



Department of Water and Environmental
Regulation
Wanju and Waterloo Water Servicing
Final Report

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Table of contents

Acronyms.....	i
1. Introduction.....	1
1.1 Background and project need.....	1
1.2 Study purpose.....	2
1.3 Scope and limitations.....	3
1.4 Assumptions and reference documents	3
2. Water servicing principles	4
3. Water service providers	5
3.1 Overview	5
3.2 Strategic planning by existing water service providers.....	5
3.3 Appointment of a water service provider	5
3.4 Water service provider licences.....	6
4. Review of planning instruments	7
4.1 Embedding water servicing principles into land use planning instruments	7
4.2 Review of land use planning instruments	7
4.3 Recommendations	11
5. Estimated water demands.....	12
5.1 Approach.....	12
5.2 Development staging	13
5.3 Other assumptions.....	13
5.4 Assumed unit demands	15
5.5 Demand summary.....	15
6. Water servicing options.....	17
7. Key issues and options	22
8. Next stages	28
9. References.....	30

Table index

Table 1:	Wanju open space	14
Table 2:	Wanju schools.....	14
Table 3:	Water efficiency estimates	14
Table 4:	Adopted unit demands	15
Table 5:	Wanju and Waterloo water servicing options	18
Table 6:	Key considerations and issues	23
Table 7:	Recommended tasks	28
Table 8:	Wanju staging – high growth rate	33
Table 9:	Wanju staging – medium growth rate	34
Table 10:	Open space staging – high growth rate	35
Table 11:	Open space staging – medium growth rate	35
Table 12:	Wanju demand estimates – high growth (kL/annum)	36
Table 13:	Wanju demand estimates – medium growth (kL/annum)	37
Table 14:	Wanju residential demand estimate – upper estimate, high growth, by precinct (kL/annum).....	38
Table 15:	Wanju residential estimate – upper estimate, medium growth, by precinct (kL/annum).....	38
Table 16:	Wanju residential estimate – lower estimate, high growth, by precinct (kL/annum).....	39
Table 17:	Wanju residential estimate – lower estimate, medium growth, by precinct (kL/annum).....	39

Figure index

Figure 1:	Locality plan	1
Figure 2:	Wanju water demand over time	16
Figure 3:	Wanju water demands over time by demand type (high growth rate)	16

Appendices

Appendix A – Water demand calculations

Acronyms

BaU	Business as usual
CBA	Cost Benefit Analysis
CRID	Collie River Irrigation District
DCP	Developer contribution plan
DPLH	Department of Planning, Lands and Heritage
DSP	District structure plan
DW	Drinking water
DWER	Department of Water and Environmental Regulation
DWMS	District Water Management Strategy
ERA	Economic Regulation Authority
FFPW	Fit for purpose water
GBRS	Greater Bunbury Region Scheme
LGA	Local government area
LPS	Local planning scheme
LSP	Local structure plan
MAR	Managed aquifer recharge
P&D Act	<i>Planning and Development Act 2005</i>
POS	Public open space
SSDP	Southern Seawater Desalination Plant
TWW	Treated wastewater
WAPC	Western Australian Planning Commission
WSP	Water service provider
WSS	Water servicing solution
WTP	Water treatment plant
WW	Wastewater
WWTP	Wastewater treatment plant

1. Introduction

1.1 Background and project need

The Wanju development is considered the most significant greenfield development in the greater Bunbury region for the next 40 years¹. It is forecast that the population of Wanju will ultimately reach 50,000 people within 20,000 homes.

Wanju is situated approximately 15 km east of Bunbury (Figure 1), in the Shire of Dardanup. It is expected that the development will take decades to be fully completed and will be developed over six precincts.

Adjacent and south of Wanju is the Waterloo industrial development. Waterloo will consist of eleven precincts of commercial, industrial and light industrial land uses with an agri-food processing precinct. The development will be connected to Greater Bunbury area by the Bunbury outer ring road and proposed railway.

Studies undertaken to date identify that there is no clear water service provider(s) for the development. One wastewater and two water service provider (WSP) licences currently exist over the development area and are held by Water Corporation and Aqwest. Additionally, Water Corporation is a drainage and irrigation service provider and Harvey Water is a non-potable water supply and irrigation service provider in the area. There are also opportunities for new water service providers in the area.

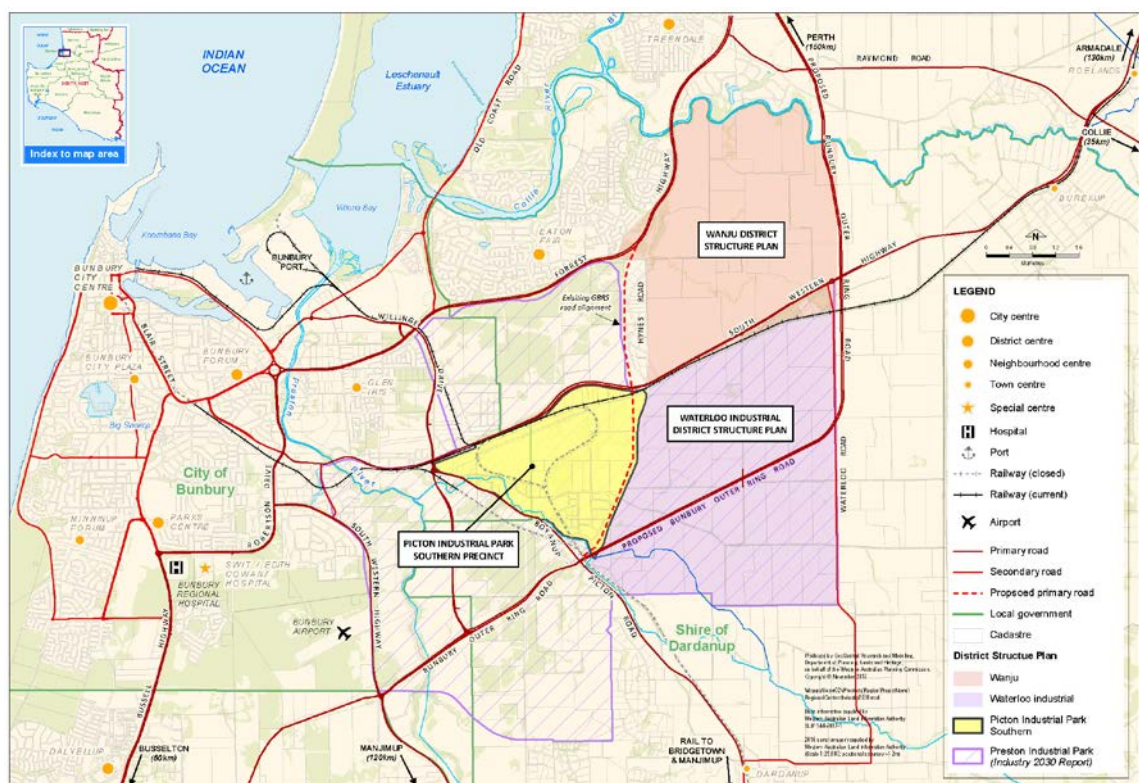


Figure 1: Locality plan²

¹ Wanju District Structure Plan (Draft) (2016).

² Source: Draft Waterloo Industrial Park District Structure Plan

In 2014 the then Department of Water commenced the South West Non-potable Urban Water Project with the goal of developing an intermediate and long term strategy to facilitate the provision of water and water infrastructure to support the demand for non-potable water. The project had a focus on irrigation demand for public/regional open space and community recreational space in priority urban development areas of the South West. Wanju was one of the focus areas and while the project undertook a gateway assessment of potential fit for purpose water sources, it was deemed more appropriate to investigate water servicing as a total service.

As development of the Wanju District Structure Plan progressed, investigations were undertaken to assess how to ensure the vision for Wanju could be realised. This required consideration of water service needs and included a review of how water service provisions and providers are selected and implemented.

Under the current planning process, no currently licensed WSP has a guaranteed position and this results in uncertainty and risk, in the context of their strategic (20-50 year horizon) and detailed (6-20 year horizon) planning. Further, there is a significant risk that multiple service providers with differing objectives may be appointed as Wanju progresses, leading to an uncoordinated approach and sub-optimal outcomes in terms of water resource management. Consequently, a more collaborative approach is required, with planning and regulatory direction provided by the Department of Planning, Lands and Heritage (DPLH), Department of Water and Environmental Regulation (DWER) and Shire of Dardanup (SoD).

As a largely greenfield site, with minimal existing infrastructure and limited groundwater availability, there are opportunities for alternative approaches to water servicing.

1.2 Study purpose

The purpose of this Wanju and Waterloo Water Servicing report is to:

1. Collaboratively develop water servicing principles to guide the staged development of Wanju and Waterloo,
2. Review the process for selection of water service providers in a major residential/commercial greenfield development area, such as Wanju,
3. Identify planning instruments to embed and enforce the agreed principles,
4. Estimate the staged water demands for Wanju,
5. Identify high level site specific water servicing options (including integrated options) applicable for Wanju and Waterloo,
6. Consult with the relevant stakeholders through DWER, including Water Corporation, Aqwest, Harvey Water, Water West, DPLH and Shire of Dardanup, and
7. Prepare a list of recommended actions to continue the water servicing planning for Wanju and Waterloo.

1.3 Scope and limitations

This report: has been prepared by GHD for Department of Water and Environmental Regulation and may only be used and relied on by Department of Water and Environmental Regulation for the purpose agreed between GHD and the Department of Water and Environmental Regulation as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Department of Water and Environmental Regulation arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer sections 1.4 and 5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Department of Water and Environmental Regulation and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.4 Assumptions and reference documents

The following documents have been used in preparing this report:

- Wanju district structure plan (Draft) (September 2016),
- Wanju – Staging plan (March 2018), Integran,
- Wanju Integrated Water Management Strategy (June 2016), Calibre,
- Wanju and Waterloo – Servicing Needs Investigation (May 2016), Integran, and
- Waterloo Industrial Park district structure plan (draft) (May 2017).

Using these documents, a series of assumptions have been made to estimate the water demands for the Wanju development. These assumptions have been documented in Section 5.

2. Water servicing principles

A key step to implementing and delivering appropriate water servicing to the Wanju and Waterloo developments is the early establishment of water servicing principles. Once agreed, these principles can be embedded into relevant planning instruments (refer to Section 4 for further discussion).

