

Answers to questions raised in Forum 2 and requests for further information

Answers in *italics* have been provided in written form before. The following information is provided by the various relevant sections of the Water Corporation.

What does term ‘prudent commercial principles’ mean? What were the proven prudent commercial principles that were used by the Water Corporation when it made its first site selection? What were the proven prudent commercial principles that were used by the Water Corporation when it made its second site selection (when the site was moved to Mundaring Hill)? What prudent commercial principles will be applied the next time around? Is there an overall project budget?

The words ‘prudent commercial principles’ are contained in the ***Water Corporation Act 1995 – Sect 30***, which reads:

30. Corporation to act on commercial principles

***(1) The corporation in performing its functions must –
(a) act in accordance with prudent commercial principles; and
(b) endeavour to make a profit, consistently with maximizing its long term value
(2) If there is any conflict or inconsistency between the duty imposed by subsection (1) and a direction by the Minister under his Act, the direction prevails.***

This section of the Act allows the Minister to give directions when there are conflicts or inconsistencies. Commercial principles are consistent with the endeavour to make a profit, to maximise its long term value. While ‘prudent’ adds “wise, judicious, or wisely cautious in practical affairs.” (Macquarie Concise Dictionary).

The Water Corporation conducts a multi-criteria analysis (based on the triple bottom line principles of social, economic and environmental), which ensures that all issues are considered – not just financial.

In the initial selection of sites for the proposed water treatment plant, the Water Corporation had an interest in the land both below the Weir and adjacent to the existing tanks on Sawyers Valley Hill. Based on the estimated cost savings of approximately \$6 Million (1999 dollars) compared to the Mundaring Weir Site 1 Option, and numerous advantages with respect to environmental, social impacts and fewer site constraints; the Water Corporation decided it was ‘prudent’ to site the water treatment plant at Sawyers Valley Hill site.

The current preliminary budget on the Water Corporation’s Capital Investment Program for the water treatment plant is \$135.7 million.

Once the site for the water treatment plant has been confirmed, costs will be estimated and included in the State Budget. The Water Corporation has done a preliminary analysis of 11 of the sites under consideration and has previously provided some indicative costs.

Project Manager Site Selection Ken Walter has informed the forums on a number of occasions that he will debate the case for the need for extra funds to Water Corporation

Executive Management and Government to ensure the 'best' site is obtained. Based on the presentation given at the Forum 2, Mr Walter is comfortable to present an estimate in the order of \$150 million, compared with the cheapest option of \$118 million.

Why is a water treatment plant needed? Is it possible to have an independent analysis of the need for a water treatment plant?

Presentations given by the Water Corporation's General Manager Water Technologies Keith Cadee and Manager Drinking Water Quality Richard Walker at previous meetings and forums have set out in detail the need for a water treatment plant.

The Water Corporation's position is that there is an urgent need for a water treatment plant so that drinking water supplied to the Hills area (east of Hardey Road, Glen Forrest) and those served by the Goldfields and Agricultural Water Supply Scheme continue to receive water of drinking water quality standard set by the Minister for Health.

The Water Corporation has discussed the possibility of an independent, third-party analysis of the need for a water treatment plant at Mundaring, but it does not believe that the significant cost involved would be a worthwhile way to spend tax payer dollars. Also, there is the issue of finding a local organisation with the requisite independence, resources and expertise to undertake such a task in the timeframe required.

The Water Corporation has said that no private property will be compulsorily acquired. A number of forum participants have said that they would like this statement clarified and see it confirmed in writing.

The Water Corporation has for many years had a policy of purchasing land within the Mundaring Catchment area, if and when it became available, and if it was at a reasonable price. This is part of an ongoing catchment management strategy aimed at protecting drinking water quality and is not connected to the proposed Mundaring Water Treatment Plant.

