



Darling Quarter Development

Network Operator's
Infrastructure Operating Plan

Rev5

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Solutions & Technologies

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Note the only controlled copy is that electronic version located on VWS server.

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1. Purpose

This update of Infrastructure Operating Plan (IOP) has been prepared by Veolia Water Solutions & Technologies Pty Ltd (VWS, VWST) for the Darling Walk Development (DW), 1-25 Harbour street Sydney NSW pursuant to VWS's obligation under its NSW Network Operator's Licence No. 10_008 granted by the Minister for Water under Section 10 of the Water Industry Competition Act 2006 (WICA) 24 June 2010 for the following water industry infrastructure and varied on 18th December 2016 for the following water industry infrastructure (the Infrastructure):

- *A treatment plant for non-potable water and other water infrastructure only used, or to be used, in connection with the treatment plant, where components of the treatment plant or other water infrastructure may be used for one or more of the following:*
 - *production of non-potable water;*
 - *treatment of non-potable water;*
 - *filtration of non-potable water;*
 - *storage of non-potable water; and*
 - *conveyance of non-potable water*
- *A reticulation network for non-potable water and other infrastructure only used, or to be used, in connection with the reticulation network, where components of the reticulation network or the other water infrastructure may be used for one or more of the following:*
 - *storage of non-potable water;*
 - *conveyance of non-potable water; and*
 - *treatment of non-potable water*

As per WICA Act, "water infrastructure" means any infrastructure that is, or is to be, used for the production, treatment, filtration, storage, conveyance or reticulation of water, but does not include (a) any pipe, fitting or apparatus that is situated downstream of a customer's connection point to a water main, or (b) any pipe, fitting or apparatus that is situated upstream of a customer's connection point to a stormwater drain.

Under a contractual arrangement between VWS (the Licensee) and the owner of the asset, represented by Jones Lang LaSalle (NSW) Pty Limited (hereafter named "JLL"), customer's connection point (terminal point TP2) are the point just after the recycled storage tanks in basement level B3 (As set out in Appendix 4 of this Plan).

Accordingly, VWS operates and maintains the water infrastructure up to these customer terminal point (that covers the plant designed, installed and commissioned by VWS up to the recycled storage tanks) (sometimes termed "RWTP", "Treatment Infrastructure" within this Plan); while the reticulation system beyond those terminal point (i.e. the network of pipes, pumps, meters, valves originating from outlet of the recycled water storage tanks and carrying treated recycled water to the cooling towers, toilet cisterns and irrigation downstream of recycled water storage tanks) are directly operated and maintained by JLL and are not part of the WICA licensed area.

The two product tanks (Storage Tanks #8010 and 8020) themselves up to these TPs are within the limits of 'Recycled Water System' and infrastructure, maintained and managed by VWS.

This Plan describes, and affirms the integrity of the design, construction, operation, servicing and maintenance of the water treatment infrastructure so far as VWS is concerned, as explained above and its ability to reliably and safely supply recycled water to VWS's sole customer (JLL).

1 Background

In February 2010 VWS was awarded a contract by Bovis Lend Lease Pty Ltd (ABN 97 000 098 162) (hereafter named "BLL") to design, supply, construct and commission a Recycled Water Treatment Plant (RWTP) to produce 166kL per day of recycled water, the design and construction of which is summarised in this Plan and includes the following summary components and unit processes:

- Receipt of sewage from the local Sydney Water Corporation (SWC) sewer main,
- Grease Removal and solids screening system including macerating pumps,

- Proprietary Moving Bed Bioreactor (MBBR) System,
- Proprietary Membrane Bioreactor (MBR) System,
- Reverse Osmosis,
- Ultra Violet Light (UV) and Chlorine Disinfection Systems, and
- Ancillary tanks, pumps, piping, electrics, instrumentation and controls

Pursuant to the Water Industry Competition Act 2006 (Act), VWS also obtained a Retail Supplier's Licence No 10_009R granted by the Minister of Water 24 June 2010 and varied on 21st December 2016.

2 The infrastructure construction

The Infrastructure described in Section 1 and elaborated upon in Section 2 is presented diagrammatically in Appendix 1 and comprises the following scope split by the developer (BLL) and the Licensee (VWS) during the design and build phase.

2.1 By Developer, BLL

BLL had sole responsibility for the design and construction of the following:

- Gravity sewerage infrastructure for sewage conveyance from the SWC 450mm vitreous clay sewer main under Harbour Street,
- The sewerage conveyance infrastructure to and including the waste collection sump and connections back to the main sewer,
- Odour Extraction system,
- The treated water storage tanks including outlet connections (to be operated and maintained by VWS), and
- The non-potable water piping infrastructure within the development precinct of Darling Quarters.

2.2 By the Licensee and Supplier VWS

VWS was responsible for the design and construction of the following Infrastructure under contract to BLL.

- WTP Feed pumps
- Grease removal and solids screening system,
- MBBR,
- MBR,
- Reverse Osmosis,
- UV and Chlorine (sodium hypochlorite) disinfection,
- Odour control, and
- Ancillary pumps, piping, electrics, instrumentation and controls.

3 Scope of this plan

3.1 Scope included

This plan (and its scope) relate to the Recycled Water Treatment Plant (RWTP) and has been prepared in accordance with the Water Industry Competition (General Regulation) 2008 (the Regulation) Schedule 1 (Conditions for Network operators' licences) Part 2 (Additional conditions for licences for Water infrastructure) section 6 (Infrastructure Operating Plans).

Accordingly the scope of this Plan addresses the prescriptive requirements of the Regulation, VWS own certified Plan-Do-Check approach and the IPART audit guideline (September 2018 Revision) as follows, and which have been logically categorised as Planning, Implementation and Compliance:

Planning

Before commencing to operate water infrastructure commercially, the licensed network operator for the infrastructure must prepare, and forward to IPART, an infrastructure operating plan that indicates the arrangements that the licensee has made, or proposes to make, in relation to:

- (a) the design, construction, operation and maintenance of the infrastructure, including particulars as to the life-span of the infrastructure, the system redundancy built into the infrastructure and the arrangements for the renewal of the infrastructure, and
- (b) the continued safe and reliable performance of the infrastructure, and
- (c) the continuity of water supply, and
- (d) alternative water supplies when the infrastructure is inoperable,
- (e) the maintenance, monitoring and reporting of standards of service.

Implementation

The licensee:

- (a) must ensure that its infrastructure operating plan is fully implemented and kept under regular review and, in particular, that all of its activities are carried out in accordance with that plan, and
- (b) must, if the Minister so directs, amend its infrastructure operating plan in accordance with the Minister's direction.