In developing a set of water servicing principles for Wanju and Waterloo the following key stakeholders were consulted through DWER:

- DWER,
- DPLH,
- Shire of Dardanup,
- Aqwest,
- Harvey Water,
- Water Corporation, and
- Water West.

The feedback received from the stakeholders was reviewed and considered in the development of the following final set of water servicing principles, which are consistent with the National Urban Water Planning Principles developed under the National Water Initiative.

- 1. As a primary approach, water service providers and developers are required to incorporate leading-edge water service solutions (WSS), including consideration of integrated water cycle management solutions, in their infrastructure planning ^(3,4).**
- 2. Optimal WSS will be proven by a triple bottom line assessment of viable options; and shown to be financially viable, wherein there is a means of recovering costs through charges.**
- 3. Long-term water servicing needs will be consistently, fairly and equitably defined for residential, commercial, industrial and community customers, based on a robust whole-of-water-cycle balance that takes into account the best available climate forecasts.**
- 4. Development of optimal WSS will be completed for local level structure planning and enable timely implementation at subdivision stage. Staged implementation will not limit the ability to deliver the optimal WSS for the entire urban footprint, as defined in the district structure plan(s).**
- 5. Optimal WSS will be resilient, flexible and adaptable to external factors, including drying climate, water policy reforms, changes in demand profiles, commercial servicing options and emerging technologies.**
- 6. As staged development progresses, there will be opportunities for beneficial collaboration between multiple water service providers, in any part of the water cycle.**

These principles will form the vision for water servicing within Wanju. The “owner” of each principle and its specific implementation actions will need to be defined during the next phase of work.

³ An integrated water cycle management solution may include drainage/stormwater, scheme water, fit for purpose water (for irrigation of public and regional open space and community recreational space) and wastewater.

⁴ Refer to the Cooperative Research Centre for Water Sensitive Cities for current research and strategies – <https://watersensitivecities.org.au/>

3. Water service providers

3.1 Overview

In 2012, the *Water Services Act 2012* replaced, consolidated and streamlined water services legislation which was previously spread across nine Acts.

The purpose of the *Water Services Act 2012* includes enabling water service providers to deliver water supply, irrigation, sewerage and drainage services, as well as affording easier entry into the market for new service providers thereby allowing increased competition.

DWER were consulted in completing this chapter on water service providers.

3.2 Strategic planning by existing water service providers

Under the *Water Corporations Act 1995*, the Water Corporation, Aqwest and Busselton Water are required to develop five year strategic development plans, approved by the Minister and endorsed by the Treasurer. For example, the Water Corporation carries out its water supply planning at three levels: strategic/regional (up to 30 or 50 year planning horizons); tactical (scheme), 5 to 20 year plans; and operational, detailed short-term plans (up to 5 years). DWER then coordinates independent advice across government to the Minister for Water on decisions to develop new water supplies and takes into account the strategic directions that involved key stakeholders during the long-term planning.

To achieve the water servicing principles outlined in section 2, medium and long term water supply planning is essential and will encourage innovation, transparency, integration, stakeholder consultation and help to secure adequate investment. Failure to undertake this medium and long term planning by the appropriate water service provider(s) is a key risk for Wanju and Waterloo.

3.3 Appointment of a water service provider

It is the responsibility of a developer to appoint a service provider(s) (water, wastewater, drainage and/or non-potable water) for their development. Traditionally and uncontroversially, the appointment has defaulted to the established service providers within proximity of the development area (e.g. Water Corporation, Aqwest or Busselton Water). However, in some cases the land developer will chose a private licensed service provider (e.g. North Dandalup, South Lancelin, South Guilderton and Stoneville urban expansion areas).

However, Wanju (and Waterloo) is a unique development as there is no clearly established service provider in the area, and both Water Corporation and Aqwest have potable water service provider licences encompassing the Wanju area. Additionally, Water Corporation is a licenced service provider for wastewater, drainage and irrigation and Harvey Water is a non-potable water supply and irrigation service provider. Both potable water service providers also have some potable water infrastructure in the broad vicinity of the development, but this is largely reticulation sized pipes. Water Corporation have wastewater services in Burekup, however this is not in the immediate vicinity of the development. Therefore the onus is on the developer to select a provider(s) that suits their needs. This presents a risk that multiple service providers with multiple objectives may be appointed as Wanju progresses, leading to an uncoordinated approach and sub-optimal outcomes in terms of water resource management.

It is understood that there is no set trigger within the planning process for the appointment of a service provider, however land assembly and a firm approach by the land developer is the usual trigger point for the identification and appointment of a service provider. Further, there are no

provisions under the *Water Services Act 2012* for the Minister to select a single service provider for the area at the District Structure Plan stage.

Due to the scale of the Wanju/Waterloo development area, its anticipated 40 year implementation timeframe, and the 5 to 10 year lead time prior to first sub-division stages, it is considered premature to make a selection of WSP(s) during district planning. However, there is an expectation from DPLH that a service provider(s) would be confirmed by the time of a local structure plan being lodged.

To minimise the risk of having several water provision objectives within Wanju and Waterloo, a clear set of water servicing principles, as outlined in Section 2, is to be established. It is the intent that these principles are embedded within the relevant planning instruments to guide and regulate the water service provision within Wanju. The planning instruments are further discussed within Section 4.

3.4 Water service provider licences

A brief summary of the process for obtaining a water service provider licence is summarised below. Currently, Water Corporation and Aqwest are existing potable water service providers. Additionally, Water Corporation is a sewerage, drainage and irrigation service provider and Harvey Water is non-potable water supply and irrigation service provider in the area. Any additional private entities would need to gain a licence from the Economic Regulation Authority (ERA) to provide potable water, sewerage, irrigation, drainage or non-potable services to Wanju and Waterloo. It is recommended that the ERA consider the water servicing principles developed for Wanju as part of their licence assessments.

To apply for a water service licence (of up to 25 years) an applicant would need to (*Water Services Act 2012 Section 10. Application for licence*):

- Submit an application form to the ERA with the prescribed fee.
- The applicant must inform the ERA of:
 - Nature of proposed service(s) to be provided.
 - For each class (water supply, sewerage, irrigation or drainage services) the applicant must inform of:
 - Area(s) of service provision (areas do not need to be contiguous)
 - Methods/principles that will be used in provision of the service(s)
 - Nature of water service works to be used
 - Standard terms and conditions for the service provision
 - Standard customer contracts (if any).

To be considered for a licence the following has to be satisfied (*Water Services Act 2012 Section 11: Grant of licence*):

- The applicant has and is likely to retain the financial and technical ability to provide the service(s) to the operating area(s) (or will acquire that ability within a reasonable time after approval), and
- Approval of the licence is not contrary to the public interest. Public interest assessment is carried out by the ERA and involves public consultation on the granting of any new licence.

4. Review of planning instruments

4.1 Embedding water servicing principles into land use planning instruments

The key opportunities to embed water servicing principles for the proposed new community of Wanju include:

- Shire of Dardanup Local Planning Scheme (LPS), providing a statutory framework to achieve the principles,
- Wanju District Structure Plan (DSP), providing a strategic planning framework to achieve the principles, and
- Wanju District Water Management Strategy (DWMS), providing an implementation framework to achieve the principles.

In considering the most appropriate instruments to embed principles, it is important to consider the intent of the principles in relation to the planning purpose of various instruments. The proposed water servicing principles have been developed in consultation with key stakeholders, and relate to a diversity of factors that influence delivery of water servicing. Not all of these factors relate specifically to land use planning decisions; in particular collaboration between water service providers, financial viability, and cost recovery through charges.

If water servicing principles are to be embedded into planning instruments (in particular planning schemes), they will require adaptation to serve a clear planning purpose. In their current form, they are likely suitable for inclusion into water management strategies, as the purpose of these documents is to plan for all facets of integrated water cycle management and inform infrastructure planning, and servicing principles are consistent with that purpose. However, the following elements do not comfortably align with the role and function of specific land use planning instruments, such as schemes and structure plans:

- Principle 1 – planning schemes and structure plans do not typically regulate infrastructure planning by water providers as this occurs outside land use planning decisions.
- Principle 2 – water charges are not applied under any land use planning instrument, therefore planning measures cannot achieve this principle.
- Principle 5 – commercial servicing options, (some) water policy and technology choices are not regulated by land use planning instruments and this decision-making would occur outside of typical land use planning decisions.
- Principle 6 – collaboration between different water service providers is not regulated or influenced by land use planning decisions.

4.2 Review of land use planning instruments

The following review explores where there are opportunities to embed water servicing principles for the proposed new community of Wanju and Waterloo into available land use planning mechanisms.

The review considers the following types of planning mechanisms:

- Strategic planning documents and policy instruments, and
- Statutory and implementation instruments.

The review included consultation with DWER and the Shire of Dardanup.

4.2.1 Strategic planning documents and policy instruments

Strategic plans and policy set the overall expectation for consideration of integrated water cycle management (part of which includes water servicing) for planning and development.

Generally, site-specific water servicing principles would not be appropriate for inclusion at this level of strategic planning. However these documents provide the overall policy intent that supports principles being embedded at more detailed planning stages.

State Planning Policy 2.9 Water Resources and Better Urban Water Management

State Planning Policy 2.9 sets the overall planning policy expectation that integrated water management will be considered at all planning stages. The policy is supported by *Better Urban Water Management (WAPC, 2008)* that provides the framework for preparation of water management strategies that underpin planning decisions at various levels of planning.

As a state-wide planning document, there is no benefit or opportunity to embed water servicing principles for Wanju in these documents. However, the documents support developing principles to underpin local planning.

Greater Bunbury Strategy

The Greater Bunbury Strategy 2013 was carried out by the Department of Planning to interpret State planning policy at the local level, and was endorsed by the Western Australian Planning Commission (WAPC). The Strategy considered several different alternatives for future growth of the Greater Bunbury sub-region, and identifies the greenfield urban expansion area that is now known as Wanju.

The Strategy includes broad expectations for more detailed planning for urban expansion to embed sustainability outcomes and commitments to best practice in relation to water management and supply, including water sensitive urban design and onsite water capture and reuse.

As more detailed planning for Wanju has commenced with the development of the District Structure Plan, there would be little benefit in amending the Greater Bunbury Strategy to embed water servicing principles. More effective statutory and implementation opportunities exist (as described in the next section).

