

The Water Grid

Background

The water grid is a network of infrastructure that delivers drinking water from sources to customers. The water grid consists of pipes, pumps, valves, tanks and reservoirs of various sizes designed, built and operated to optimally deliver the required level of service.

As Perth grows in the future the water grid will expand to meet the needs of new customers. Planning for the expansion of the water grid occurs with planning for new water sources.

The nature of development in Perth will influence the shape of the grid and the timing of this investment.

As the Perth population becomes increasingly dense in older, more established suburbs, the infrastructure will need to be replaced or maintained to continue to deliver a high level of service. In addition, as new sources are developed further away from the existing water grid and new suburbs are added to the north, south or east of the city, an investment will need to be made to expand the grid.

There will also be opportunities to connect to communities which have not previously been able to access this shared infrastructure.

The benefits of a structured, established and well planned water grid are:

- orderly expansion of the grid in the future;
- new developed areas can be easily connected to the grid; and
- simplification of operation of the grid.

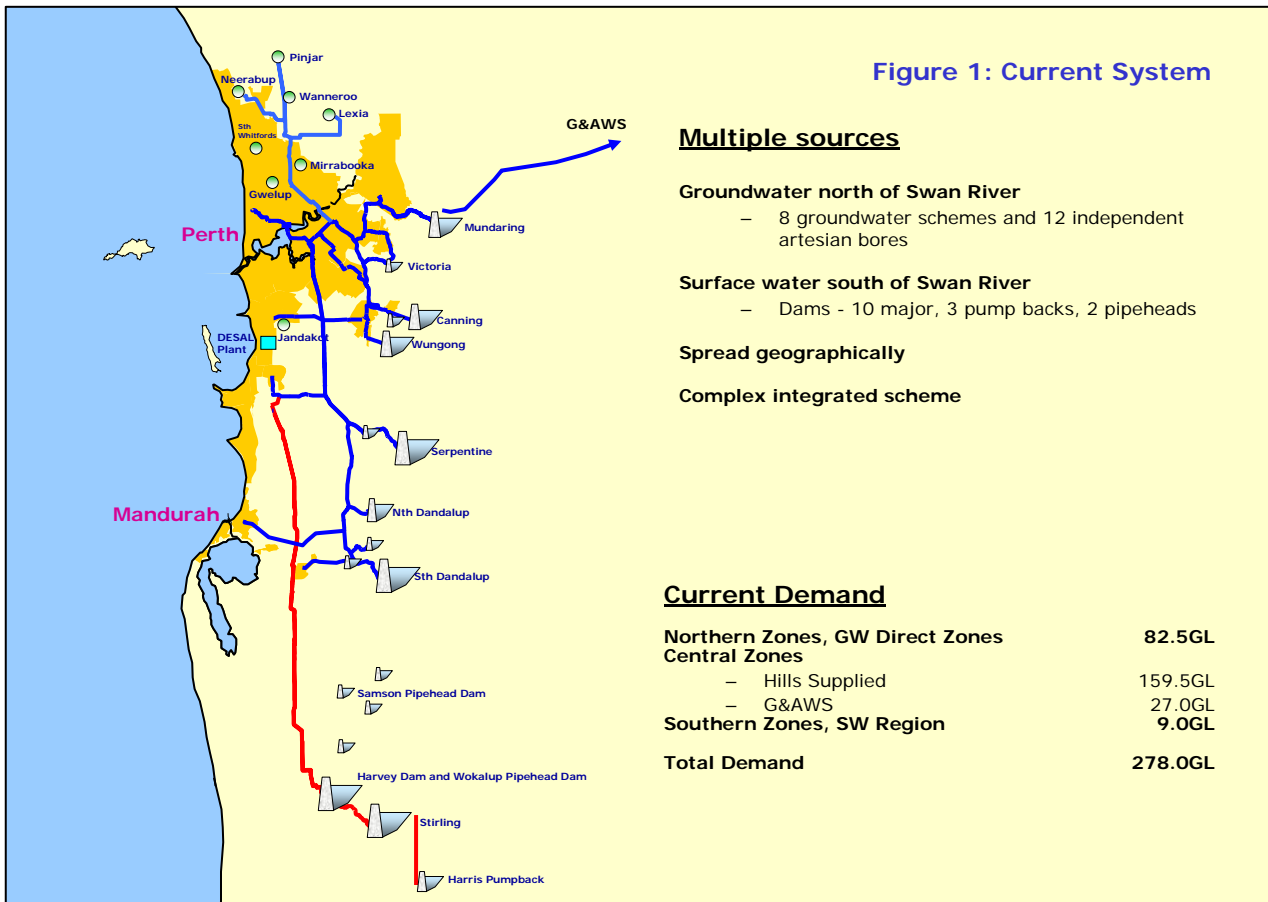
Current Situation

The current water grid for the Integrated Water Supply System (IWSS) is shown in Figure 1 below.

The dams or surface water reservoirs are located in the Darling Scarp, predominantly in the south east of Perth. These sources normally supply the southern and central suburbs. Groundwater sources are mainly in the north of Perth and these sources generally supply the northern and some central suburbs.

The water grid has been adapted to help to manage climate change and variability. For example, due to falling dam storage levels water is now moved to southern suburbs as well. This transfer capacity has now given the water grid greater flexibility and reliability as water for a variety of sources can be moved to most parts of the IWSS.





Most surface water sources only require minimal treatment (generally chlorination and fluoridation). In contrast, groundwater sources generally require a higher level of treatment. Groundwater is pumped from the borefields to treatment plants before being transferred to service reservoirs for supply.

The service reservoirs, tanks and distribution and reticulation mains are designed to supply the peak demand of the system. Peak demand usually occurs in the early to mid morning and in the evening when water use is at its highest. Assets are sized to supply these high flows. The reservoirs are filled via the trunk mains which supply on a more uniform basis over the day.