Compliance

If the Minister or IPART so demands, or if any significant change is made to its infrastructure operating plan, the licensee:

- (a) must provide the Minister or IPART with a report, prepared by an approved auditor in such manner and form as the Minister or IPART may direct:
 - i. as to the adequacy of the plan, and
 - ii. as to the condition of its infrastructure, having regard to the purpose for which it is licensed, or
- (b) must pay the Minister's or IPART's costs of conducting an investigation into the adequacy of the plan or the condition of its infrastructure.

In the preparation of current revision of this Plan, VWS has also taken due regard to IPART's Water Licensing Audit Guidelines (September 2018 version) for the purpose of assuring all stakeholders that this Plan and its associated controlling actions have the resilience and integrity required under the Regulation.

3.2 Scope not included

This Plan does not address the design, construction, operation, servicing or maintenance of the following; these are the responsibilities of others (namely Lend Lease Developments or their delegates):

- Sewage supply system to the RWTP sewage mining agreement SWC-LLFM (refer stakeholders),
- RWTP waste disposal system to sewer; trade waste agreement SWC-LLFM (refer stakeholders),
- Alternative sources of water supply systems; installed by BLL,
- Recycle water systems delivering water for use in cooling towers, toilet flushing or irrigation; installed by BLL,
- Odour control system outside the boundaries of the RWTP; installed by BLL,
- Drinking water; installed by BLL.

4 Other conditions under Licence

Schedule B under Network Operator's Licence No 10_008 prescribes a comprehensive list of standard conditions which the Minister has determined to impose pursuant to section 13(1)(b) of the Water Industry Competition Act 2006 as well as those obligations imposed by the Regulation:

- B1 - Ongoing capacity to operate,
- B2 - Obtaining appropriate insurance,
- B3 - Maintaining appropriate insurance,
- B4 - Complying with NSW Health requirements,
- B5 – Complying with Audit Guidelines from IPART
- B6 - Reporting in accordance with the Reporting Manual,
- B7 - Reporting information in relation to the Register of Licences,
- B8 – Monitoring,
- B9 - Provision of copy of Plan,
- B10 - Delineating responsibilities – interconnections

- B11 – Notification of changes to end-use
- B12 – Notification of changes to Authorised Person; and
- B13 – Notification of commercial operation.

5 Other conditions under Regulation

In addition to this Plan the licensee (VWS) must meet the following conditions under Regulation, Schedule 1 Part 1 and to which VWS commits to meeting as applicable to Licence No 10_008 unless directed otherwise by IPART or the Minister:

- Part 1 – licence conditions for all licences
 1. Provision of information,
 2. Commercial operation of water (or sewerage infrastructure),
 3. Safe and reliable network,
 4. Environmental protection, and
 5. Codes of conduct.
- Part 2 – additional conditions for licences for water infrastructure
 6. Infrastructure Operating Plan (this Plan),
 7. Water Quality Plan,
 8. Water meters,
 9. Drinking Water (not applicable to this licence),
 10. Non-potable Water,
 11. Customer connections,
 12. Matters to be contained on licensee's website.

6 Codes of conduct

VWS commits to complying with any water industry code of conduct, marketing code of conduct and transfer code of conduct that may be applicable to its Network Operator's Licence.

Having said that, VWS notes that NSW Office of Water (NOW) had issued draft marketing and transfer codes during early 2011. VWS as Licensee is not involved and nor does it anticipate in the foreseen future to be involved in any marketing and transfer activities in relation to its licenses for Darling Quarters RWTP.

7 Security Note

Regarding availability of information on the VWS website, this is restricted to information that does not jeopardise VWS intellectual property rights or indeed put the RWTP within Darling Quarter at risk with respect to security.

8 Relationship with other plans under Regulation

This Plan forms part of a suite of plans required under the Regulation as part of VWS's obligations as both a Network Operator (this requirement) and a Retail Supplier (not part of this Licence requirement) in relation to water industry infrastructure as follows.

Network Operator's (2 plans)

1. Infrastructure Operating Plan for water infrastructure (this Plan) pursuant to the Regulation Schedule 1, Part 2, Section 6 which describes the design, construction, operation and maintenance of the water infrastructure and its integrity,
2. Water Quality Plan (WQP) pursuant to the Regulation Schedule 1, Part 2, Section 7 which describes the non-potable water quality integrity of the water infrastructure having regard to defined guidelines (AGWR1), the purposes for which water is to be used and for which water is not used (this plan).

Retail Supplier's Licence (1 Plan)

- Retail Supply Management Plan (RSMP) for water supply pursuant to the Regulation, Schedule 2 Part 2 (Additional conditions for licence for water supply) Section 8, (Retail Supply Management Plans) which describes the arrangements the licensee has made or proposes to make in relation to the events and circumstances that could adversely affect its ability to supply water, the probability of such occurrences and the measures taken to prevent or mitigate the effect of such circumstances and the arrangement for alternative water supplies.

9 Stakeholders

This Plan refers to stakeholders, namely those persons, entities and authorities that have an interest in the RWTP and its supply of water under licence. These stakeholders are listed below:

Stakeholder	Role
Australian Prime Property Fund (APPF) managed by Lend Lease Developments	Owner of the development, built infrastructure. Also known as Lend Lease Funds Management Limited (LLFM).
Veolia Water Solutions & Technologies (Australia) Pty Ltd (VWS, Veolia)	Operate and maintain the RWTP for JLL.
Jones Lang LaSalle (JLL)	Asset Management and Operations of the built infrastructure and VWS's Single Customer for receiving water; as an agent of Darling Walk Trust. (JLL works for Lend Lease Funds Management Limited (ACN 000 335 473) and is the trustee and responsible of the Darling Walk Trust (ABN 24 634 378 816))
Public and DQ resident community	Users of Recycled Water.
Minister for Water, Property and Housing	Approval Authority for WICA licence applications
Department of Planning, Industry and Environment	Administers WIC Act, as necessary
Independent Pricing and Regulatory Tribunal (IPART)	The independent economic regulator for NSW. Administers the Water Industry Competition legislation.
NSW Ministry of Health	In relation to all Health incidents for Schemes operated under WICA Act.
Office of Environment & Heritage (Under Ministry of Planning & Environment)	Administers environmental and water legislation other than WICA including noise and air quality (odour)
Energy and Water Ombudsman of NSW (EWON)	Manages complaints (except for water pricing) which the Licensee has not handled to the satisfaction of the complainant and has referred the complainant to EWON.
City of Sydney Council	Local council authority.
Sydney Water Corporation (SWC)	Supplier of Raw Sewage and potable water when Infrastructure off-line and receiver of waste discharge.
Interfacing Contractors	Development maintenance including cooling tower, toilet, irrigation, landscape and associated interfacing services.