Shire of Dardanup Local Planning Strategy (2015)

The Local Planning Strategy articulates the Shire of Dardanup's broad vision and longer term directions for land use and development. The Strategy was endorsed by the Western Australian Planning Commission (WAPC) in 2015.

The strategy identifies Wanju as a major urban expansion area, and sets policy expectations for future urban areas, with a focus on development staging. The Strategy sets specific implementation actions for the delivery of Wanju through the local planning scheme, including:

- Identify this land in LPS9 as being within a 'Special Control Area' as a 'Development Investigation Area' requiring district level structure planning.
- Provisions being included in LPS9 to control the staging of development.

- Amend LPS9 accordingly following structure planning.

The Strategy provides a pathway and implementation actions required to embed principles into the local planning scheme. There is little benefit in embedding principles directly into the Strategy.

4.2.2 Statutory and implementation level planning documents

Statutory and implementation level planning mechanisms provide detailed, site specific guidance for land use and development.

Planning schemes provide a statutory, site specific framework for land use and development requirements for land through zoning. Schemes are a very useful tool to embed principles as the statutory role of schemes provides certainty in implementation.

Other implementation level planning documents (including structure plans and water management plans) are given due regard in decision-making and are not statutorily binding. However, these plans provide the detailed implementation framework for planning and servicing urban expansion areas. It is therefore important to embed principles at this level to guide how those principles can be delivered in more detailed design and planning.

Greater Bunbury Region Scheme

The Greater Bunbury Region Scheme (GBRS) defines the future of land use in the Greater Bunbury region, dividing it into zones and reservations. Local governments provide detailed plans for their part of the region consistent with the GBRS.

The key role of the GBRS is to reserve and zone land for detailed implementation through local planning schemes and more detailed planning decisions. The GBRS does not include detailed planning provisions or policy to guide the form of future development. Therefore, the principles cannot be embedded into the GBRS and it will be important to embed principles within more detailed, local planning instruments.

The Wanju area is currently zoned Rural, and requires rezoning to Urban under the GBRS. Water servicing principles may be included in the supporting report for when the GBRS amendment process is undertaken to rezone the land, but they would not be embedded into the GBRS itself.

Shire of Dardanup Local Planning Scheme

Local Planning Schemes are prepared in accordance with the *Planning and Development Act 2005* (P&D Act) and the *Planning and Development (Local Planning Schemes) Regulations 2015*. Schedule 7 of the P&D Act gives local planning schemes the power to control “public works and undertakings of any kind including lighting, water, sewerage, drainage, public transport and associated facilities on land and water”. This provides the statutory ability to incorporate water servicing into the local planning scheme.

Incorporating water servicing principles in the local planning scheme will have the result of embedding those principles in all subsequent planning documents and planning decisions that are to comply with the scheme.

The Wanju area has not yet been zoned Urban under the current Shire of Dardanup Town Planning Scheme No. 3. The Shire of Dardanup is currently preparing a new Local Planning Scheme No. 9 (LPS9). A completed draft for LPS9 is anticipated to be prepared toward the end of 2018. It is reasonable to anticipate that LPS9 will be gazetted in 2019.

The Shire’s local planning strategy identifies that a special control area will be included within LPS9 for Wanju. Water servicing principles could be incorporated into the special control area to apply to all future planning and decision making in the area. Including water servicing principles

into a special control area for Wanju within LPS9 will make the principles binding for all levels of planning, including structure plans, subdivision, and development applications.

Incorporating water servicing principles into the scheme has benefit in that they will have statutory effect. However, the Shire of Dardanup's current preferred approach is for the special control area to reference key planning documents for the development of Wanju, such as the District Structure Plan, rather than including all development requirements in the scheme. Furthermore, any future modifications to the principles if embedded in the scheme would require a scheme amendment, which can be a lengthy process as it requires approval of the Minister for Planning, compared to a much shorter process to amend strategic documents. Whilst the opportunity to embed principles in the scheme exists, the decision to do so will require consultation between the Shire of Dardanup, DPLH and other key stakeholders.

Structure Plans

Structure plans are prepared pursuant to Part 4 of the deemed provisions that apply to all local planning schemes, as set out in the *Planning and Development (Local Planning Schemes) Regulations 2015*. Structure plans are defined by the deemed provisions as "a plan for the coordination of future subdivision and zoning of an area of land".

Structure plans are not statutory documents, and are given due regard in decision-making. Whilst not statutory, they are important implementation policies for future urbanisation.

A draft District Structure Plan (DSP) has been prepared for Wanju. The DSP is expected to be endorsed by the Western Australian Planning Commission in early 2019.

The DSP identifies precincts for more detailed planning through local structure plans, and sets principles and expectations for future planning in these precincts. Whilst it includes a range of elements that relate to integrated water cycle management, Part 1 (the policy section) does not currently set specific principles for water servicing. The draft DSP requires that Local Water Management Strategies are prepared for Local Structure Plans, but does not include any policy guidance in relation to water servicing principles.

Part 1 of the DSP (in particular section 4.1) could be amended prior to finalisation to include water servicing principles for Wanju that would be delivered through all other subsequent plans – including the supporting District Water Management Strategy, Local Structure Plans, and Local Water Management Strategies.

Including water servicing principles in the DSP will have the result of embedding those principles in all subsequent planning documents that are to have due regard to the district structure plan across the entirety of the Wanju area.

Local structure plans will be prepared for precincts identified in the DSP, and provide a more detailed framework for subdivision. By this stage in planning, a water service provider should be confirmed for the relevant precinct, therefore principles within local structure plans may have limited influence and inclusion at the DSP level may be more effective.

District and Local Water Management Strategies

Water management strategies are prepared in accordance with *Better Urban Water Management* (WAPC, 2008) that supports *State Planning Policy No. 2.9 Water Resources*. These documents support structure plans, and provide the implementation framework for how water (including all water resources) will be managed during planning and development.

Water servicing principles can be embedded in these plans, therefore guiding the implementation of water management design and delivery in subsequent water planning stages.

A district water management strategy is currently being prepared for Wanju. Water servicing principles should be incorporated into a water servicing section of the strategy that provides guidance for selection of water service providers for precincts identified in the DSP.

Local water management strategies will be prepared to support Local Structure Plans. By this stage in planning, a water service provider should be confirmed for the relevant precinct. Therefore, there is limited value in embedding water servicing principles at this stage. However, local water management strategies should demonstrate how water servicing principles have been met for the relevant precinct.

4.3 Recommendations

After the review of the opportunities to embed water servicing principles Wanju, the following is recommended:

- If the water servicing principles are revised to reflect planning decisions and matters, it is recommended that these are embedded into the LPS. It is noted that to undertake this the support of the Shire of Dardanup will be required.
- Embed the principles (in their current form) into the DWMS prior to the expected endorsement of the DSP in 2019.

5. Estimated water demands

5.1 Approach

5.1.1 Wanju District Structure Plan

GHD has undertaken a high level staged estimate of the future water demands for the Wanju development through consultation with DWER and using the following sources:

- Wanju – Staging Plan (Integran, 2018),
- Draft Wanju District Structure Plan (WAPC, April 2016), and
- Urban National Performance Reports: Urban Water utilities 2015-16 ⁵.

The information obtained from these sources was analysed and interpolated where necessary to estimate:

- Unit water demands applicable to the Wanju development,
- Expected residential and non-residential water demands over time, and
- Expected water demands for open space areas.

To test the sensitivity of the inputs to the demand estimates, GHD has:

- Included the two staging plan estimates as outlined in the Wanju – Staging Plan (Integran, 2018), medium growth and high growth, and
- Assessed a potential upper and lower expected demand estimate using the 2015-16 average annual residential water supplied by Water Corporation for Perth (240 kL/property) and by Water Corporation for Australind/Eaton (315 kL/property). These demands were used as they cover a reasonable upper and lower estimate and encompass the 2015-16 average annual residential water supplied by Aqwest (261 kL/property) and Busselton Water (288 kL/property).

For the purposes of this study, it has been assumed that drinking water will be required for all residential (internal and external residential use) and non-residential uses (i.e. schools, commercial and retail space). It is noted that a suitably treated, fit for purpose water (FFPW) source could be used for some internal use and external use, however it not considered further at this stage.

5.1.2 Waterloo District Structure Plan

The Waterloo District Structure Plan (draft) currently identifies that majority of the area will be industrial or light industrial land uses. The estimation of potable water demands for industrial areas are sensitive to the proposed industry. As this level of detail is not yet considered for Waterloo, any potable water demand estimate would be unreliable.

The open space area identified in the draft structure plan is predominately conservation area of approximately 6 ha, which is less than 1% of the total structure plan area. The Waterloo DSP (draft) proposes a streetscape, swale and wetland system to manage stormwater, as well as landscaped detention basins. It is expected that vegetation proposed for these areas will be suitable for the local environment and will not include large grassed areas. As such, the streetscape, swales, basins and wetlands will require initial establishment irrigation, but should be landscaped such that ongoing irrigation is not required.

⁵ http://www.bom.gov.au/water/npr/npr_2015-16.shtml

Based on this assessment, any water demands estimated for Waterloo at this stage would have limited accuracy. Further, the estimated irrigation demands for Waterloo would be considerably smaller than estimated demands for Wanju. With careful management of available water for open space irrigation, the expected demands at Waterloo should be manageable with any groundwater allocation or FFPW source obtained for Wanju.

Water demands associated with the Wanju DSP will only be discussed further in this chapter.

5.2 Development staging

A staging plan for Wanju (Integran, 2018) has been developed for residential and non-residential (mixed use) uses for each development precinct over a 50 year development horizon. The staging plan considered a medium growth rate and a high growth rate, both of which have been considered in the demand assessment.

Using the staging plan, GHD also estimated the staging of the proposed schools within Wanju.

The assumed staging has been summarised in Appendix A as Table 8 for the high growth rate and Table 9 for the medium growth rate.

As part of the demand assessment, GHD assumed the following from the staging plan:

- Occupancy rate of 2.7 for medium density development and 2.1 for mixed use, and
- The dwelling numbers per precinct per year for each growth rate and therefore population projections.

The open space staging has been determined as a percentage of the total number of residential dwellings for the whole development. That is, for the high growth rate, where 16% of the dwellings are constructed by year 10, it has been assumed that 16% of the open space will be constructed by year 10. The open space staging is presented in Appendix A as Table 10 and Table 11 for the high and medium growth rates respectively.