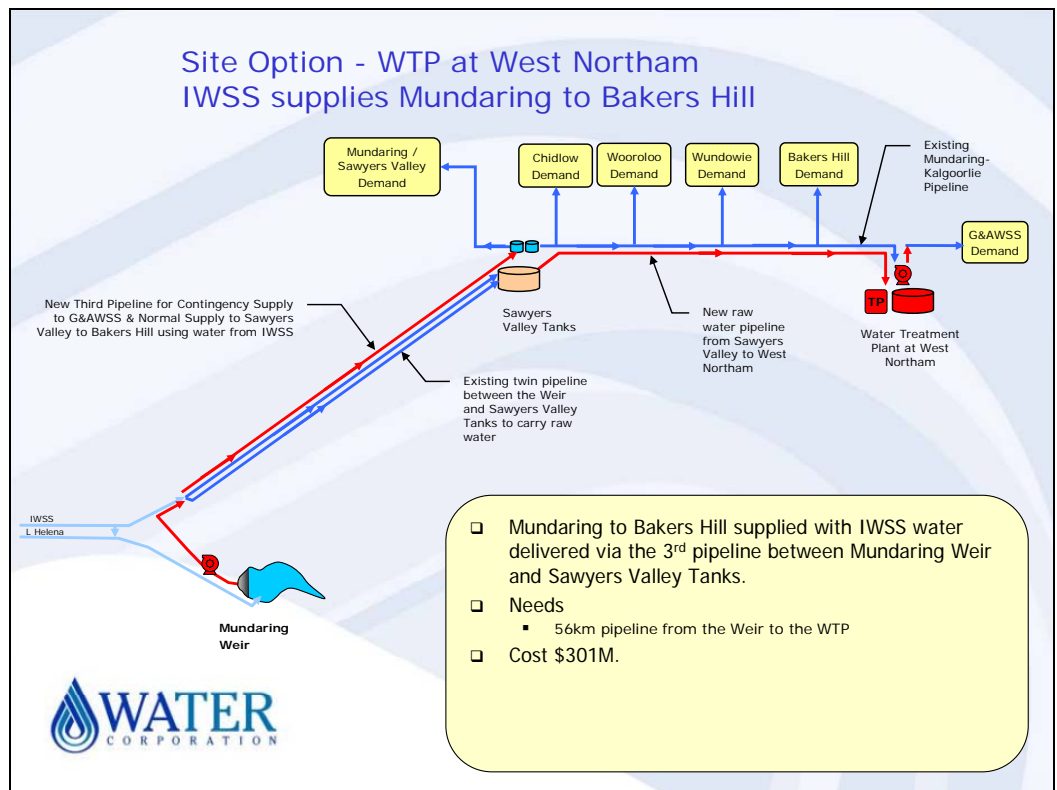
The Premier recently wrote to a local Mundaring resident to explain that no land would be compulsorily acquired for the proposed Mundaring Water Treatment Plant. A copy of that letter, with the name and address blanked out, is attached for your information.

Why can't Mundaring residents receive treated water from Perth scheme and the water from Mundaring Weir be sent further out to be treated closer to where it be used?

The Water Corporation has investigated the option of splitting the supply into two schemes:

- Mundaring to Bakers Hill Scheme; and
- The Goldfields and Agricultural Water Supply Scheme (G&AWSS) east of West Northam.

This supply arrangement was presented at the last forum held at the Mundaring Shire Hall on the 12 June 2006 and is shown again in the schematic diagram below.



Mundaring to Bakers Hills Scheme

This scheme requires a new third pipe about 6km in length between Mundaring Weir and Sawyers Valley to be constructed so that a pipeline link to the Integrated Water Supply Scheme (IWSS) could be established. This link will be used to send potable quality water from the IWSS directly to the two existing 9ML storage tanks at Sawyers Valley. From these two tanks, water will be distributed by gravity to residents in the Mundaring to Bakers Hill town sites using part of the existing Mundaring-Kalgoorlie pipeline and the existing reticulation pipe network. This link will also serve to provide contingency supply to the G&AWSS in the event of a major outage in the water source at Mundaring Weir or the water treatment plant at West Northam.

G&AWSS east of West Northam

This scheme requires a new raw water pipeline (about 50km in length) to be constructed between Sawyers Valley and West Northam. This pipeline together with the existing twin Mundaring-Kalgoorlie pipelines between Mundaring Weir and Sawyers Valley will be used to transfer raw water from Mundaring Weir to West Northam for treatment. From West Northam, treated water will be transferred eastwards to supply the G&AWSS.

Technically, this option is feasible but due to its significantly high cost of about \$300M, it is considered not as attractive as other options that are at about half the cost. It is obviously economically not viable and the Water Corporation considers that this option should not be considered further. The high cost is due largely to the significant distance of about 56km in total between the raw water source at Mundaring Weir and the water treatment plant at West Northam.