So, in summary, water is transferred from the water sources and treatment plants through large trunk mains to service reservoirs and tanks, and then through the distribution and reticulation mains to customers.

The Perth Seawater Desalination Plant became operational in 2006. This major water source required substantial connecting works (for example mains, pump stations, storage tanks) to enable it to supply drinking water into the water grid. This water is also banked in hills dams for later use. The proposed Southern Seawater Desalination Plant will also require substantial connecting works to the water grid.

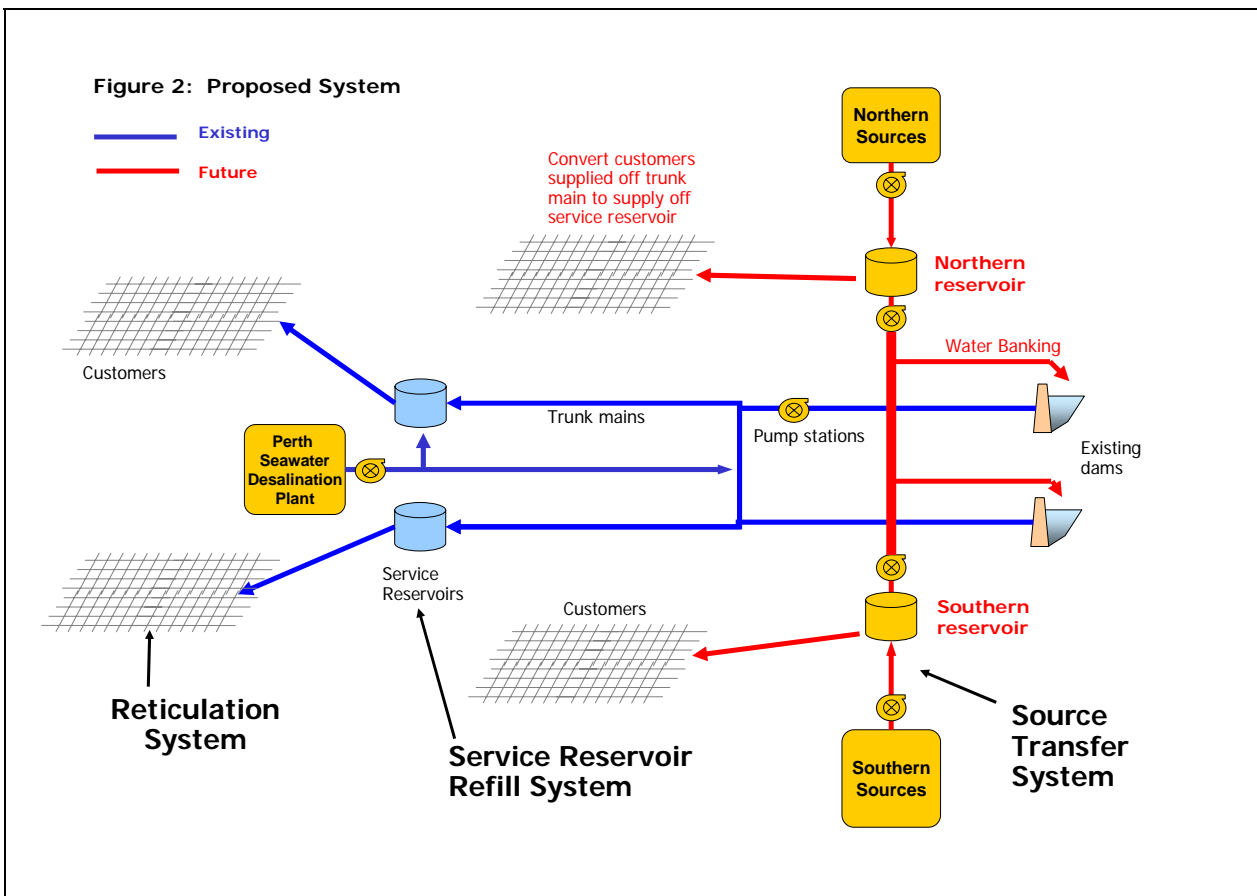
The current water grid is highly effective and efficient at moving water from a multitude of sources to customers. The great flexibility in the system means that supply outages are rare. Customer service and water quality standards are always maintained to very high levels.

The Future

Perth is expected to double in population size over the next 50 years. We need to plan for up to double the amount of current water use as a result. The water grid needs to be able to connect future water sources to the future customers.

The future proposed water grid for Perth is shown diagrammatically in Figure 2 below. The concept's main features are:

- Two new large service reservoirs, located in the metropolitan area to store water transferred from future southern and northern water sources. Sources north of Perth will transfer into the northern reservoir (Forrestfield) and sources south of Perth will transfer into the southern reservoir (Mundijong). These reservoirs are planned to be located on high land which substantially minimises energy use through gravity supply to customers.
- A central transfer system will connect these two reservoirs to:
 - bank excess water transferred from northern or southern sources directly into hills dams for later use; and
 - supply local areas via distribution and reticulation networks.
- Existing hills reservoirs will directly supply local service reservoirs and tanks throughout the water grid.
- Existing service reservoirs and tanks will continue to supply local demand areas via distribution and reticulation systems.





Sustainability considerations

Economic	Social and cultural	Environmental
Future water grid can be staged over a number of years.	Greater security of supply.	Minimises energy use.
Promotes low operating costs through simplicity of system operation.	Provides water of an appropriate pressure (flow rate) to customers.	Requires new reservoir sites.
Flexible water supply system able to integrate diverse current and future water sources.	Supports land development in Perth.	Agreed pipeline corridors and reservoir sites can minimise environmental impacts.