5.3 Other assumptions

The Draft Wanju District Structure Plan (WAPC, April 2016) summarises the number of expected schools within the structure plan area as well as the type and area of open space allowed within the plan area. Outlined below are the assumptions adopted in the development of the demand assessment around open space and schools.

5.3.1 Open space

The Draft Wanju District Structure Plan (WAPC, April 2016) outlines the area and type of open space within the structure plan area, and this is summarised in Table 1. For this demand assessment, the open space for playing fields has been separated from the other space as the water demand for playing fields is greater.

The assumed level of irrigation for each open space type has also been included in Table 1 and have been derived to be consistent with the Department of Water's *North West corridor water supply strategy* (January 2014). These estimates are reflective of a drying climate and water scarcity. As the structure plan develops further, there will be opportunities to review these assumptions with the planners and developers to further refine the required open space water requirements.

Table 1: Wanju open space

Type	Area (ha)	Irrigation %	Irrigation area (ha)
Open space			
Foreshore reserves	131	33%	43.23
Linear open space / multi use corridors	23	33%	7.59
Wetlands	5	0%	0
Conservation area and other POS	51	33%	16.83
SUB TOTAL	210		67.65
Playing fields			
District open space	62	64%	39.68
Public open space associated with schools	26	64%	16.64
SUB TOTAL	88		56.32
TOTAL	298		123.97

5.3.2 Schools

Outlined in Table 2 is the quantity of schools allowed within the Draft Wanju Structure Plan as well as the assumptions around the number of students per year for each school. The intent of this assumption is to provide a high level estimate for water consumption within a school to include within the overall water estimate for Wanju.

Table 2: Wanju schools

School type	Quantity	Students/year	Total students
Primary school	9	75	525
High school	3	150	900
Private (K – 12)	2	75	900

It is to be noted that the school water demands provided in Section 5.5 exclude irrigation of playing fields or open space associated with schools. These demands are covered separately in the open space demand estimates.

5.3.3 Water efficiency

It is recognised that over time water use will become more efficient through more water efficient water fixtures, fittings and leak detection methods. Water Corporation have set a target of 25% reduction in water use per person by 2030 (Water Forever: South West 2015). In adopting a water efficiency factor to the demand estimate at Wanju, GHD has assumed that this reduction will be applicable to Wanju and there will be a linear reduction in water consumption to 2030.

Using the Water Corporation Perth consumption for 2009/10, the target 2030 water consumption can be calculated (that is, 25% less than 2009/10). Using the expected water consumption in 2030, an annual water reduction can be calculated per dwelling (refer to Table 3).

Table 3: Water efficiency estimates

	kL/dwelling/annum
Perth 2009/2010 consumption	276
Estimated 2030 consumption	207
Annual water reduction	3.45

The adopted annual water reduction is 3.5 kL per dwelling and this annual water reduction has been applied to the staged demand estimates for Wanju.

5.4 Assumed unit demands

The set of unit water demands adopted for this project and their source are summarised in Table 4.

Table 4: Adopted unit demands

Land use	Unit	Rate	Comment
Residential – Upper limit	kL/service/annum	315	2015-16 average annual residential water supplied by Water Corporation for Australind/Eaton.
Residential – lower limit	kL/service/annum	240	2015-16 average annual residential water supplied by Water Corporation for Perth
Non-residential ⁶	kL/m ² /annum	1	Consistent with Water Corporation's H2Options Water Balance Tool assumptions
Schools	kL/student/annum	5	Consistent with Water Corporation's H2Options Water Balance Tool assumptions
Open space	kL/ha/annum	6,750	Consistent with the rate adopted in the <i>North West corridor water supply strategy</i> (DoW, 2014).

5.5 Demand summary

The unit demands and population estimates described above have been used to estimate the water demands – residential, non-residential and open space – for the Wanju development. The total demands for Wanju are presented in Appendix A as Table 12 and Table 13 for the high and medium growth rate. The demands by precinct are also provided as in Appendix A. Figure 2 presents the demands over time for each growth scenario and Figure 3 displays the demands over time by water use (i.e. residential, non-residential, schools and open space) for the high growth rate.

It can be seen from Figure 2 that the ultimate demand estimate is the same for both staging scenarios, with the time taken to achieve the ultimate demand changing between the scenarios. Ultimately, there is approximately 1760 ML/annum difference between the high unit demand estimate (Australind) and the lower unit demand (Perth) which highlights the impact the unit demand has on the overall residential water estimates. Figure 3 highlights that majority of the water estimated at Wanju is for residential uses, followed by the open space demands.

⁶ Retail and commercial land uses

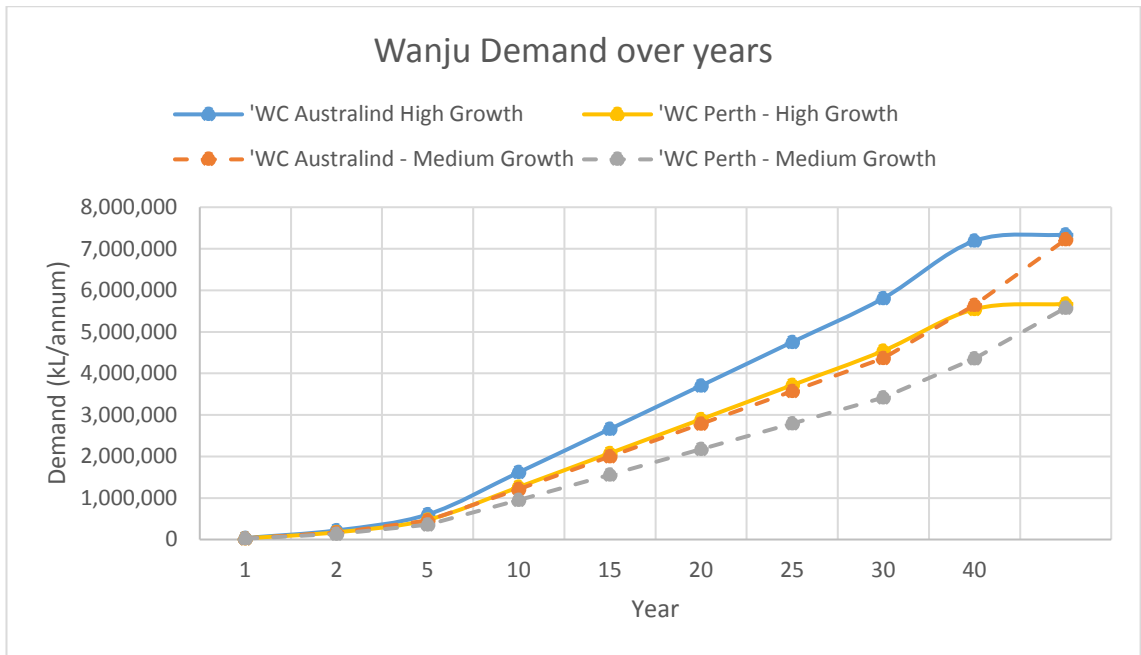


Figure 2: Wanju water demand over time

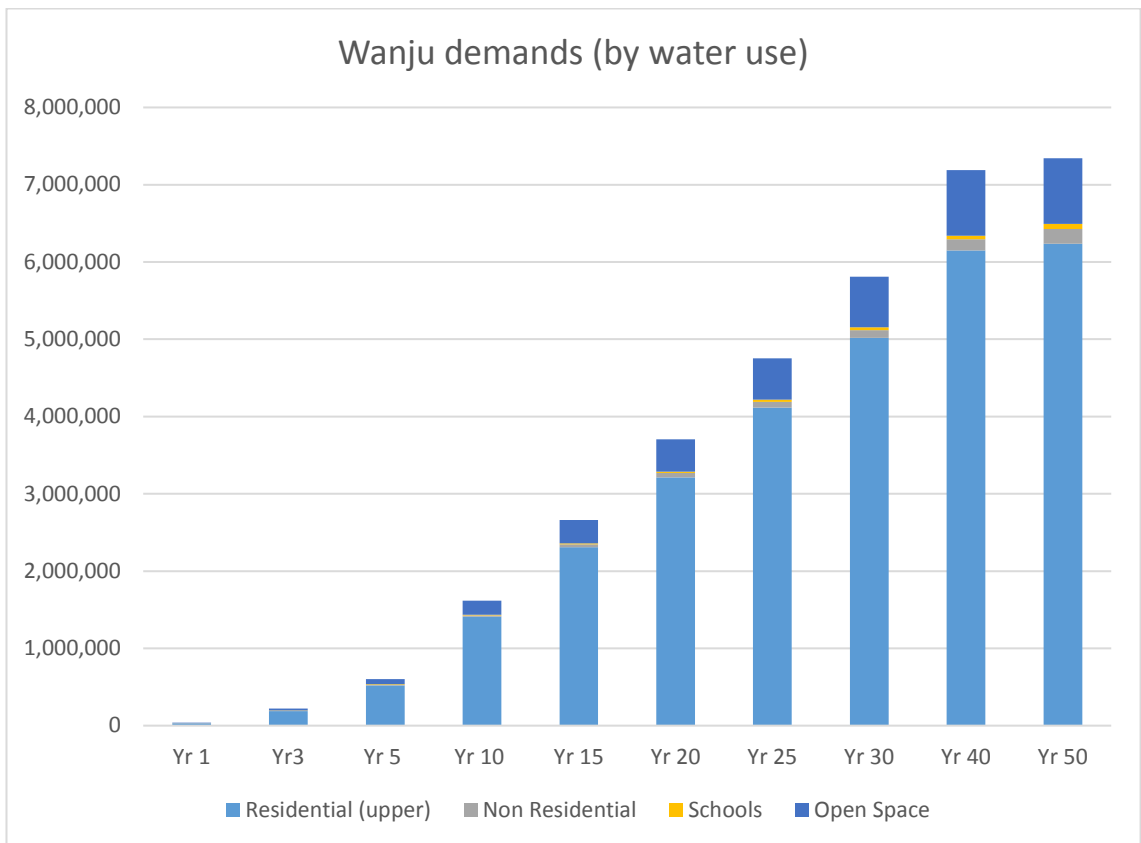


Figure 3: Wanju water demands over time by demand type (high growth rate)

6. Water servicing options

There are several options for water servicing for the Wanju and Waterloo developments to cover the potable water, wastewater and fit for purpose water demands. Using the developed water servicing principles and review of existing water infrastructure within the vicinity of Wanju, GHD has developed a range of water servicing options available for the Wanju and Waterloo developments.