There was a request for a map showing the reticulation mains of the water that comes to Mundaring and where it is distributed.

Map supplied – see ‘maps’ section.

Is it possible to have a 3D-graphic model of the treatment plant overlaid onto a number of sites so we can get some sense of scale?

Yes. The Water Corporation is working with an information technology consultant on this matter and it will give a presentation at a future forum.

More specific details were requested on the 11 sites.

Larger and more detailed maps are being prepared and will be available for viewing and discussion in the syndicate groups at the next Forum.

Forum participants wanted more information about the new site 1km below the Weir.

The site 1km below the Weir is conceptually the Paull's Valley site option, where a broad area was defined for the conceptual locations but no specific sites were identified. The Water Corporation always intended to conduct further investigations to define the site more specifically in terms of location. So far, an initial investigation has been carried out and a potential site located about 1km below the Weir has been found. Its location and cost were presented in the 11 site options at the first deliberative forum.

The site is located:

- in the Shire of Kalamunda on Reserve No. 47880 Lot 3040 within the new Mundaring National Park, which is vested in the Conservation Commission of Western Australia and managed by the Department Environment and Conservation (formerly the Department of Conservation and Land Management);
- about 1km west of Mundaring Weir, on the south side of Helena River;
- to the west of a steep ridge which reduces the visual impact from Mundaring Weir;
- outside the existing Heritage and Tourist Precinct; and
- well away from residential areas.

In terms of environmental impacts, this 20ha site is comparable to other sites such as Site 1, 2 and 5 (Sawyers Valley Tank site) that are partly or wholly located within the new Mundaring National Park. Other than environmental impacts, this site has some advantages in terms of costs, less infrastructure requirements, technical and operation simplicity, less social impacts and opportunities to extend/enhance the existing Heritage and Tourist Precinct.

Environmental impacts study for this site is scheduled to be carried out in early spring and more details when survey data becomes available will be provided at the later forums.

At Forum 2, a question was raised in relation to an article that appeared in the Autumn edition of the Water Corporation customer magazine ‘Watermark’. Specifically, clarification was requested on a paragraph that read:

“Other work in the Goldfields includes a new \$70 million dollar project to design and build two reservoirs and water treatment facilities at Binduli, west of Kalgoorlie-Boulder.”

The 'water treatment facilities' referred to are simply chlorination stations at the outlets from the new reservoirs being built. The cost of these stations will be less than \$3 million, with the bulk of the \$70 million project costs being spent on civil works.

There are a number of chlorination stations along Goldfields and Agricultural Water Supply Scheme (G&AWSS) pipeline, which are necessary to maintain the disinfectant residual to reduce the risk of microbiological regrowth in the thousands of kilometres of water pipes in the G&AWSS.

The proposed Mundaring Water Treatment Plant will introduce the filtration process for all water from Mundaring Weir. Filtration has a major role in maintaining the disinfectant residual throughout the pipe network. It filters out the natural organic matter in the source water which would otherwise react with the residual disinfectant chemicals, leaving no active disinfectant left to fight any new micro-organisms.

The Forum requested more detail on the environmental impacts for each site and how they will be managed.

Full environmental impact studies will be carried out once the site short-list has been agreed.

The Forum raised concerns about environmental rehabilitation.

A rehabilitation plan will be prepared to the satisfaction of the Department of Environment and Conservation once the ultimate site is determined.

The Forum requested more information about environmental offsets.

This will be determined by the Environmental Protection Authority once the ultimate site is determined.

How much logging occurs in the catchment area and what is the impact on the quality of the water?

The quantity and areas for hardwood and softwood logging in the Water Corporation's surface water area, including the Mundaring Catchment, vary from year to year. The variation is dependent on a number of external factors, including demand.

The Department of Environment and Conservation (formally the Department of Conservation and Land Management) and the Forest Products Commission (FPC) prepare biennial logging plans. These must be consistent with the FPC's *Code of Logging Practice* and the Department of Water's Drinking Water Source Protection Plans. These include road, river and stream buffers to protect the quality of run-off from the catchment area into the reservoir. These plans are also reviewed by the Water Corporation and the Department of Water to ensure that the objectives of each agency will be met. These plans are subject to audit by agencies such as the Conservation Commission and the DEC.