10 Planning

10.1 Planning requirements

The planning requirement of the Regulation, Schedule 1, Part 2, clause 6 (1) requires this Plan to indicate the arrangements that the licensee (VWS) has made, or proposes to make, in relation to:

- (a) the design, construction, operation and maintenance of the infrastructure, including particulars as to the life-span of the infrastructure, the system redundancy built into the infrastructure and the arrangements for the renewal of the infrastructure, and
- (b) the continued safe and reliable performance of the infrastructure, and
- (c) the continuity of water supply, and
- (d) alternative water supplies when the infrastructure is inoperable, and
- (e) the maintenance, monitoring and reporting of standards of service.

VWS approach to design and construct integrity

VWS approaches the delivery of all its contracts in a planned and managed basis in order to meet its contractual, commercial and legal obligations under good corporate governance and risk management principles.

To this end VWS's contract execution approach and methodology for the project management, design, procurement, supply, construction, commissioning, operation, servicing and maintenance makes use of VWS's Business Management System (BMS) within Veolia Water Technologies Australia Internet, certified by QMS Certification Services to the following standards:

- AS/NZS 4801: 2001 OHS Management Systems
- AS/NZS ISO 14001: 2015 Environmental Management Systems
- AS/NZS ISO 9001: 2015 Quality Management Systems

An over view of VWS BMS is detailed below:

VWS' Business Management System (BMS) incorporates all systems and processes into one complete framework, enabling us to work as a single unit with unified objectives. BMS allows the management team to create one structure that helps to effectively and efficiently deliver the company's objectives. VWS systematically integrates safety, quality and environment into management and work practices at all levels through the creation and maintenance of required documentation to sustain an effective BMS.

BMS provides the overarching details to the system and its implementation across all VWS' operations in Australia and New Zealand region. BMS covers:

- Roles and responsibilities
- Management review and planning
- Control documents and records
- Training and competency
- Operational and process control
- Legal and other requirements
- Safety Standards
- Corrective and preventative action
- Continuous improvement
- Risk management
- Internal audit
- Communication and consultation
- Incident management and investigation
- Quality Management
- Management reporting
- Resources

11.1.1 Verification of design, construct, operate & maintain

- Design & construction
 - Following lists all the major assets of the RWTP designed and built in 2010:
 - C/w Biological Tank, Mechanical and Electrical Equipment, Level Transmitter and DO analyser
 - MBBR system including Blower and NEOSEP Membranes
 - MBBR Feed Pump
 - Rotosieve
 - RO Equipment – Multipure Plus
 - Buffer Break, Contact and Backwash Tanks
 - Macerator and Macerated Sewage Pump
 - Air Blower
 - Biological Tank
 - Dosing Pumps
 - Holding Tank Pump
 - Sludge Pump
 - UV Disinfection Unit
 - Electrical Power Cabinets and Cubicles
 - Chlorine Contact Tank
 - Miscellaneous Instruments
 - All connections (Piping, cabling)

As built status of all the above is represented in the set of P&IDs in Appendix 3.

- Relative locations of major infrastructure are shown in Appendix 1 and 2
- Safe and reliable performance
 - Asset condition risk assessment is regularly reviewed.
 - Operations & maintenance manual is always available to the Operator and is regularly referred to.
- Continuity of supply including alternatives sources
 - O&M procedures address normal and abnormal (incident and emergency) conditions at the plant level, and
 - The Retail Supply Management Plan (RSMP) under the Retail Supplier's Licence addresses continuity of supply at the risk management level
- Standard of service
 - Appropriate management exists for implementing and monitoring the IOP

11.2 Water treatment infrastructure D&C, reliability, O&M & service

The sections below embrace the VWS approach.

11.2.1 Process description

The essential process steps of the design of the RWTP are described below and in the Block Flow Diagram in Appendix 1. The process is continuous.

Sewage is provided by the Customer by gravity at the entry to the RWTP where it is first macerated then discharged to a buffer tank for oil and grease removal and from where it is pumped to a fine screen to remove oversized material undesirable for feeding the biological process. Grease and oversized materials are returned to sewer.

Macerated degreased and screened sewage gravitates to the Moving Bed Bioreactor (MBBR) section of the plant wherein, at a biofilm level on bulk plastic media maintained in circulation by blower air, the microbiological reactions occur to remove sewage pollutants.

The resulting sludge adhering to these media continuously sloths off and carries over to the second stage Neosep Bioreactor where the microbiological reactions are completed and the treated effluent is filtered through the Neosep ultrafiltration membranes. Filtered sludge is returned to sewer.

Filtered effluent is retained in the Reverse Osmosis (RO) Feed tank for surge capacity purposes. High pressure RO feed pumps force the effluent through the RO media to remove ionic salts (brine) and to provide the clean permeate for downstream disinfection by ultraviolet light (UV) and chlorination where it becomes classified as treated water (recycle water) for Customer use.

MBR does not shut down when the turbidity exceeds set high levels (<0.3 NTU). Rather, the system opens a valve that takes the water back to the MBR filtrate tank. That is: in order to prevent continual stop start of the MBR and RO units, the control philosophy does automatically shut down supply to the treated water tank but rather than sending the out of spec water to sewer, it sends such water back to the filtrate tank.

A shutdown is initiated after 120 minutes of continued bypass, but as this timer is reset after a MBR backwash; a shutdown will never occur as a backwash is carried out every 30 minutes. The high quality RO permeate is sent to the filtrate tank; until the turbidity is less than 0.3 NTU.

Treated water is verified for Chlorine and pH concentration inside the tank. The tank is continuously stirred by a pump that takes water from the tank and recirculates back .

Ancillary plant includes clean in place (CIP) equipment and systems for chemical cleaning of membranes as well as local collection sumps and fume extraction to odour control activated carbon filters.

Electrical power switchgear and motor control centres are also provided in the plant rooms along with necessary process instrumentation, programmable logic controller (PLC) and supervised control and data acquisition (SCADA) system for process monitoring, control and recording.

Process Flow Block diagram, associated Piping and Instrument Diagrams (P&IDs) and general arrangement drawings are conveniently filed for easy reference.