In developing a set of water servicing options for Wanju and Waterloo the following key stakeholders were consulted through DWER:

- DWER,
- DPLH,
- Shire of Dardanup,
- Aqwest,
- Harvey Water,
- Water Corporation, and
- Water West.

The comments received from the stakeholders have been incorporated into the final water servicing options presented in Table 5, including a high level description of the option as well as some key considerations regarding each option.

While these servicing options have been developed for Wanju and Waterloo, there are opportunities for some of the options to be applied more broadly across the Greater Bunbury area to provide a regional water solution. There are particular merits with reusing treated wastewater close to a wastewater treatment plant to irrigate large open spaces (for example Hay Park). This has the potential to release groundwater allocation for use elsewhere in the groundwater sub areas.

Table 5: Wanju and Waterloo water servicing options

Water type	Option	Description	Notes
Drinking water sources	DW1	Supply from Aqwest existing network (i.e. Glen Iris WTP)	It is understood that the limit of Aqwest's network is on South West Highway near Temple Road, Waterloo/Picton which is approximately 1.5 km from the south west corner of the Wanju DSP. It is assumed that Aqwest will be the service provider for this option. Assessment will be required to confirm if there is capacity at the source (i.e. groundwater) to supply Wanju in the long-term. New infrastructure will be required. Either extension of existing mains, or construction of new mains.
	DW2	Supply from Water Corporation existing network (i.e. Picton or Burekup)	It is understood that the limit of Water Corporation's network is: - North: Off Raymond Rd, Roelands - West: South West Highway at Picton - East: Burekup. It is assumed that Water Corporation will be the service provider for this option. Assessment will be required to confirm if there is capacity at the source (i.e. groundwater) to supply Wanju in the long-term. A new source may need to be developed. New infrastructure will be required. Either extension of existing mains, or construction of new mains.
	DW3	Development of new water source: - Water from Collie River irrigation scheme	Federal funding for the Myalup-Wellington water project which will improve the quality of the water available within the Collie River Irrigation District (CRID). Will require discussions and agreements with Harvey Water and will require treatment to become potable. Work to improve the Collie River water quality will not occur until at least 2020.
	DW4	Development of new water source: - Local groundwater	Source groundwater from a local bore and treat to potable water at a dedicated WTP Unlikely to be suitable groundwater allocation available and will require treatment to become potable. Needs a potable water service provider.
	DW5	Desalinated water from existing Southern Seawater Desalination Plant (SSDP) at Binningup	New main to supply potable water from desalination plant to Wanju. The capacity of the existing desalination plant will need to be reviewed to determine if Wanju can be supplied. Long pipelines/pumping required. No existing connection south of Binningup. It is highly unlikely that a dedicated new water transfer main would be extended from Binningup to Wanju, or only for Wanju. If this long term source option into the Greater Bunbury system was viable, then the Water Corporation would likely transfer the additional water from the SSDP only as far as the nearest water storage tank in the Eaton-Australind water scheme for further transfer on to other nearby scheme networks, including possibly to a Wanju water zone.
	DW6	Desalinated water from new desalination plant	Site a new desalination plant for the Wanju development. Options to supply other developments from the plant. Significant planning, approvals, construction and capital required. Likely to be significant challenges to implementation.
Wastewater destinations	WW1	Bunbury WWTP	Pump wastewater to the existing treatment plant in Bunbury. It is assumed that the WW scheme would be operated by Water Corporation or an appropriately licenced service provider but coordination (and approval) will be required with Water Corporation to convey wastewater to Bunbury WWTP. An access agreement with the wastewater provider will be required. Bunbury WWTP and its discharge arrangements would likely require upgrades to accommodate the additional wastewater from Wanju. Has a secure disposal option through ocean outfall. A new dedicated wastewater pressure main would be required to convey wastewater from Wanju to the Bunbury WWTP at Dalyellup. A critical issue with this option would be the difficulty in securing a suitable route for a large diameter pressure main. Lost fit for purpose water source (without a return pipeline).

Water type		Option	Description	Notes
	WW2	Burekup WWTP	Pump wastewater to the existing treatment plant in Burekup.	<p>It is assumed that the WW scheme would be operated by Water Corporation or an appropriately licenced service provider but coordination (and approval) will be required with Water Corporation to convey wastewater to Burekup WWTP. An access agreement with the wastewater provider will be required.</p> <p>Closest to Wanju, however is located uphill from the DSP area. Significant lifting of the wastewater will be required.</p> <p>Construction of a new dedicated wastewater pressure main to the WWTP, significant upgrades at the Burekup WWTP site and associated approvals will be required. Additional land area may be required for WWTP and disposal infrastructure.</p> <p>Lost fit for purpose water source (without a return pipeline).</p>
	WW3	Kemerton WWTP	Pump wastewater to the Kemerton WWTP.	<p>It is assumed that the WW scheme would be operated by Water Corporation or an appropriately licenced service provider but coordination (and approval) will be required with Water Corporation to convey wastewater to Kemerton WWTP. Kemerton WWTP is unlikely to have capacity to accommodate the additional wastewater from Wanju as the treated wastewater disposal from the WWTP is very constrained.</p> <p>Long pumping distances.</p> <p>Lost fit for purpose water source (without return pipeline). Further, returning TWW from Kemerton for public open space irrigation in Wanju could result in insufficient TWW volumes to support industrial reuse in Kemerton, if/when an industry requires TWW.</p>
	WW4	On site WWTP	Site and construct a new WWTP for Wanju and/or Waterloo.	<p>It is assumed that the wastewater scheme could be operated by an appropriately licenced service provider.</p> <p>Significant planning, approvals, construction and capital required including sufficient land being set aside for the WWTP and buffers.</p> <p>Ability to reuse treated wastewater (TWW) within the development.</p> <p>There could be one large WWTP for the development or smaller package WWTPs which may occupy less area.</p> <p>A critical planning factor is how the treated wastewater will be disposed. Possibilities include:</p> <ul style="list-style-type: none"> - 100% disposal via infiltration/MAR - reuse of TWW and disposal via MAR for any surplus TWW - disposal to a waterway (Collie River, Millars Creek) - seasonal on-site storage of TWW and reuse throughout the year
Fit for purpose sources	FFPW1	Development of new water source: - Water from Collie River irrigation scheme	Federal funding for the Myalup-Wellington water project which will improve the quality of the water available within the CRID. Abstract water from the CRID scheme as required.	<p>Likely to be of a suitable water quality for irrigation.</p> <p>Will require discussions and agreements with Harvey Water to confirm price of water and availability.</p> <p>If purchasing from Harvey Water, then a service provider licence may not be required.</p> <p>Work to improve the water will not occur until at least 2020.</p> <p>It is expected that this option could supply all open space irrigation requirements subject to agreement with Harvey Water.</p>

Water type	Option	Description	Notes
FFPW2	Surface water abstraction and storage	This differs from Option FFPW1 in so much as the water is abstracted from surface water sources during high flow times (typically winter) and stored for use for the high irrigation periods (typically summer).	<p>Surface water allocation will need to be secured.</p> <p>Storage areas will need to be provided within the DSP. Potential storage options include artificial lakes, tanks etc.</p> <p>A service provider may be required if the water is supplied to another party or customer.</p> <p>This option is unlikely to supply all open space irrigation requirements and an additional source would be required.</p>
FFPW3	Groundwater abstraction	BaU approach to irrigation of open space.	<p>Limited to no groundwater allocation available within existing sub area. Water trading may increase available groundwater. Recouping of unused water allocations is also to be considered.</p> <p>Groundwater may be able to partially meet open space irrigation demand, if initiatives to reduce current demand are implemented.</p> <p>A service provider may be required if the water is supplied to another party or customer.</p>
FFPW4	Use of public drinking water allocation within the Yarragadee aquifer	Temporary or permanent access to the public drinking water area for use for open space irrigation or other fit for purpose water uses.	<p>Obtaining the allocation may be difficult.</p> <p>May provide options for initial irrigation of open space while other fit for purpose water sources become available.</p> <p>Deep bores are required.</p> <p>Treatment is unlikely to be required.</p>
FFPW5	Treated wastewater	Using treated wastewater to meet irrigation demands and/or other fit for purpose water demands, potentially with 'third pipe' distribution to individual lots.	<p>The costs associated with this option are dependent on where the treated wastewater is located. Wastewater collected and treated locally may be more cost effective than returning treated wastewater from another WWTP (e.g. Bunbury).</p> <p>The use of treated wastewater could be investigated in other areas of the Greater Bunbury Area (for example Hay Park) to free up groundwater allocation.</p> <p>The water source is climate independent and could supply all open space requirements.</p> <p>A service provider will be required.</p>
FFPW6	MAR – treated wastewater	<p>Disposal of locally generated treated wastewater to groundwater via infiltration galleries or basins and abstraction from groundwater as required.</p> <p>Abstracted water could be used to meet irrigation demands and/or other fit for purpose water demands.</p>	<p>This is a beneficial disposal of the treated wastewater for use as required throughout the year.</p> <p>Additional land will be required for the MAR infrastructure.</p> <p>Approvals will be required for the MAR scheme.</p> <p>A service provider may be required if the water is supplied to another party or customer.</p> <p>This option could supply all open space requirements.</p>
FFPW7	MAR – stormwater	<p>Capture and injection/infiltration to the deep aquifers of post development stormwater generated within the development and abstraction from groundwater as required.</p> <p>Abstracted water could be used to meet irrigation demands and/or other fit for purpose water demands.</p>	<p>Stormwater may be reinjected into any aquifer subject to a hydrogeological assessment/groundwater modelling and risk assessment as per national guidelines.</p> <p>Additional land will be required for the MAR infrastructure.</p> <p>Approvals will be required for the MAR scheme.</p> <p>A service provider may be required if the water is supplied to another party or customer.</p> <p>Further investigation would be required to determine if this option could supply all open space irrigation demands.</p>

Water type	Option	Description	Notes
FFPW8	On lot rainwater tanks	Installation of rainwater tanks at each new dwelling. Water to be used for on lot irrigation or in house fit for purpose water demands.	Could be mandated within the planning provisions. Cost could be transferred to the home owner. This option is only applicable to the dwelling scale and would not provide water to meet the open space irrigation demands.
FFPW9	On lot greywater reuse	Installation of greywater tanks at each new dwelling. Water to be used for on lot irrigation or in house fit for purpose water demands.	Could be mandated within the planning provisions. Cost could be transferred to the home owner. Responsibility for approval of the system and maintenance will reside with the home owner. Poor upkeep of the system may limit its performance. This option is only applicable to the dwelling scale and would not provide water to meet the open space irrigation demands.
FFPW10	On lot or community bores	Installation of bores on lot or at a central location with reticulation to the dwellings. Water to be used for on lot irrigation.	Cost could be transferred to the home owner. Responsibility for approval of the system and maintenance will reside with the home owner. Poor upkeep of the system may limit its performance. Unlikely this option will be viable given the constraints in groundwater availability.

