



CENTRAL PARK WATER UTILITY

WICA APPLICATION

Public Version

Submitted to : **Independent Pricing and Regulatory Tribunal**
Utility Licensing

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INTRODUCTION

Central Park Water Factory Pty Ltd ('CPWF'), a wholly owned subsidiary of Water Factory Company Pty Ltd ('WFC'), submits the following application for **network operator licence and retail supplier licence** in relation to the supply of sewerage, drinking water and recycled water services in the Local Government Areas of Sydney, Randwick, Botany Bay, Marrickville, Rockdale and Canterbury, New South Wales.

High-rise residential/commercial buildings will deliver sewage, rainwater and ground water to a new Recycled Water Factory to be constructed at the major mixed residential/commercial development site at Broadway, Sydney, known as 'Central Park'.*

A gravity sewer system network from the separate buildings will deliver sewage from the buildings within Central Park to the new Recycled Water Factory to be situated in the basement of one of the buildings.

The sewage, rainwater and ground water sources from within Central Park, will be collected via gravity systems and processed by membrane bioreactor (MBR) technology, together with reverse osmosis (RO) ultraviolet light (UV), and chlorination treatment, to produce two qualities of recycled water (High TDS and Low TDS). Recycled water will then be distributed to residential and non-residential (retail and commercial) customers in Central Park, to public facilities in the development, as well as to 3rd party customers outside Central Park.

A Recycled Water Factory is being installed for the following functions:

- Treatment of all sewage generated within the development
- The supply of recycled water within the site, primarily for toilet flushing, clothes washing, irrigation purposes and general outdoor use including wash-down (non-potable applications); and
- The supply of make-up water for the power generation and cooling water system

Drinking water supply, sewerage services and recycled water supply to toilets are **essential services** and WFC has identified the following contingency plans:

- **Drinking Water Supply Contingency Plan** – All drinking water is supplied from 2 separate Sydney Water reservoirs via drinking water ring mains that allow alternate supply should there be a distribution or reservoir failure
- **Sewerage Service Contingency Plan** – All sewage is able to by-pass the Recycled Water Factory and discharge into Sydney Water's sewerage system
- **Recycled Water Supply Contingency Plan** – Top up recycled water storage with drinking water supplied from the existing Sydney Water drinking water system

It is intended that drinking water will be supplied to CPWF by Sydney Water at a series of bulk water meters at the edge of Central Park. CPWF will be responsible for the distribution and retail services to consumers within Central Park.

CPWF, through WFC, delivers the following competencies:

1. **Technical capacity** is demonstrated through the experience of WFC's management team, board advisors and our business partners
2. **Organisational capacity** is demonstrated through our simple organisational structure and strong outsourcing model for specialist personnel.
3. **Financial capacity** is demonstrated through our projected financial performance and supported by our commercial arrangements with the Central Park developer (a JV between Frasers Property Group and Sekisui House).

* Central Park is a large mixed resi/commercial development located at the southern edge of Sydney CBD. With approx. 10 buildings (comprising 1,800 apartments and approximately 100,000 sqm commercial premises), together with laneways, terraces and offices, Central Park transforms the old Kent Brewery in Chippendale into an intelligent interplay of buildings and public spaces, and raises the benchmark for sustainable living globally.

SECTION A – WICA APPLICATION FORM

SECTION B – RESPONSE TO QUESTION 2 (B)

Question: What is the design of the infrastructure?

Describe the process to be used to extract and/or treat water or sewage.

Table (B1) details the key steps used to process raw sewage into high quality recycled water.