Notably, the RWTP may be shutdown at any time for maintenance or emergency or any other reason without impacting water supply to the Customer who has designed and installed the necessary system to provide potable water for cooling tower makeup, toilet flushing and irrigation in any such event.

11.2.2 Odour management

Odour management is the responsibility of JLL

In the event of an odour excursion leading to any complaint the RWTP would be shut down including ventilation to atmosphere and not brought back into service until the root cause had had been determined and corrective measures put in place.

11.2.3 Design and engineering

During the design and build phase, good design principles were followed pursuant to VWS design procedure covering the main design phases (gates) ensuring that the project specifications and Safety in design were met. The flow of design preparation was generally as follows:

- Concept design
- Process engineering resulting Process Flow Diagram (PFD)
- Piping and Instrument Diagrams (P&IDs)
- Equipment and device schedules and specifications
- General Arrangement drawings (GAs)
- Civil Guidance drawings for third party civil consultants and contractors to BLL
- Piping arrangements
- Electrical drawings from single line diagrams through to detailed schematics
- Control specification
- PLC programming and SCADA development
- Issue for construction (IFC) documentation, and
- O&M manual preparation

11.2.4 Procurement

During the design and build phase, the procurement process followed VWS procurement procedure except that prequalification of suppliers and the seeking of competitive pricing were generally waived for the major items of equipment and devices based on equipment being either nominated as Veolia proprietary or suppliers already on VWS approved supplier database.

11.2.5 Construction

Good construction principles and practice in accordance with VWS construction procedure were followed including the following:

- Construction safety and environmental management
- Method and order of construction,
- Program from mobilisation to demobilisation,
- Organisation and position responsibilities
- Materials receiving, storage and issuing,
- Construction and installation execution following approved safe work method statements (SWMSs),
- Construction Quality; construction installation integrity ITPs:
- Internal audit.

11.2.6 Commissioning and performance testing

Commissioning and testing were completed in accordance with WICA guidelines back in 2010-2011. Validation Plans have been submitted to IPART for their records at the time.

11.2.7 Asset register

The VWS equipment and device (valves and instruments) schedules serve as the project asset register. These were developed during the design and procurement stages of the D&C contract with BLL and were contained in the electronic files. These schedules included a list of all assets by tag number along with basic physical data, duty, including size, capacity and materials of construction.

The relative locations of major infrastructure were provided in the D&C contract drawings as general arrangement drawings and on the BLL Darling Quarter development plans.

As the RWTP has by now gone through many years of operation and minor changes in operations; updated asset registers are maintained for ready references of a VWS Operator.

11.2.8 Operational analysis

The aim of the operational analysis of the assets is to meet present and future needs. Outputs from the operational analysis include a schedule of required capital works for asset renewal, replacement and development. The RWTP is designed for 24-hour/day operation 365 days per year at 95% availability to produce 166kL per day of recycled water.

Currently commercial discussions are ongoing between VWS and JLL regarding required capital works for asset renewal, replacement and development for the next five years.

A full assessment of the risks and critical control points (CCPs) are addressed in the Water Quality Plan (WQP).

The operating rules are maintained in the control philosophy document and is summarised in the following section. The system operating procedures including those for normal and emergency shutdown are included in the O&M manual.

11.2.9 System operating rules

The system operating rules aim at operating the RWTP in the most effective manner during normal and breakdown conditions. The RWTP is designed with a high level of automation; this means 24/7 on site operational and service support is not a requirement. When conditions fall outside normal controlled operation, such condition gets alarmed to the operator assigned to remote monitor who can assess the alarmed situation and take applicable corrective action remotely. If the alarmed condition deteriorates, RWTP may be taken off-line or shutdown automatically; in which case recycle water supply will be automatically replaced by mains water supply for customer use.

There are five control modes; these are described below.

Control is accessed using either the site located PLC and SCADA human-machine interface (HMI; namely computer, screen, keyboard and mouse) or remotely via PC in the possession of the assigned operator.

1. Shutdown Mode

In shutdown mode raw sewage from the SWC main is automatically shut off; the MBBR blower and instrument air compressor continues to run; the MBR automatically back-flushes, de-gases, relaxes and de-aerates; the RO unit flushes permeate and rejects brine from the membranes with permeate from the CIP tank. Once these operations are complete, all equipment, except the blowers, are turned off. The RWTP automatically shuts down in the event of emergency shutdown, power failure or instrument air low-pressure.

In these instances the operator (whether on site or remote) is warned of the condition. If no action is taken or the action taken to correct the problem is not successful, RWTP gets shut down. The operator is able to initiate a controlled shutdown. In the event of power failure all equipment, valves and the like stop or shut in their predetermined failed close or open position. A power failure requires the operator to attend the RWTP on site at the earliest possible time.

2. Maintenance Lockout Mode

This mode is provided so that all equipment and instruments can be isolated for safe maintenance or inspection without the risk of machinery starting accidentally.

Any inspection or maintenance shall only be carried out in accordance with pre-prepared safe work method statements / SOP's or via VWS permit to work procedures, including all necessary hazard identification, risk assessment and controls put in place accordingly.

3. Ready to Run Mode

In this mode, RWTP plant and equipment gets charged or filled with sewage or partially treated effluent, permeate, brine and or water as applicable, all pumps operational and sufficient volume available in the Re-use Water Tank to receive fresh re-use water.

4. Pause Mode

The RWTP will be automatically paused in the event of a low level in the Buffer Tank and high-high levels in the final Water Storage Tank. Once this mode is initiated, the MBR will automatically back- flush, de- gas, relax, de-aerate and shutdown. The RO unit will flush all permeate and reject brine with permeate from the CIP tank. This mode is similar to the shutdown mode but stops short of turning off operating equipment.

The Recycled Water Treatment Plant may also be placed in this mode by the operator for an extended period while alarms are checked-out or temporary problems are resolved.

5. Run Mode

Raw sewage is received from the SWC main in an on-off mode; the Buffer Tank provides surge capacity for continuous flow by the macerator; inflow is progressively degreased, screens, biologically treated, filtered by ultrafiltration, salts removed using RO, disinfected then stored in the customer's final water storage tanks. Waste streams from the Screen, MBR and RO unit discharge automatically to the SWC sewer downstream of the sewer inlet.

11.2.10 Performance requirements of assets

Performance requirements of each item of equipment, device and operational component of the RWTP operating 24/7 and 95% availability are specified in the contract between VWS and JLL as follows.

- MBBR media 20 years
- MBR membranes 5 years
- RO membranes 3 years
- Pumps 10 years
- Blowers 10 years
- Monitoring Chlorine probes 5 years
- Valves 5 years
- Other Monitoring probes 10 years
- UV Lamps 12 months

After these times it is recommended the above equipment be fully refurbished or replaced as may be applicable.