7. Key issues and options

There are several issues and considerations required to apply the proposed water servicing principles to the Wanju and Waterloo development. Outlined below is a summary of the key considerations, the associated issues and risks and possible options and/or risk mitigation measures. The planning considerations have been discussed as part of Section 4 and are not considered in detail here.

Similar to the water servicing principles and servicing options, the following key stakeholders were consulted through DWER in developing the key issues and risk mitigation measures:

- DWER
- DPLH
- Shire of Dardanup
- Aqwest
- Harvey Water
- Water Corporation; and
- Water West.

Table 6 below presents the key considerations, issues, risks, options and risk mitigation measures inclusive of feedback received from the stakeholders.

Table 6: Key considerations and issues

Consideration	Key issues and risks	Options/Risk mitigation measures
Identifying agreed WSS scenarios	<ul style="list-style-type: none"> • Significant investigation/ study work will need to be completed to determine the optimum long term WSS. • It is uncertain who will fund this work at this pre-development stage. • The optimum WSS may not be mandatory to implement if government policy and legislation doesn't have the power to enforce it. • The optimum WSS may not be affordable. • The desirability of an integrated solution at Wanju is driven mainly by the need to secure a fit for purpose water supply for the irrigation of green space. 	<ul style="list-style-type: none"> • Explore potential for current and potential future WSPs to co-fund high-level strategic studies on water servicing solutions suitable for inclusion in the DSP. Subsequent detailed planning will be the responsibility of the preferred service provider and developer, which would be commercial in confidence. • If required seek funding for these studies from local/state government. • Consideration is required of utility planning stages, and strategic planning horizons. Future technology advancements and policy changes will influence the optimum WSS. • Identification of the developer/beneficiary will drive who is responsible for funding. • The bulk of the fit for purpose demand will be required in the later stages of development. If consideration of this does not occur in the early stages then opportunities for economies of scale may be lost.
Resilience of optimal WSS	<ul style="list-style-type: none"> • Despite the rigour of the work completed at initial DSP stage to determine the optimal long term WSS for the entire urban footprint, refinements or significant updates may be necessary over time to assure its resilience and relevance in the face prevailing/evolving external factors. 	<ul style="list-style-type: none"> • Review to be completed every 5 to 10 years (by WSP(s)) to confirm/refine optimal long term WSS. Review to assess relevant external factors including drying climate, water policy reforms, changes in demand profiles, commercial servicing options and emerging technologies. • Service provision planning should be prepared to support local structure plans (LSP). LSP to be updated to reflect review outcomes on as-required basis.

Consideration	Key issues and risks	Options/Risk mitigation measures
Compatibility of land use planning and WSS	<ul style="list-style-type: none"> DSP may not incorporate land requirements for long term WSS headworks infrastructure (e.g. decentralised treatment facilities, storage tanks), and may not preclude potential for non-compatible land uses within hazardous area, odour and/or noise buffer areas of this infrastructure. 	<ul style="list-style-type: none"> Optimal long term WSS to be developed at DSP stage. Appropriately zoned land for long term WSS headworks infrastructure to be shown in Wanju and/or Waterloo DSPs. Wanju and/or Waterloo DSPs to only allow compatible land uses within hazardous area, odour and/or noise buffer areas of long term WSS headworks infrastructure.
Consistency of approach	<ul style="list-style-type: none"> Lack of collaboration/ consistency of approach between developers/WSPs servicing different areas results in missed opportunities to realise economy of scale savings. Commitment to agreed water servicing principles wanes over time; or is subject to political influence. 	<ul style="list-style-type: none"> Minimise risk of developers/WSPs “going it alone” by ensuring that all relevant stakeholders, including developers and WSPs, are actively involved in scoping and completion of the DSP stage high-level strategic studies to determine the optimum long term WSS. Subsequent detailed planning to inform a business decision would be undertaken separately by WSPs and would be commercial in confidence. Embed principles in relevant planning instruments and regulations.
Location/timing of development	<ul style="list-style-type: none"> WSS viability could be adversely affected by actual water demands and/or wastewater flows being significantly lower or higher than what is projected. WSS viability could be adversely affected if development proceeds in a non-frontal manner (e.g. as a consequence of higher than expected up-front costs). 	<ul style="list-style-type: none"> Financial analysis should confirm WSS viability under low and high growth scenario’s agreed with key stakeholders. The commercial realities (high costs) of non-frontal development will act to deter such development. Utilising staging plans and zoning categories to influence the first stages of development. Incorporate a requirements into the local planning scheme that development must be sequential to ensure each stage abuts existing developed areas. Refinement of water demands is to be encouraged at each development stage and the demands must be based on the best

Consideration	Key issues and risks	Options/Risk mitigation measures
		<p>current knowledge/ science at the time of development and overestimation of demands is to be avoided.</p>
Funding model	<ul style="list-style-type: none"> • The analysis completed to determine the optimal WSS for the entire urban footprint may not adequately take into account impacts on groundwater resources and the environment, or the amenity value associated with irrigated green space. • The optimal WSS based on economic considerations may not be financially viable (insufficient revenue, under government pricing policies, to meet costs and provide acceptable rate of return to WSP). • Uncertainty in relation to LGA/consumers' willingness to pay for fit for purpose water. • An incomplete developer contribution plan (DCP) increases uncertainty for utilities as to the level of contributions allowed for. While headworks charges will be placed, the DCP may be relevant for significant infrastructure requirements such as an MAR system, a decentralised WWTP, etc. • There is an opportunity for WSPs to be proactive in planning and making provisions to be the preferred WSP for Wanju, however there is limited cooperation to achieve a holistic approach to water delivery at this stage. • There is the potential for any new water supply scheme, constructed to the standards required to achieve a WSP operating licence, may incur a shortfall between revenue and costs. 	<ul style="list-style-type: none"> • The optimal WSS for the entire urban footprint is to be determined based on the findings from: <ul style="list-style-type: none"> ○ a comprehensive Cost Benefit Analysis (CBA) that compares (in monetary terms) the costs and benefits of alternative WSS including a BAU servicing strategy where green space irrigation demands are met with surface water, groundwater or (fall back option) potable water. ○ a financial evaluation that assesses alternative funding models for the WSS and reflects the willingness of the LGA and developers to contribute (wholly or partially) to any additional capital and operating costs upfront. • If a shortfall exists between revenue and costs for the WSPs, the WSPs could: <ul style="list-style-type: none"> ○ Seek to obtain an operating subsidy, or ○ Seek permission to charge higher charges than it currently is permitted to charge for country services, or ○ Be unable to provide the service.

Consideration	Key issues and risks	Options/Risk mitigation measures
Potential suitability of local aquifers for MAR type water recycling schemes ⁷	<ul style="list-style-type: none"> Lack of information on potential suitability of local aquifers for MAR type water recycling schemes results in potentially viable MAR type WSS being ruled out from consideration on the grounds of cost/time required to investigate this with no guarantee that such schemes will be viable. 	<ul style="list-style-type: none"> As part of future investigations complete a study to assess the potential suitability of local aquifers for MAR type water recycling schemes. Incorporate findings of MAR study in work completed to define optimal long term WSS
Availability of groundwater	<ul style="list-style-type: none"> With the drying climate there is uncertainty around the future availability of groundwater to meet green space irrigation and/or other demands. 	<ul style="list-style-type: none"> DWER reviews groundwater allocations on a 5-yearly basis. Further assessment is required to determine if local groundwater abstraction is acceptable. This will need to be done in conjunction with the groundwater allocation evaluation and reviews.
Availability of bulk raw water from Harvey Water	<ul style="list-style-type: none"> Collie Water's Wellington-Myalup project aims to improve water quality to the CRID. Project is only recently funded and still has many years to achieve implementation. Timeline may be incompatible with Wanju development. Collie Water may seek higher value customers for bulk water sales, leading to limited availability for Wanju WSPs. 	<ul style="list-style-type: none"> Continue liaison with Harvey Water and Collie Water on the development of the Wellington-Myalup scheme. Aim to negotiate and secure long-term water supply contracts for the Wanju district.

⁷ A comment received from the stakeholders regarding a potential mitigation measure for this consideration was to undertake a desktop hydrogeological report. However, DWER South West Region agreed that this measure should be investigated further if a local WWTP is to be considered at Wanju.

In developing the key issues and risk mitigation measures for the Wanju and Waterloo developments, it has become clear that there is limited motivation for potential water service providers to cooperate and be proactive in the water servicing planning. Additionally, it is not clear where the responsibility lies for long-term district-level coordination for water servicing in the area or a clear illustration of what the final objective of an optimal water solution may look like. The optimal water solution must be commercially viable for the preferred WSP

Therefore, there is a significant risk of an uncoordinated, ad hoc approach to water servicing as the development rolls out, leading to sub-optimal outcomes and limited opportunity for consideration of more integrated water management solutions.

To obtain clarity in the vision for an optimal water solution, it is recommended that an **independent reference design** be prepared. The intent of a reference design will be to provide a “master planning” type view for water servicing at Wanju (and Waterloo) and would provide regulators and developers with a base design to use in assessing and procuring a preferred water service provider. It is envisioned that the reference design would be prepared by an independent party to develop a solution that does not intentionally or otherwise favour a potential service provider, technology or servicing option.