Item	Unit operation	Size / Capacity	Purpose / Comment
1	Extraction pump station		Raw sewage is pumped from the existing Sydney Water sewer as additional make-up for periods when the recycled water demand exceeds the precinct sewage supply.
25	Pressure sewer network		Raw sewage is collected at each building in a pump station and transferred via a gravity sewer system to the flow balance tank.
2	Flow balance tank		Raw sewage will be delivered into a new flow balance tank from the gravity sewer networks. The flow balance tank will be used to buffer diurnal flows.
2	Sewage feed pumps		The raw sewage will transfer the sewage from the flow balance tank via the macerator and screens into the anoxic zones.
3	Maceration		The raw sewage will be macerated prior to entering the inlet screen to eliminate the need for coarse screening and reduce the risk of downstream blockages.
4	Inlet screen		Inlet screening will be used to remove to remove solids >2mm which is critical to protect downstream membrane filtration (see Item 6 below).
5 and 6	Bioreactor		A bioreactor, consisting of an anoxic and aerobic zone, will form the core of the proposed recycled water factory. The biological reactor will be designed to achieve the required levels of BOD and nutrient reduction. Nitrogen will be removed biologically whereas Phosphorus will be precipitated with alum and subsequently form part of the biomass.
7	Membrane filtration		The membranes will separate the biomass from the treated water and provide the first disinfection barrier. The biomass is sent back to the start of the biological reactor and the treated water is sent onto further disinfection. Excess biomass is periodically wasted from the aerobic zone. The bioreactor is configured into distinct zones via baffles to minimise short circuiting.
8	RO feed sump		This provides buffer storage capacity between the membrane filtration and reverse osmosis system.

Item	Unit operation	Size / Capacity	Purpose / Comment
9	Reverse Osmosis (RO)		The reverse osmosis (RO) removes the salt from the feed water ensuring that it meets the required specification as feed to the cooling towers. For cooling water use, the recycled water requires the salt level to be reduced. Reverse Osmosis will remove dissolved minerals, salts, organic molecules and other contaminants within the feed water.
10	UV Disinfection		UV disinfection provides the second disinfection barrier. Importantly the low turbidity water (typically ~0.2NTU) produced from membrane filtration is well suited to UV disinfection.
11	Calcite filters		Permeate from the RO is acidic and requires neutralisation/stabilisation. Calcite contactors are generally used after Reverse Osmosis unit or where the water has a pH below 7 and is acidic. The Calcite contactor is used to return the pH to approximately 7 and add minerals removed by the RO device in order to stabilize the water for distribution and use.
12	Chlorine Disinfection		Chlorine disinfection provides the third disinfection barrier. Importantly the low turbidity water (typically ~0.2NTU) produced from membrane filtration is well suited to chlorine disinfection. Chlorine will also be dosed to maintain a residual in the recycled water storage tanks.
13	General use recycled water storage		The general purpose treated water storage tank will provide a buffer between the production capacity of the recycled water factory and the peak recycled water demand for the general use activities, such as toilet flushing, clothes washing, irrigation and other non-potable uses.
14	Cooling tower supply recycled water storage		The cooling tower treated water storage tank will provide a buffer between the production capacity of the recycled water factory and the peak recycled water demand for the cooling tower make-up. NOTE: the general use and cooling tower supply treated water tanks are connected via a common balance line.
15	General use recycled water distribution		A delivery pump set will be selected to match the instantaneous and daily demands of the customers to be served.
16	Cooling tower supply recycled water distribution		A delivery pump set will be selected to match the instantaneous and daily demands of the cooling tower make-up.

Item	Unit operation	Size / Capacity	Purpose / Comment
17	General use drinking water distribution		Distribution pipelines will be selected to connect Sydney Water's drinking water supply to each building to match the instantaneous and daily demands of the customers to be served.

Describe, in bullet point form, the design of the infrastructure, including details of the life-span and system redundancy built into the infrastructure or system

Table (B2) – Life span and system redundancy

Item	Unit operation	Life span	Redundancy	
1	Extraction pump station	Collection vessel	>50 years	Duty only
		Pump	>25 years	Duty only
		Control panel	>25 years	Duty only
		Rising mains	>75 years	Duty only
25	Pressure sewer network	Carrier mains	>75 years	Duty only
25	Gravity sewerage network	Carrier mains	>75 years	Duty only
2	Flow balance tank	Concrete structure	>75 years	Duty only
		Flow balance mixer	>15 years	Duty
2	Sewage feed pumps	Feed pumps	>15 years	Duty / Standby
3	Maceration	Inlet macerator	>15 years	Duty / Standby
4	Inlet screen	Inlet screens	>15 years	Duty / Standby
5 and 6	Bioreactor	Bioreactor Stage 1 – Concrete	>75 years	Duty only
		Bioreactor Stage 2 - Concrete	>75 years	Duty only
		Anoxic mixers	>15 years	Duty only
		Fine bubble diffusers	>10 years	Duty only
		Recycle pumps	>15 years	Duty / Standby