As the plant has now operated for over 8 years, VWS and JLL are now under discussion for specific major replacements in the current and next years.

11.3 Continued safe and reliable performance

11.3.1 Performance criteria

The safe operation of the treatment infrastructure in terms of public health is addressed in the Water Quality Plan (WQP).

Safety in design was addressed at the design stage by way of meeting Australian standards and conducting a formal HAZOP study. The prime design bases for the design of the water infrastructure are set out below.

Raw sewage quality

Based on grab sample analysis of the sewer undertaken by BLL in May 2009 combined with knowledge that there are no significant industrial contributors to the raw sewage catchment area, VWS has based its design for raw sewage quality being typical municipal sewage as follows. Detailed analyses over time (diurnal data) are contained in the WQP and the electronic files.

Raw sewage

Parameter	Units	Value or Range
Oil & Grease	mg/L	42
Ammonia NH3-N	mg/L	45
BOD5	mg/L	200
pH		[6-8]
SS	mg/L	190
TN	mg/L	50
TP	mg/L	10
TDS	mg/L	550

Recycled Water Parameters

The Customer's recycled water design and performance parameters are as follows:

Parameter	Units	Value or Range
BOD ₅	mg/L	< 5
Suspended Solids	mg/L	< 5
pH		6.0-9.0
Turbidity	NTU	<0.3
E.Coli	cfu/100mL	< 10
Coliphages	pfu/100mL	< 1
Clostridia	Cfu/100mL	< 1
Validated Virus reductions	log reduction	7
Validated Cryptosporidium reductions	log reduction	6
Validated Giardia reductions	log reduction	6
TDS	mg/L	<100

11.3.2 Level and standard of service for the assets

Level of service

The level and standard of service provided by VWS to its customer JLL are detailed in the operations, service and maintenance agreement between JLL and VWS. These levels and standards are summarised below.

- **Meetings and reporting**
 - Meet with and report to applicable stakeholders required under contract and Regulation.
- **Site Operations**
 - Operate and monitor the plant 24/7 in accordance with the RWTP O&M procedures and performance criteria
- **Service support**
 - Carry out specialty servicing to ensure optimal plant performance
- **Maintenance**
 - Perform all necessary plant maintenance in accordance with manufacturers' instructions and as detailed in the O&M manual
- **Spare Parts and Consumables**
 - Supply all necessary spare parts and consumables for operation of the RWTP as agreed; excluding RO and MBR membrane replacement which shall be in accordance with agreed pricing
- **Chemicals**
 - Supply all necessary chemicals to operate the plant for the duration of the contract
- **Water testing**
 - All necessary water testing to achieve performance parameters and regulatory compliance
- **Licensing**
 - Maintain plant performance to meet or exceed all licensing requirements
 - Reporting in accordance with regulation

Standard of service

The standard of performance will be measurable by key performance indicators (KPIs) tabled below.

Standard of service key performance indicators

KPI	Min/Max target	Method of Assessment
Safety	No lost time injuries	Number of lost time injuries reported
Environment	No environmental incidents	Number of incidents reported
Service Delivery	Phone response within 4 hours of contact by JLL representative	Contact with VWS personnel
Reclaimed Water Quality	Samples taken as per specification requirements	Independent water analysis
System Performance	95% availability over a 365 day period. Availability is based on stoppages for routine maintenance only. Emergency stoppages are excluded from this guarantee.	Review of hours run counter
Critical control points: MBR filtrate turbidity RO permeate conductivity UV status Chlorine residual value	Refer service agreement & WQP	Refer service agreement & WQP
Maintenance Mechanical Electrical & controls Instrumentation	All work detailed in the Service agreement will be carried out in accordance with the maintenance log.	Review of SCADA performance

The probability of the occurrence of any event or circumstance that could adversely affect the level and standard of service has been addressed in the Retail Supply Management Plan (RSMP)

Documenting performance and reporting

VWS performance will be reported internally and to the Customer and IPART as below:

- Detailed Operational performance data and maintenance logs as downloaded from the RWTP SCADA system will be made available upon request.
- Annually in accordance with the Regulation and IPART Reporting Manual requirements for Network Operators (and Retail Suppliers)

A schedule of non-compliant results will be maintained by VWS and submitted as part of the annual report to IPART. This schedule will include various reporting compliance requirements (as revised by IPART time to time), such as:

- List of any obligations breached, including a brief description of each obligation,
- Date and duration of non-compliance,
- Nature and extent of any non-compliant result including a list of whom have been affected,
- Results of any monitoring
- Reasons for non-compliance, and
- Any remedial action required and actual or anticipated date of full compliance

11.3.3 Asset condition and risk assessment

Criticality qualifications

This section qualifies asset condition, criticality and assessment in relation to VWS scope of work under contract for both the design and construction of the RWTP with BLL and its operation, service and maintenance with JLL.

Firstly, it is recognised that the RWTP in itself is not to be considered as critical to the operations and daily workings of the Darling Quarter Development. While VWS has been contracted to operate and maintain the RWTP, which shall treat raw sewage to produce 166kL/day of recycle water 365 days per year at 95% availability for delivery to the Customer, the Darling Quarter Development can fully function if indeed the RWTP were not to be in service at all; namely mains potable water would be used in place of recycled water.

This means that the availability of the RWTP has critical contractual significance but does not have critical significance under Legislation.

Secondly, the RWTP design does not include any equipment or device redundancy, which would provide additional assurance regarding RWTP availability. VWS design and supply after installation and commissioning has been well operated and maintained and has well served its contractual performance requirements and availability obligations.

The criticality of the RWTP and its individual component assets are now be addressed in context.

Asset condition

At the time of preparation of this Plan update, which must be reviewed regularly by VWS or as otherwise directed by the Minister, all RW TP assets are functioning; fit for purpose however discussions are currently ongoing between VWS and JLL for next 5 year repair and replacements schedule.

Asset criticality

As the RWTP includes no redundancy of equipment or devices for operation, it may be generally stated that each item of equipment and device is critical to the operation and performance of the RWTP to meet its obligation to supply recycled water under contract and Licence.

In context with the RWTP within its battery limits, asset criticality is related to those items of equipment and their ancillaries associated with the RWTP process critical control points (CCP) or barriers. These are addressed in detail in the Water Quality Plan (WQP) and summarised below noting at each barrier the log reduction of hazards is reduced stage wise to meet contractual requirements for recycled water.