It is expected that the reference design would:

- Identify an optimal water servicing strategy for Wanju which could achieve the water servicing principles over the long-term.
- Provide an independent view of optimal water provision separate to the water service providers view (which is naturally biased by seeking to maximise the use of their existing infrastructure and sunk costs).
- Be available for developers to use to go to market for water service providers to base their planning and detailed design.
- Be based on available structure plan information. This would present a risk to the development of the design if the structure plan changes substantially.
- Be informed by additional work to confirm groundwater allocations, managed aquifer recharge suitability and CRID water quality and availability.
- Be a potential input into the further development of the developer contribution scheme and the determination of tariffs (and subsidies) for the district.

In developing the reference design, a steering committee or working group would be required to provide feedback on the preferred optimal water servicing strategy and the final reference design. It is recommended that the steering committee is convened and managed by DPLH, and includes (as a minimum) the stakeholders consulted for this study.

South West Non-potable Urban Water Project

Additionally, reference should be made to the work undertaken in the South West Non-potable Urban Water Project. While this project is facilitated by the DWER, it is supported by state and local government, utilities, and irrigation and urban development industry bodies with input from over 30 organisations. The project has a reference group and technical advisory group (which includes local government, utilities and development industry representation), and provides updates to the state’s Senior Officers Group (Water Supply Planning).

For Wanju, the gateway assessment undertaken by DWER included a fatal flaw assessment of 18 potential supply sources, of which 14 sources were then analysed using a multi-criteria analysis. This process ranked sources, which were further refined to identified total, interim and/or partial solutions. This allowed solution pathways to be developed that took account of the development timeframe, so as to avoid over capitalisation.

8. Next stages

The delivery of water services to the Wanju and Waterloo developments will require a unique approach which has not yet been undertaken in Western Australia. The approach to water servicing should be considered holistically and should not in a “business as usual” manner. The water servicing principles developed as part of this project are reflective of the unique nature of Wanju and Waterloo.

For further work, there are three recommended areas of focus:

1. In view of the service provider not being selected until the LSP stage, further work is required to refine the water servicing principles suitable for embedment within the Shire of Dardanup LPS to reflect planning decisions and matters. The water servicing principles can and should be embedded into the DWMS in their current form. There are time constraints surrounding this decision as the Wanju DSP and the Shire of Dardanup LPS are likely to be endorsed and gazetted respectively in 2019.

Additionally, it is recommended that the ERA also consider the water servicing principles in their decision to grant water licences at Wanju.

2. To advance strategic water planning and achieve a level of agreement as to the optimal water service solution, it is recommended that an independent water servicing reference design be prepared to refine the available water servicing options and create a basis for a consolidated approach at Wanju.
3. To provide greater financial certainty for water service providers the DCP should be advanced, and informed by the independent water servicing reference design.

In undertaking this study, it has become clear that currently, water service providers are required by legislation to act in a commercial manner and have limited opportunity to invest resources at this early stage in developing alternative servicing approaches without any security of being the service provider. However, there is a need for early consideration of water planning at Wanju which is in part driven by the need to source an alternative fit for purpose water supply for open space irrigation. It is therefore recommended that an independent water servicing reference design be prepared to refine the available water servicing options and create a basis for a consolidated approach at Wanju.

Outlined below is a summary of the recommended tasks and actions as well as the agency required to lead the required partnership approach to continue to develop and ultimately implement an optimal water servicing solution for Wanju.

Table 7: Recommended tasks

Task	Description	Lead agency	Timing	Task influence
1	Refinement of the water servicing principles to reflect planning decisions and matters suitable for embedding into the Shire of Dardanup LPS	DPLH / DWER / Shire of Dardanup	ASAP	The finalised principles will guide the reference design and future implementation of water servicing.
	Embedment of the water servicing principles (in their current form) into DWMS.	DPLH / DWER	ASAP or prior to the	The finalised principles will guide

Task	Description	Lead agency	Timing	Task influence
			finalisation of the DWMS	the reference design.
2	<p>Development of an independent water servicing reference design which will:</p> <ul style="list-style-type: none"> • Provide further refinement of the staged water demands. • Further develop and assess the water servicing options to confirm viable and optimal water servicing solutions using a multi-criteria analysis or other agreed assessment method. Further investigations could include the refinement of groundwater allocations plans and desktop MAR studies. • Prepare a reference design for the optimal water servicing solution(s) including a financial and economic assessment. 	DPLH	As soon as practical.	<p>The finalised reference design will potentially have impact on the land use and may require land to be set aside for infrastructure. This may be able to be accommodated in the Waterloo DSP.</p> <p>The reference design will inform detailed infrastructure planning and business case decisions for the WSPs.</p>
3	<p>Influence and provide input into the further development of a DCP and setting of tariffs.</p> <p>The reference design would be used as an input into further development of the DCP.</p>	Shire of Dardanup	After completion of the reference design.	Provision of greater financial certainty for the potential WSPs.

9. References

- Greater Bunbury Region Scheme, Department of Planning
- Better Urban Water Management (2008), Western Australian Planning Commission
- State Planning Policy No. 2.9 Water Resources, Department of Planning
- North West corridor water supply strategy (2014), Department of Water
- Urban National Performance Reports: Urban Water utilities 2015-16NPR, http://www.bom.gov.au/water/npr/npr_2015-16.shtml
- Wanju - Staging plan (2018), Integran
- Wanju and Waterloo – Servicing Needs Investigation (2016), Intergran
- Wanju district structure plan (Draft) (2016), Western Australian Planning Commission
- Wanju Integrated Water Management Strategy (2016), Calibre
- Water Forever, towards climate resilience (2009), Water Corporation
- Water Forever: South West (2015), Water Corporation.

Appendices

Appendix A – Water demand calculations

Table 8: Wanju staging – high growth rate

DSP Precinct	Yr 1	Yr3	Yr 5	Yr 10	Yr 15	Yr 20	Yr 25	Yr 30	Yr 40	Yr 50	Ultimate
Precinct 1											
Residential (dwellings)	100	600	1,700	3,604	4,418	4,655	4,697	4,698	5,664	5,664	5,664
Non residential (GFA/m ²)	1,000	4,000	8,000	18,451	33,798	46,104	49,836	49,838	51,224	57,440	57,440
Schools (students)	0	525	1,050	1,050	1,050	1,050	1,950	1,950	1,950	1,950	1,950
Precinct 2											
Residential (dwellings)	0	0	0	1,096	1,990	2,653	2,882	2,890	2,890	2,890	2,890
Non residential (GFA/m ²)	0	0	0	1,549	6,202	10,518	11,850	11,977	12,018	12,022	12,022
Schools (students)	0	0	0	0	525	1,425	1,425	1,425	1,425	1,425	1,425
Precinct 3											
Residential (dwellings)	0	0	0	0	1,292	3,011	3,519	3,535	3,536	3,536	3,536
Non residential (GFA/m ²)	0	0	0	0	0	3,379	9,711	12,283	13,201	13,201	13,201
Schools (students)	0	0	0	0	0	0	525	1,425	1,425	1,425	1,425
Precinct 4											
Residential (dwellings)	0	0	0	0	0	381	2,379	3,185	3,252	3,252	3,252
Non residential (GFA/m ²)	0	0	0	0	0	0	7,793	16,171	21,488	22,005	22,005
Schools (students)	0	0	0	0	0	0	0	525	1,425	1,950	1,950
Precinct 5											
Residential (dwellings)	0	0	0	0	0	0	224	2,333	3,166	3,166	3,166
Non residential (GFA/m ²)	0	0	0	0	0	0	810	10,947	24,036	26,459	26,459
Schools (students)	0	0	0	0	0	0	0	0	525	1,950	1,950
Precinct 6											
Residential (dwellings)	0	0	0	0	0	0	0	60	3,179	3,179	3,179
Non residential (GFA/m ²)	0	0	0	0	0	0	0	3,784	33,113	74,253	74,253
Schools (students)	0	0	0	0	0	0	0	0	0	525	525

Table 9: Wanju staging – medium growth rate

DSP Precinct	Yr 1	Yr3	Yr 5	Yr 10	Yr 15	Yr 20	Yr 25	Yr 30	Yr 40	Yr 50	Ultimate
Precinct 1											
Residential (dwellings)	75	450	1,275	3,525	4,502	4,651	4,692	4,697	4,698	5,664	5,664
Non residential (GFA/m2)	750	3,000	6,000	15,000	25,246	35,787	44,868	49,817	50,298	51,634	57,440
Schools (students)	0	525	1,050	1,050	1,050	1,050	1,950	1,950	1,950	1,950	1,950
Precinct 2											
Residential (dwellings)	0	0	0	0	1,273	2,500	2,839	2,885	2,890	2,890	2,890
Non residential (GFA/m2)	0	0	0	0	4,754	9,213	12,122	12,031	12,023	12,022	12,022
Schools (students)	0	0	0	0	525	1,425	1,425	1,425	1,425	1,425	1,425
Precinct 3											
Residential (dwellings)	0	0	0	0	0	874	2,544	3,432	3,533	3,536	3,536
Non residential (GFA/m2)	0	0	0	0	0	0	3,010	10,908	13,103	13,194	13,201
Schools (students)	0	0	0	0	0	0	525	1,425	1,425	1,425	1,425
Precinct 4											
Residential (dwellings)	0	0	0	0	0	0	200	1,403	3,199	3,252	3,252
Non residential (GFA/m2)	0	0	0	0	0	0	0	5,993	21,323	21,953	22,005
Schools (students)	0	0	0	0	0	0	0	525	1,425	1,950	1,950
Precinct 5											
Residential (dwellings)	0	0	0	0	0	0	0	107	2,415	3,166	3,166
Non residential (GFA/m2)	0	0	0	0	0	0	0	0	17,045	25,747	26,459
Schools (students)	0	0	0	0	0	0	0	0	525	1,950	1,950
Precinct 6											
Residential (dwellings)	0	0	0	0	0	0	0	0	290	3,179	3,179
Non residential (GFA/m2)	0	0	0	0	0	0	0	0	2,458	41,700	74,253
Schools (students)	0	0	0	0	0	0	0	0	0	525	525

Table 10: Open space staging – high growth rate

	Yr 1	Yr3	Yr 5	Yr 10	Yr 15	Yr 20	Yr 25	Yr 30	Yr 40	Yr 50
Dwellings completed – high growth	0%	3%	8%	22%	36%	49%	63%	77%	100%	100%
Open space (ha)	0.97	5.81	16.46	45.51	74.56	103.61	132.67	161.72	210.00	210.00
Playing fields (ha)	0.41	2.43	6.90	19.07	31.24	43.42	55.59	67.77	88.00	88.00