		Process blowers	>15 years	Duty / Standby
7	Membrane filtration	Membrane tank - Concrete	>75 years	Duty only
		Backpulse tank – Concrete	>75 years	Duty only
		Membrane blowers	>15 years	Duty / Standby
		Membrane cassette	>10 years	Duty only ¹
		Permeate pump	>15 years	Duty / Standby
		Membrane tank drain pump	>15 years	Duty only
8	RO feed sump	Concrete structure	>75 years	Duty only
9	Reverse Osmosis (RO)	Low pressure feed pumps	>15 years	Duty / Standby
		High pressure pump	>15 years	Duty
		Pressure vessels	>20 years	Duty
		Skid	>25 years	Duty
10	UV disinfection	UV reactors	>15 years	>25 years
11	Calcite filters	FRP pressure vessels	>25 years	>25 years
12	Chlorine contact tank	Concrete structure	>75 years	Duty only
13	General use recycled water storage	Concrete structure	>75 years	Duty only
14	Cooling tower supply recycled water storage	Concrete structure	>75 years	Duty only
15	General use recycled water distribution	Delivery pump set	>15 years	Duty / Standby
		Distribution mains	>75 years	Duty only
16	General use drinking water reticulation	Distribution Mains	>75 years	Duty/Duty/Duty
17	Cooling tower supply recycled water distribution	Delivery pump set	>15 years	Duty / Standby
		Distribution mains	75 years	Duty only

Is the process common industry practice?

Yes, the unit operations proposed for the recycled water factory at Central Park represent common and industry best practice. In particular:

- **MBR technology** is widely used nationally and globally for production of high quality treated water from municipal and industrial wastewater. Installations in Australia range from <40,000L/day to 75,000,000L/day.
- **Reverse Osmosis** is widely used nationally and globally for desalination of saline waters to produce high quality product water.
- **Calcite filters** are globally used after Reverse Osmosis units or where the water has a pH below 7 and is acidic.
- **UV disinfection** is widely used nationally and globally for disinfection of recycled and potable water.
- **Chlorination** is widely used nationally and globally for disinfection of recycled and potable water.

Please provide a process flow diagram of the scheme (from source to end use), and identify the Critical Control Points in the process, specifications of key units and design, and a copy of any independent validation of process or value engineering assessment of the design and/or its suitability for use in the proposed activity to be licensed (if available) in an Appendix.

Please find following preliminary responses to the issues raised above. Further information is available in **the DRAFT Recycled Water System Management Plan** which will be completed by CPWF/WFC in conjunction with all relevant stakeholders through a consultative workshopping approach during the course of the eventual IPART audit process

SECTION C – RESPONSE TO QUESTION 2 (E)

Question: How will the infrastructure be maintained and operated?

Describe the arrangements made for the maintenance, monitoring and reporting of standards of service for the infrastructure.

Table (C1) details the arrangements for the operation, monitoring, maintenance and reporting of the infrastructure.

Table (C1) – Operation, monitoring, maintenance and reporting of the infrastructure

Area	Sub area	Comment
Operation	Daily – Basic Operation	Daily operation of the proposed recycled water factory will be undertaken by WFC/CPWF personnel and sub-contractors. Key staff members will be trained in all aspects of plant operation to enable them to identify and troubleshoot basic issues with plant performance.
	Daily – Overview	
Monitoring	Daily	Site staff will complete a basic checklist during their daily site visit. Specifically the checklist will focus on identifying aspects of plant operation which are considered outside of normal operation.
	SCADA	<p>The site SCADA will continuously monitor plant performance and enable a simple / user friendly interface to check key parameters and make changes as required.</p> <p>Plant alarms will be structured into three basic categories:</p> <ol style="list-style-type: none"> 1. Plant critical – Response required immediately. 2. General – Response required inside 24 hours. 3. Information – Response required inside 7 days. <p>A SMS alarm alerting system will be established to alert the operators of the alarms, especially in the case where critical or general response is required.</p> <p>Key parameters can be trended over time to assess the impact of process changes.</p>
	Remote monitoring	Remote monitoring will be installed to enable secure access to the plant by authorised personnel. Via remote monitoring the authorised personnel will be able to check plant performance and make adjustments as required.

