided herein but it will also be necessary to

meet with each of the potential providers to gain an understanding of their differing proposed approaches and capacity to deliver.

The selected service provider is expected to play an increasingly significant role from this stage forward. The service provider will need to undertake due-diligence investigations and whichever potential service provider is engaged, it will be necessary to agree to a process and funding arrangements for investigations.

This step requires Council to resolve to work with and support a specific service provider to progress with development of detailed conceptual design and business case and to initiate discussions with developers. In addition, there may be a need for Council to commit funding for investigations.

Actions

Commence discussions with potential service providers to confirm interest in the proposal and clarify expectations and preferred delivery arrangements.

Provide the preferred service provider with access to previous studies to facilitate their due-diligence process and develop funding model for investigation phase works.

Outcome	Deadline
Council resolution to work with and support a specific service provider to progress with development of detailed conceptual design and business case and to initiate discussions with developers.	September 2012

Step 3 – Investigations



During this step it is expected that the proposed service provider will take the lead, directing investigations and development of a business case as well as negotiating directly with developers to establish the parameters of future service agreements. It will however be necessary for the Shire to assist with these activities and it may be necessary to wholly or partially fund this step. The extent and nature of Shire involvement in this step should have been established during previous negotiations with the service provider.

The key objective for this step will be to gain developer support for the proposed wastewater and non-drinking water strategy as well as establishing a business case and detailed conceptual design. It is expected that this work can be progressed to the point necessary to secure developer support by January 2013.

Actions

Assist in preparation of detailed conceptual design and business case for endorsement by relevant authorities and subsequent approvals documentation for the preferred scheme (as required).

Confirm the preferred funding model of the service provider and assist in presenting this funding model to developers to obtain their support for the proposal.

Outcome	Deadline
Developer support for proposed non-drinking water scheme and funding model	January 2013

Step 4 – Approvals



The core tasks of this step are likely to be largely service provider-led and the Shire’s involvement will be limited to the provision of support for approval applications and administration of planning approvals.

The Shire will also play a significant role in administering notices and applying controls to implement the infill sewerage scheme, and depending on funding mechanisms defined during the investigations phase, the Shire may also be administering developer contributions for the scheme.

Actions

Support applications for various approvals required to implement the scheme.

Apply relevant conditions to planning and development applications as required to implement the strategy.

Administer notices and controls to implement infill sewerage to existing lots.

Outcome	Deadline
Approved wastewater and non-drinking water scheme ready for construction phase	August 2013

5 CONCLUSION

Preliminary review of information on options, costs and service provision have demonstrated prefeasibility for the development of a wastewater and non-drinking water scheme for Mundijong/Whitby based on the decentralised collection, treatment and distribution of wastewater. This will require agreement between the Shire and a third party service provider to design, develop and implement the proposed scheme.

In addition, consideration should be given to the opportunity for the service provider to supply the community with drinking water, as this provides greater clarity for the community regarding its water services provider and also provides additional financial incentives through economies of scale.

On the basis of this review, it is recommended that the Serpentine-Jarrahdale Shire:

1. endorse the delivery of a wastewater and non-drinking water scheme for Mundijong/Whitby based on the decentralised collection, treatment and distribution of wastewater through a third party service provider;
2. commence the implementation process through discussions with potential third party service providers to further examine the financial viability of the proposal and explore options for design and the timing of key infrastructure, with the aim of obtaining a commitment from one provider to operate the scheme;
3. Support investigations and necessary actions including infill sewerage and planning conditions; and
4. Support, as required, the necessary approvals for the scheme.

It is important to note that developers are proceeding with investigations and planning for development currently and it is expected that applications for subdivision will be received within the next 15 months.

It is also noted that if a fully decentralised system and alternatives considered by the third party prove to be unviable, the Shire has the option of pursuing the Bulk Supply option as a contingency.

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Client: Serpentine Jarrahdale Shire

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