Table 11: Open space staging – medium growth rate

	Yr 1	Yr3	Yr 5	Yr 10	Yr 15	Yr 20	Yr 25	Yr 30	Yr 40	Yr 50
Dwellings completed – medium growth rate	0%	2%	6%	16%	27%	37%	47%	58%	79%	100%
Open space (ha)	0.73	4.36	12.35	34.13	55.92	77.71	99.50	121.27	164.86	210.00
Playing fields (ha)	0.30	1.83	5.17	14.30	23.43	32.56	41.69	50.82	69.08	88.00

Table 12: Wanju demand estimates – high growth (kL/annum)

	1	2	5	10	15	20	25	30	40	50
Residential (upper)	31,973	188,799	521,561	1,408,358	2,310,540	3,212,723	4,115,203	5,019,618	6,148,453	6,234,867
Residential (lower)	24,360	143,349	393,161	1,053,608	1,728,540	2,403,473	3,078,628	3,755,231	4,504,482	4,567,790
Non residential	940	3,760	7,520	18,800	37,600	56,400	75,200	98,700	145,775	193,057
Schools	0	3,707	7,413	7,413	11,120	17,474	27,534	37,595	47,655	65,129
Open Space	3,910	23,459	66,468	183,764	301,061	418,357	535,692	652,989	847,935	847,935
TOTAL (upper)	36,822	219,725	602,962	1,618,335	2,660,320	3,704,954	4,753,629	5,808,901	7,189,819	7,340,988
TOTAL (lower)	29,210	174,275	474,562	1,263,585	2,078,320	2,895,704	3,717,054	4,544,514	5,545,847	5,673,911

Note: Lower estimate – Perth consumption Upper estimate – Australind consumption

Table 13: Wanju demand estimates – medium growth (kL/annum)

	1	2	5	10	15	20	25	30	40	50
Residential (upper)	23,979	141,599	391,171	1,056,268	1,732,905	2,409,542	3,086,179	3,764,192	4,824,425	6,153,153
Residential (lower)	18,270	107,512	294,871	790,206	1,296,405	1,802,604	2,308,804	2,816,033	3,534,472	4,507,925
Non residential	705	2,820	5,640	14,100	28,200	42,300	56,400	74,024	109,275	156,275
Schools	0	3,707	7,413	7,413	11,120	17,474	27,534	37,595	47,655	65,129
Open Space	2,932	17,594	49,851	137,823	225,795	313,768	401,740	489,673	665,657	847,935
TOTAL (upper)	27,943	168,303	464,929	1,255,396	2,063,266	2,873,784	3,688,009	4,507,123	5,958,324	7,619,429
TOTAL (lower)	22,233	134,215	368,629	989,333	1,626,766	2,266,847	2,910,634	3,558,963	4,668,371	5,974,201

Note: Lower estimate – Perth consumption Upper estimate – Australind consumption

Table 14: Wanju residential demand estimate – upper estimate, high growth, by precinct (kL/annum)

DSP Precinct	1	2	5	10	15	20	25	30	40	50
Precinct 1	31,973	188,799	521,561	1,081,332	1,330,555	1,406,617	1,420,790	1,421,088	1,610,304	1,634,472
Precinct 2	0	0	0	327,026	595,292	794,628	863,408	865,847	815,702	820,760
Precinct 3	0	0	0	0	384,693	898,034	1,052,119	1,058,032	997,402	1,002,957
Precinct 4	0	0	0	0	0	113,443	711,828	955,556	921,227	930,486
Precinct 5	0	0	0	0	0	0	67,058	699,540	898,176	909,309
Precinct 6	0	0	0	0	0	0	0	19,555	905,642	936,884
TOTAL	31,973	188,799	521,561	1,408,358	2,310,540	3,212,723	4,115,203	5,019,618	6,148,453	6,234,867

Table 15: Wanju residential estimate – upper estimate, medium growth, by precinct (kL/annum)

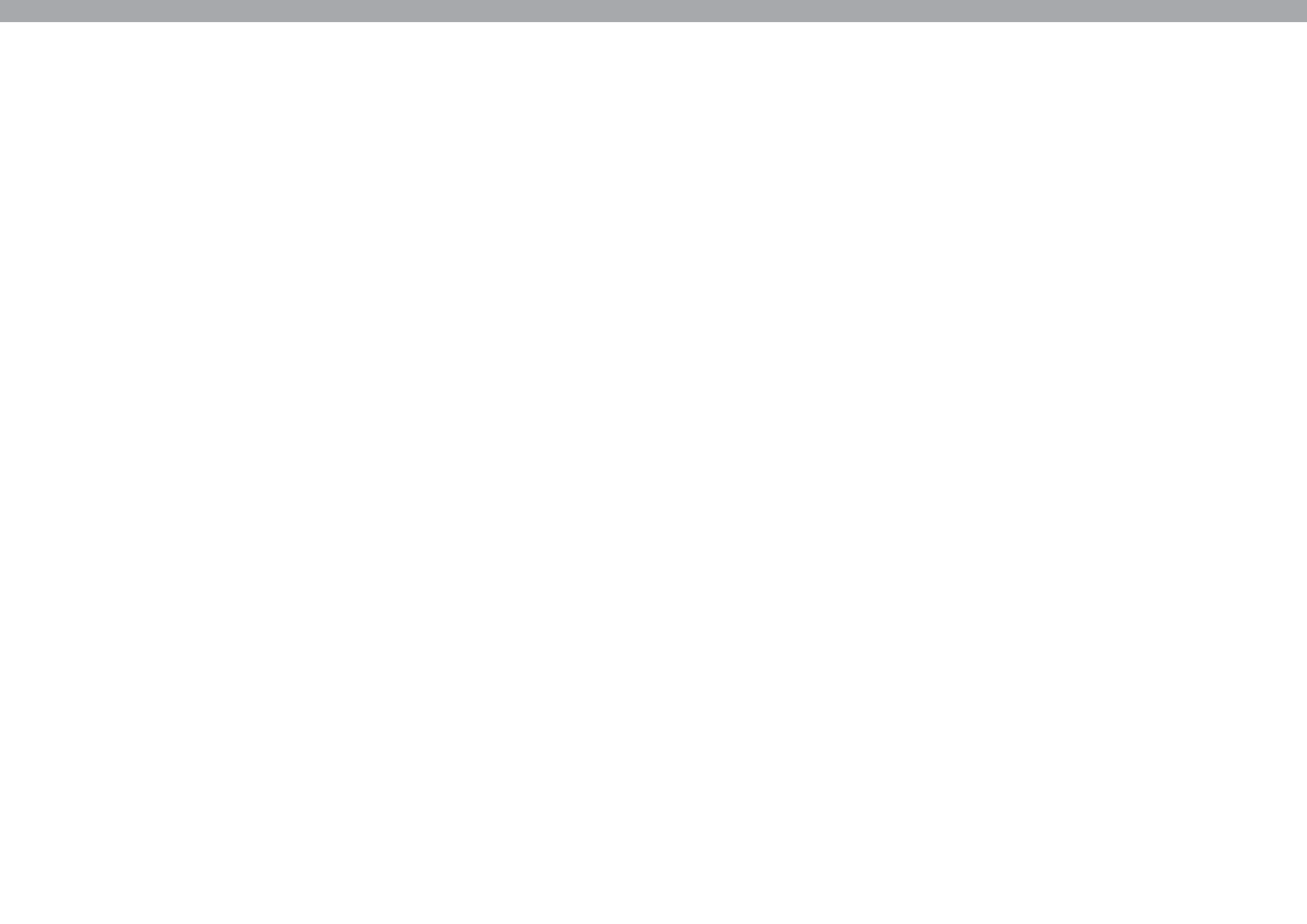
DSP Precinct	1	2	5	10	15	20	25	30	40	50
Precinct 1	23,979	141,599	391,171	1,056,268	1,351,746	1,400,819	1,417,082	1,420,781	1,338,952	1,610,477
Precinct 2	0	0	0	0	381,159	748,490	850,726	864,382	815,704	815,703
Precinct 3	0	0	0	0	0	260,234	758,820	1,026,750	996,520	997,399
Precinct 4	0	0	0	0	0	0	59,550	420,420	906,291	921,423
Precinct 5	0	0	0	0	0	0	0	31,859	684,579	898,896
Precinct 6	0	0	0	0	0	0	0	0	82,379	909,255
TOTAL	23,979	141,599	391,171	1,056,268	1,732,905	2,409,542	3,086,179	3,764,192	4,824,425	6,153,153

Table 16: Wanju residential estimate – lower estimate, high growth, by precinct (kL/annum)

DSP Precinct	1	2	5	10	15	20	25	30	40	50
Precinct 1	24,360	143,349	393,161	808,956	995,402	1,052,306	1,062,908	1,063,132	1,179,742	1,197,448
Precinct 2	0	0	0	244,652	445,345	594,470	645,925	647,749	597,600	601,305
Precinct 3	0	0	0	0	287,793	671,829	787,102	791,525	730,717	734,786
Precinct 4	0	0	0	0	0	84,868	532,526	714,862	674,910	681,693
Precinct 5	0	0	0	0	0	0	50,167	523,333	658,022	666,178
Precinct 6	0	0	0	0	0	0	0	14,629	663,492	686,380
TOTAL	24,360	143,349	393,161	1,053,608	1,728,540	2,403,473	3,078,628	3,755,231	4,504,482	4,567,790

Table 17: Wanju residential estimate – lower estimate, medium growth, by precinct (kL/annum)

DSP Precinct	1	2	5	10	15	20	25	30	40	50
Precinct 1	18,270	107,512	294,871	790,206	1,011,256	1,047,968	1,060,135	1,062,902	980,943	1,179,868
Precinct 2	0	0	0	0	285,149	559,953	636,438	646,654	597,601	597,601
Precinct 3	0	0	0	0	0	194,684	567,682	768,123	730,070	730,715
Precinct 4	0	0	0	0	0	0	44,550	314,521	663,967	675,053
Precinct 5	0	0	0	0	0	0	0	23,834	501,537	658,550
Precinct 6	0	0	0	0	0	0	0	0	60,353	666,139
TOTAL	18,270	107,512	294,871	790,206	1,296,405	1,802,604	2,308,804	2,816,033	3,534,472	4,507,925



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