Area	Sub area	Comment
	Sampling	Sampling will be undertaken by WFC/CPWF personnel under the guidance of Permeate Partners. Analysis will focus on recycled water quality and general process parameters. Adjustments will be made by on an as required basis.
	Audits	
Maintenance	Overview	A sewer and plant maintenance schedule will be compiled which identifies: <ul style="list-style-type: none"> Tasks undertaken by plant operators (i.e. inspections, grease, etc) on a daily, monthly and annual basis. Tasks undertaken by specialist contractors (i.e. equipment servicing, calibrations, etc) on a monthly and annual basis.
Reporting	Daily	The daily checklists completed by plant operators will be stored on file. Data collected from the SCADA will be backed up regularly and stored off-site.
	Monthly	Monthly reports of plant performance will be prepared by Permeate Partners and circulated to stakeholders. These reports will include brief discussion on: <ul style="list-style-type: none"> Safety. Regulatory compliance. Key performance indicators. Issues – resolved and pending. Action items.
	Quarterly	Quarterly reports of plant performance will be prepared by Permeate Partners and circulated to plant management and staff. These reports will include detailed discussion on: <ul style="list-style-type: none"> Safety. Regulatory compliance. Key performance indicators. Plant optimisation. Operating costs. Issues – resolved and pending. Action items.
	Annual	Annual reports will be compiled for other stakeholders such as IPART, NSW Health, , etc.

Describe arrangements for the continued safe and reliable performance of the infrastructure, including the arrangements for the renewal of the infrastructure.

Table (C2) details the arrangements for the continued safe and reliable performance of the infrastructure, including the arrangements for the renewal of the infrastructure.

Table (C2) – Safety, reliability and renewal of the infrastructure

Area	Sub area	Comment
Safety	Training	The safety of all stakeholders in the recycled water factory is paramount. Stakeholders include staff, plant visitors, venue visitors and the general public. Training will be provided to plant operators and management on all aspects of plant operation with a particular emphasis on safety. The general risks of plant operation and the inherent risks of sewage treatment will be outlined.
	Procedures	Standard procedures will be developed and used for various aspects of plant operation and maintenance.
	Hygiene	Industry standard hygiene practices will be adopted including minimising exposure, use of PPE, and hand washing following every visit to the recycled water factory.
	Immunisations	All operators will receive the medically recommended immunisations.
	Specialist support	
	Visitors	All visitors will complete a short induction to ensure they are aware of the nature of the facility and the general risks. Details of visitors will be recorded in visitors book kept in the control room.
	Access	Access to the recycled water factory will be controlled via defined access points.
Reliability	Redundancy	The reliability of the infrastructure is paramount, especially during times of high recycled water demand. To ensure maximum plant availability all critical equipment will be installed duty / standby. This level of redundancy enables the plant to continue to operate whilst troubleshooting / repairs are carried out.
	Equipment quality	The proposed recycled water factory includes high quality equipment providing by local suppliers. This approach provides confidence in equipment reliability and reduces the lead time for spare parts.
	Maintenance	All equipment will be maintained in accordance with manufacturer recommendations to reduce or eliminate unplanned downtime. Critical spare parts will be maintained on site.
Renewal	Partial	Parts will be replaced during maintenance and repairs.
	Complete	The asset management plan will allow for the complete replacement of infrastructure components over the life of the plant.

SECTION D – RESPONSE TO QUESTION 2 (F)

Question : How will you protect public health, water quality and the environment?

If the water to be supplied is drinking water, how will the 12 elements of the framework for the management of drinking water quality, as detailed in the Australian Drinking Water Guidelines, be addressed, implemented and maintained?