Critical Control Point	Hazard to be removed	Critical asset incl ancillaries
Ultrafiltration	Viruses, Bacteria, Protozoa, Nitrogen	MBR membranes and CIP system
Reverse Osmosis	Viruses, Bacteria, Protozoa	RO membranes and CIP system
UV Disinfection	Viruses, Bacteria, Protozoa	UV lamps
Chlorination Disinfection	Viruses, Bacteria, Protozoa, Ammonia	Sodium Hypochlorite system

The VWS-JLL operations, service and maintenance agreement focuses on ensuring these critical assets and their ancillaries are properly operated, serviced and maintained.

Asset assessment

As the assets have aged over time, VWS has accumulated operation, service and maintenance data corresponding to each item of all plant, equipment and devices to date and are currently in discussions with JLL regarding risk assessment related to the condition and criticality of each over the next 5 years.

11.3.4 Operation and maintenance arrangements

Operations & Maintenance manual and procedures

This Plan makes reference to the VWS water treatment infrastructure operation and maintenance (O&M) manual. The O&M manual contains sufficient information to address the complexity, criticality, condition and age of the plant. The O&M manual supports the O&M contract scope of work between VWS and JLL and covers preventative maintenance and servicing as well as breakdowns and trouble shooting.

RWTP capital works

The infrastructure investment/capital works requirements identified in this Plan are based on sound strategic service planning including:

- Required levels of service noting that future growth in customer base or demand have not been contemplated under the contract between VWS and JLL, and
- Security of supply and service provisions noting:
 - Security of supply of raw sewage is the responsibility of the owner in its sewer mining agreement with SWC and upon which VWS relies,
 - The RWTP is operated serviced and maintained by VWS pursuant to a service agreement between VWS and JLL,
 - JLL is responsible for alternative sources of supply of mains water in the event the RWTP is not operational or not operating to full capacity,
 - Emergency response and business continuity are managed pursuant to the companion plan Retail Supply Management Plan.

Whole of life cycle cost evaluation

Whole of life cycle cost evaluation for the RWTP is not a requirement of VWS in the VWS scope of work between JLL and VWS

Future life cycle expenditure

As well informed in earlier versions of this plan, VWS was awarded a design and construct (D&C) and commission contract by BLL for the RWTP including a 12-month warranty/defects liability period; following which VWS has been operating and maintaining the RWTP ever since. Currently VWS and JLL are engaged in formalising another long term extension of operation and maintenance for the next five years.

Assignment of responsibilities

The assignment of responsibility to appropriate management and staff is tabled below.

Function	VWS Responsible Person	Title
VWS Services	Grant McNay	General Manager-Services
VWS Regulatory / Compliance	Subrat Kar	Senior Contracts Manager
WHSEQ	Filbert Hidayat	WHSEQ & Compliance Systems Manager
O&M Management	Craig Hancock	NSW Services Manager
O&M	Service team representative	Service Engineer / Operator
▪ Operation	Claudio Kohn	
▪ Service		
▪ Maintenance		

11 Implementation

This section affirms that the licensee (VWS):

- Will ensure that its infrastructure operating plan is fully implemented and kept under regular review and, in particular, that all of its activities are carried out in accordance with that plan, and
- If the Minister so directs, will amend its retail supply management plan in accordance with the Minister's direction.

12.1 Implementation

This Plan will be implemented by VWS on the day VWS executes operation, service and maintenance agreement of the RWTP with JLL and before the RWTP enter into commercial production.

Prior to commercial operation of the RWTP and in a timely manner as applicable to each stakeholder VWS had issued this plan of the time.

In the case of those VWS personnel responsible for implementing and administering this Plan, VWS continues to ensure that those responsible are made fully aware of the obligations required under this Plan and implement these accordingly.

This Plan is implemented at the same time, and in concert with the following companion plans:

- Water Quality Plan, and
- Retail Supply Management Plan

12.2 Amendments

Amendments to this Plan may be categorised as VWS improvements or those directed by the Minister.

In addition this Plan may be amended as may be necessary following outcomes of site inspections and audit findings by VWS, JLL, or any other authorised stakeholder. Attention is drawn to section 8 preceding: Regarding availability of information on the VWS website, this will be restricted to information that does not jeopardise VWS intellectual property rights or indeed put the RWTP within Darling Quarter at risk with respect to security

13 Compliance

This section affirms that if the Minister or IPART so demands, or if any significant change is made to its infrastructure operating plan, the licensee:

- (a) must provide the Minister or IPART with a report, prepared by an approved auditor in such manner and form as the Minister or IPART may direct:
 - (i) as to the adequacy of the plan, and
 - (ii) as to the condition of its infrastructure, having regard to the purpose for which it is licensed, or
- (b) must pay the Minister's or IPART's costs of conducting an investigation into the adequacy of the plan or the condition of its infrastructure.

13.1 IPART audit

This Plan may be audited by IPART or its representative at any time pursuant to IPART's Audit Guideline Water Licence Audits, Water — Guidelines, latest version at the date of this update or as amended and accessible from IPART Website, whichever is later.

13.2 Internal audit

All VWS personnel must perform their duties lawfully and in accordance with VWS BMS. Even so, all VWS business activities, products and services, including performing our core and support processes, carry a measure of risk.

VWS has a defined way of doing business to eliminate risk or mitigate risk to a level acceptable to the company. The procedures and approaches for this are contained in VWS' BMS documentation; namely, BMS procedures include the applicable risk management tools and the level of checking and verification required to properly conduct our business.

This is largely achieved by the auditing process, for which there are three levels:

- Level 1 - third party BMS certification and third party financial accounting compliance audits,
- Level 2 - internal audits by VWS own auditors or consultants it engages on its own,
- Level 3 - audits of VWS by its customers or others; alternatively of its suppliers by VWS.

13.3 Audit outcomes

For IPART audits, following the submission of the final audit report, VWS may be required to take action to manage the audit outcomes. As prescribed in the IPART Audit Guidelines IPART will discuss the process for addressing any issues and the actions that the licensee proposes to take in response to the audit findings on a case-by-case basis.

For VWS internal audits, VWS will take immediate applicable corrective action to any non-conformance, observation of opportunity for improvement followed by review and investigation as necessary to determine cause and then put in place preventative actions to avert any reoccurrence of the non-conformance.