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Details on timber harvesting (managed and conducted by Forest Products Commission) within the Mundaring Catchment are provided below.

As a result of the January 2005 fire, there has been substantial harvesting of pines (330ha) along the Darkin River. This harvesting covers the majority of pines in Beraking and current contouring and replanting operations, which gives areas of the valley a 'moon scape' appearance. This is an abnormal situation and is a very small percentage of the entire catchment.

Selective hardwood harvesting has been very minor in recent years with no clear-felling operations (maybe several hundred ha over 5 years). All harvesting is managed in accordance with current timber harvesting codes of practice.

Data on turbidity in streams downstream of timber harvesting areas has been inconclusive. However, the Water Corporation does expect localised impacts this winter from the softwood operations along the Darkin River. The higher water levels in Mundaring reservoir this year will mitigate these impacts.

Native timber is selectively harvested in the catchment, with minimal impact on turbidity due to retention of native vegetation.

Turbidity sampling

Turbidity sampling programs using turbidity probes located upstream and downstream of timber harvesting (both pine plantations and native timber harvesting) have been run since 2000. Probes are placed to catch the first flush of rainfall. Results have been varied, with higher turbidity recorded upstream than downstream of harvesting areas in some instances. Peaks in turbidity are closely correlated with rainfall events, with turbidity levels generally subsiding within a few days. Monitoring in some years suggests that land uses other than timber harvesting (such as four wheel driving, trail bike riding and rally events) impact turbidity as much as the logging area.

Turbidity monitoring will continue this year, with a focus on the recently harvested Beraking pine plantation.

We need information on the type of vegetation on each site- cleared land, dieback, trees, healthy bushland, habitat etc.

Once the site short-list has been determined, flora/vegetation surveys will be conducted during spring. Fauna surveys will also be conducted as required. *Phytophthora* dieback assessments will also be carried out and a Dieback Hygiene Plan will be developed for the ultimate site.

How much chlorine and ammonia will be stored at the Water Treatment Plant and if it is built on Mundaring Hill in the event of a calamitous valve or tank failure how far will the chlorine plume spread?

Quantities of chemicals (question has been answered previously on the website) - Liquefied Chlorine Gas (100%) 14 x 920 kg drums or 12.88 tonnes maximum; Aqueous Ammonia Solution (25%) 30 kL maximum.

Chlorine gas is heavier than air and will tend to stay near the ground and move downhill and downwind. As it spreads it is diluted and dispersed in the atmosphere and reacts with, and is immobilised by, sunlight and materials in its path such as open water, buildings, lawns, gardens, fences, trees, undergrowth etc. While small, non-lethal, concentrations of chlorine gas would probably travel a considerable distance, the most realistic effect distance of a leak from a chlorine facility, under worst case weather conditions (hot still day), is of the order of 500 metres to 600 metres.

The Water Corporation has not experienced such a leak in more than 80 years of operation of chlorine facilities, but it has contingency plans in place never-the-less. The chlorine buffer zone, which is designed to exclude residences and areas heavily trafficked by the public, is bounded by the Department of Environment and Conservation's community risk criteria contour line for a one in a million risk per year of a fatality, which for Mundaring chlorine facility would be of the order of 250 metres to 300 metres.

The difference between the two quoted distances (500/600 metres and 250/300 metres) is because probabilities have to be taken into account to make a risk assessment realistic. For example, it would be unrealistic to assume that, simultaneously:

- A leaking drum would be full at the time of failure;
- None of the multiple separate alarms would be triggered to alert plant operators, the Statewide Operations Centre in Leederville and emergency services;
- The emergency response plan would not be activated and followed;
- Members of the public located outdoors, directly downwind would not be able to move away from a leak, despite smelling chlorine;
- Members of the public located indoors, directly downwind would have all of their windows open on a hot still day (worst case weather condition).