CPWF's proposed delivery of drinking water to customers in Central Park is sourced via bulk drinking water supply from Sydney Water at the Central Park development boundary and then affected by distribution of the same within the development through its own separate reticulation infrastructure. As such, CPWF will simply be a distributor of Sydney Water's drinking water. There will be no storage of drinking water. CPWF will comply with the Australian Drinking Water Guidelines to the extent applicable to its roles and responsibilities as a distributor.

If the water to be supplied is non-potable water, how will the 12 elements of the framework for the management of recycled water quality and use, as detailed in the Australian Guidelines for Water Recycling, be addressed, implemented and maintained?

A DRAFT Recycled Water System Management Plan (RWSMP) will be completed by CPWF/WFC in conjunction with all relevant stakeholders through a consultative workshopping approach during the course of the eventual IPART audit process

If the water to be supplied is non-potable water, what purposes will the water be used for and what purposes will the water not be used for (as determined in accordance with the 12 elements of the framework for the management of recycled water quality and use in the Australian Guidelines for Water Recycling)?

Table (D2) details the intended uses for the recycled water.

Table (D2) – Intended uses of the recycled water

End use	Comments
Residential: toilet flushing, irrigation, clothes washing machines	Residential (Apartments) will be plumbed for both potable and non-potable water. Recycled water will be supplied to residences for non-potable uses: toilet flushing, garden irrigation and clothes washing machines. At various locations, recycled water will also be used for irrigation of public open space as required. Recycled water quality will be in accordance with the requirements for "Dual reticulation, toilet flushing, washing machines, garden use" in Table 3.8 of the Australian Guidelines for Water Recycling .
Irrigation	Public open space, water features gardens (including a 170m vertical garden wall) in Central Park will use recycled water. Customers are currently being identified, such as adjacent buildings for cooling and toilet flushing, council car parks, etc, which may be interested in a recycled water supply by CPWF.
Cooling tower	Recycled water will be supplied as a priority to cooling towers throughout the buildings in Central Park.
Water Factory - Plant process water	Recycled water will be used for general plant process water such as inlet screen sprays. Exposure to the plant process water is strictly controlled. Following a review of risks of exposure CPWF is satisfied that the quality requirements for dual reticulation described above address

	the risks of this end use. Plant process water is not specifically listed as an end-use in Table 3.8 of the Australian Guidelines for Water Recycling.
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The recycled water will not be used for any other purpose without appropriate regulator consultation and approval.

If the infrastructure involves treatment infrastructure or results in discharge of waste (including due to potential infrastructure failure), what arrangements have been made or will be made for the disposal of waste from the infrastructure?

Table (D3) details the waste from the infrastructure

Table (D3) – Waste from the infrastructure

Waste	Comments
General	<p>The proposed recycled water factory includes provision for general drains and sumps in the lower levels to capture general wash down water, spills and overflows. These are sent to the trade waste sump.</p> <p>The slurry from the trade waste sump is then discharged into Sydney Water sewer under a Trade Waste Discharge agreement.</p>

If the infrastructure conveys, treats or disposes of sewage, in what manner will health and ecological assessments be undertaken and how will any concerns arising from such assessments be addressed?

A preliminary risk assessment has not identified any concerns that cannot be adequately addressed through available controls. Detailed risk workshops will be held during detailed design to ensure that any risks to health or ecological risks are eliminated or mitigated to an acceptable level. Workshops will also be help with the appropriate regulatory authorities, including IPART and NSW Health.

Please identify any potential environmental impacts of the activities to be licensed and provide details of how these activities would be conducted in a manner that would not present a significant risk of harm to the environment.

A preliminary risk assessment has not identified any potential environmental impacts that cannot be adequately addressed through available controls. Detailed risk workshops will be held during detailed design to ensure that any potential environmental impacts are eliminated or mitigated to an acceptable level.

SECTION G – PART THREE: ORGANISATIONAL STRUCTURE AND CAPACITY

SECTION I – GENERAL INFORMATION

SECTION J – DRAWINGS

Including:

Attachment J1 – Location plan

Attachment J2 – Map of the activities to be licensed