APPENDICES

Attached

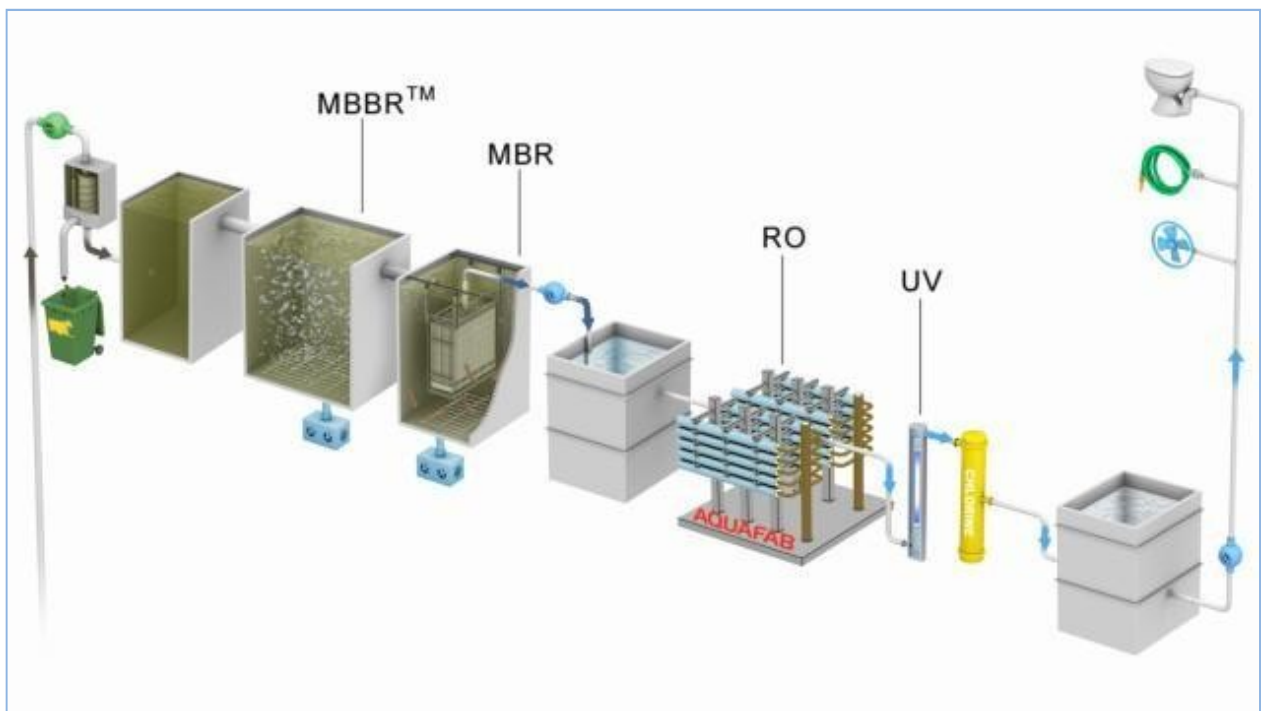
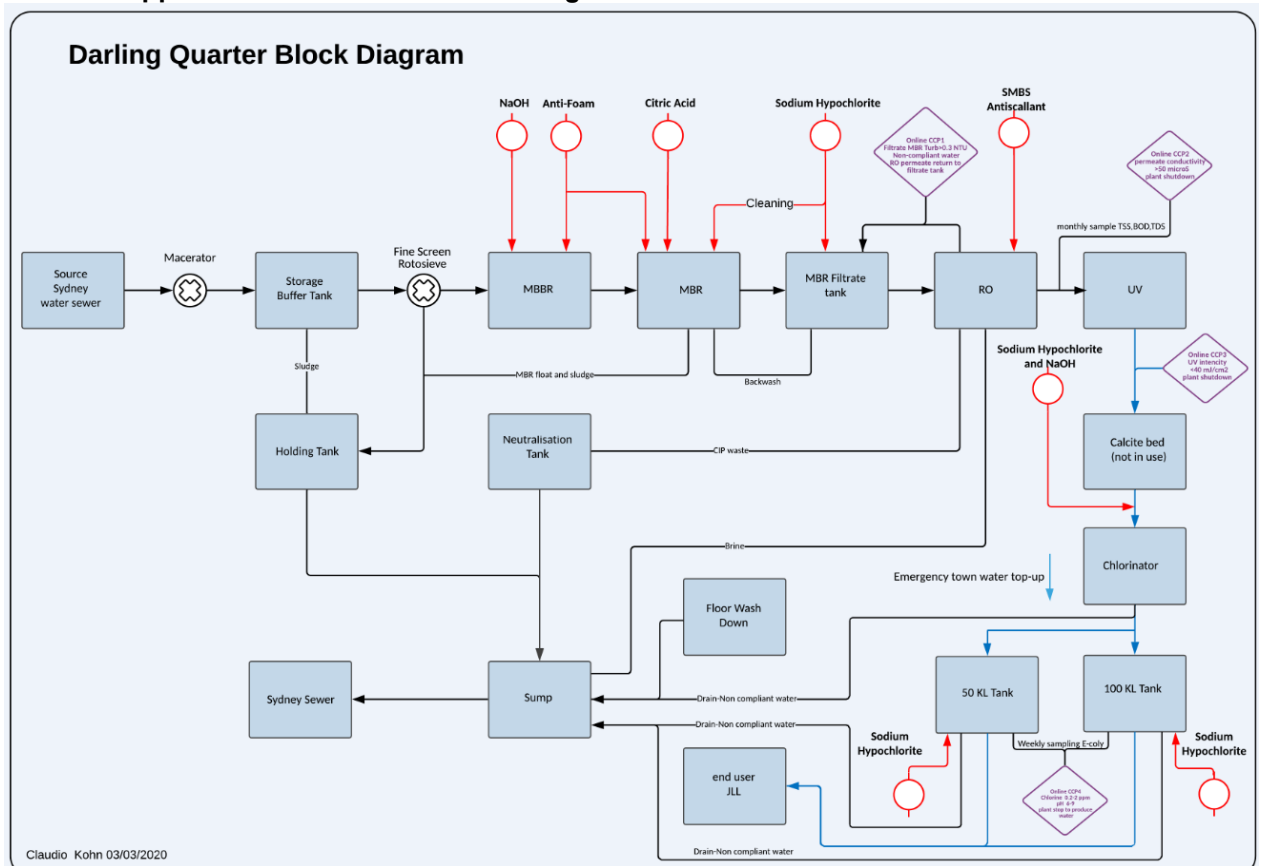
The following appendices form part of this document proper Appendix 1 WRP block flow diagram