By comparison, the nearest residence on Lot 1199 Darkan Street Mundaring, downhill from the Site Option No. 5 and about 1 kilometre west from the previously proposed chlorine storage building location, is some 400 metres to 500 metres outside of the above mentioned effect distance and more than 700 metres away from the residential risk criteria distance. An enormous amount of dilution, dispersion and reaction with intervening forest would occur in this additional 700 metres distance beyond the Chlorine Buffer Zone (where the risk is only one in a million risk per year of a fatality compared for example to the risk of death when crossing the road which is about 100 in a million per year). The risk of injury at a distance of 1 kilometre resulting from a calamity at the WTP chlorine storage building is so small compared to other risks in life that it may be confidently ignored.

Can the size of the water treatment plant be compressed to take less land and leave a smaller footprint?

The proposed water treatment plant layout planning is primarily driven by the process requirements. The process units have been arranged in such a way to minimise major

pipe and cable runs. Chemical dosing facilities have been located as close to the various dosing points as possible.

The Water Corporation would like to “compress” the water treatment plant layout and reduce the area of land needed to be cleared. However, the design of the water treatment plant layout is governed by safety standards and guidelines. For example; the chlorine building must be separated from the operation building by at least 50 metres to comply with safety requirements. Separation from other dangerous goods facilities must be at least 15 metres.

For safety reasons, Water Corporation design standard has adopted a chlorine buffer zone of 250 metres. A more detail quantitative risk assessment will be conducted once the water treatment plant site is confirmed, which may or may not reduce the buffer required.

Due to the difficulties in obtaining all the necessary approvals for a water treatment plant site and the effect the site selection has on the design and construction of associated water infrastructure within the region, it would be extremely short-sighted to choose the smallest possible site. A treatment plant for Mundaring Weir will probably always be required and so sufficient land (20 – 25 hectares) should be set aside now to provide for the future.

Extra land may be needed for increased capacity, new and improved technology and to achieve higher water quality standards. The plant layout needs to be able to accommodate new process modules with minimum disruption and impact on the initial facilities.

Some allowance of space will be needed around the corners of internal access roads to cater for manoeuvre of the maintenance trucks and the chemical delivery trucks. Space is also needed to satisfy the fire break requirement when designing the water treatment plant layout.

A study has been carried out to compare the mechanical dewatering systems which required a smaller footprint (and thus, potentially less clearing) with the sludge drying beds. The result of the study recommends that the drying beds option to be implemented for Mundaring Water Treatment Plant as it was the most cost effective option with similar environmental impacts to the mechanical options.

Was a smaller ‘footprint’ for the water treatment plant not chosen simply because it would cost more?

The drying beds option will require a larger environmental ‘footprint’ than a mechanical dewatering system, but as well as being more cost effective, the use of drying beds is also more environmentally sustainable, primarily because the energy requirement is significantly less.

How much water is generally used in domestic households?

The 2005 Domestic Water Use Study showed that single residential households used more water in-house than multi-residential households. Single residential households used an average of about 520 litres/house/a day, whereas multi-residential households used an average of about 360 litres/house/a day. The split of the components is show below:

Single Residential	
Bath and shower	33%
Washing machine	27%
Toilet	21%
Tap	16%
Other	3%

Multi - Residential	
Bath and shower	33%
Washing machine	26%
Toilet	17%
Tap	21%
Other	3%

In-house usage is highly dependent on the occupancy rates for the different households types. Given that the average occupancy rate for single residential households in this study is 3.35 persons and 2.19 persons for the multi-residential households, the difference in water usage is understandable.

What is the break down of water usage in the Goldfields and Agricultural Water Supply System?

**Goldfields & Agricultural Water Supply System
(G&AWSS)
Water Consumption by Land Use Class for 2005/06 Financial
Year**

(Excluding Hills Water Services West of Wooroloo which are included in Perth Metropolitan Area Statistics)

Land Use Class	No. of Water Accounts	No. of Land Units	Total Annual Consumption (kL/year)	Percentage	Average Annual Consumption per Unit (kL/year)
Residential	24,621	25,440	8,326,952	38%	327
Commercial	2,871	3,356	1,772,958	8%	528
Farmland	2,542	2,542	3,632,957	17%	1,429
Other	1,529	1,686	1,659,095	8%	984
Vacant Land	1,056	1,054	63,439	0%	60
Mining	53	53	5,954,900	27%	112,357
Industrial	33	34	330,349	2%	9,716
Total	32,705	34,165	21,740,650	100%	636

G&AWSS WATER SOURCES 2001 - 2006