- | | |
|------------|--|
| Appendix 2 | 3D pictorials of the RWTP |
| Appendix 3 | Location drawings within DQ complex |
| Appendix 4 | Responsibilities in relation to the use of recycled water at Darling Quarter |

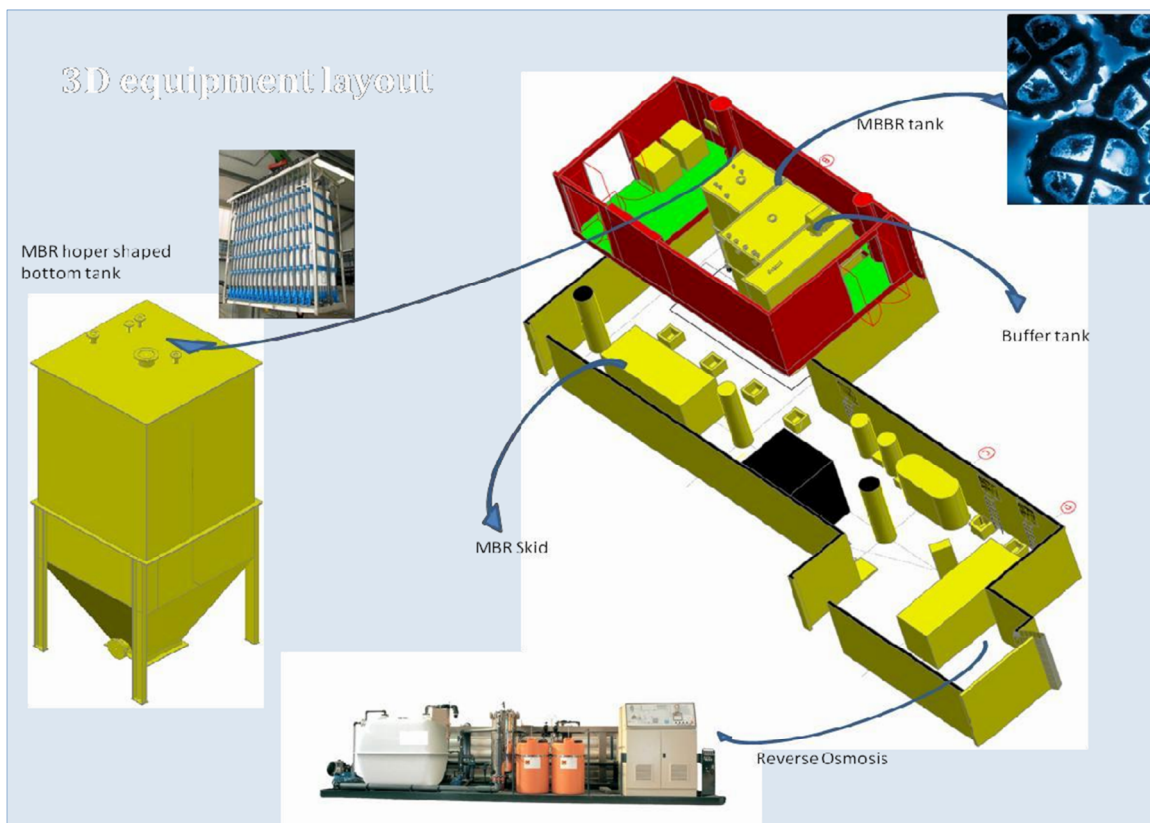
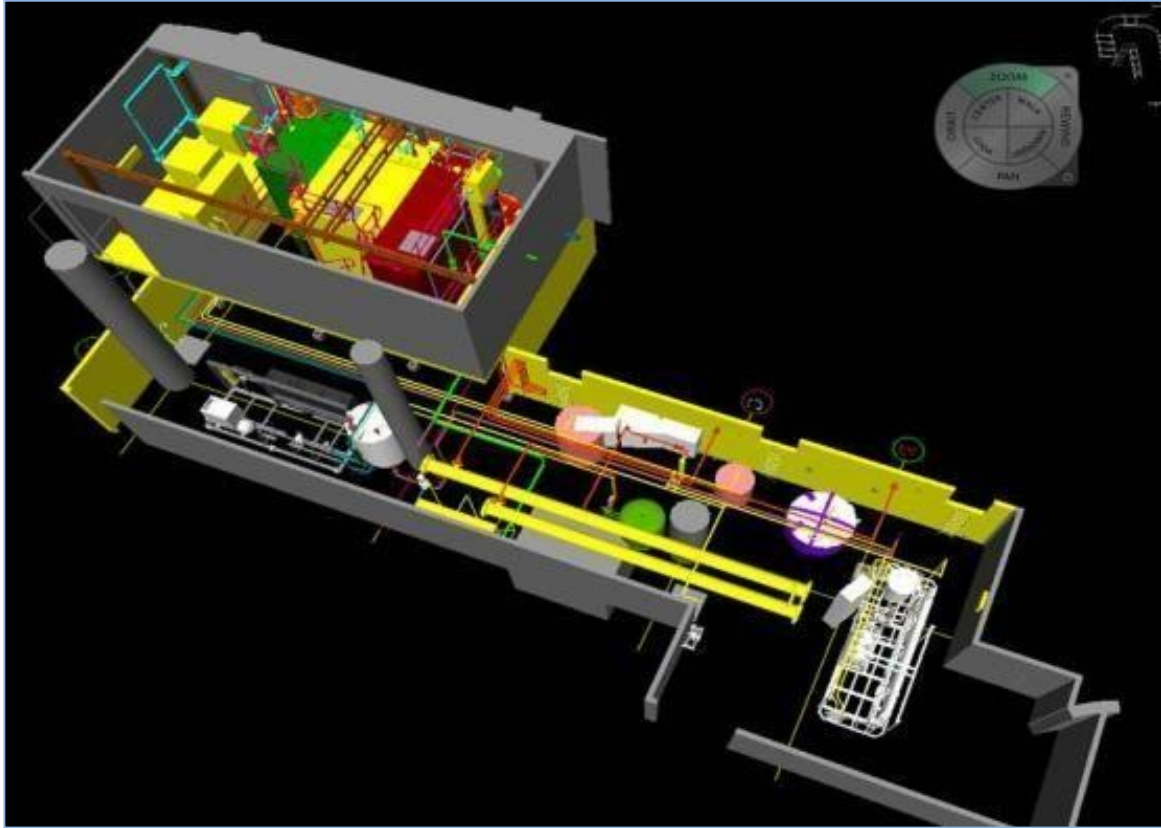
O&M manual

- Including as-built/work as executed drawings (further updated as necessary)

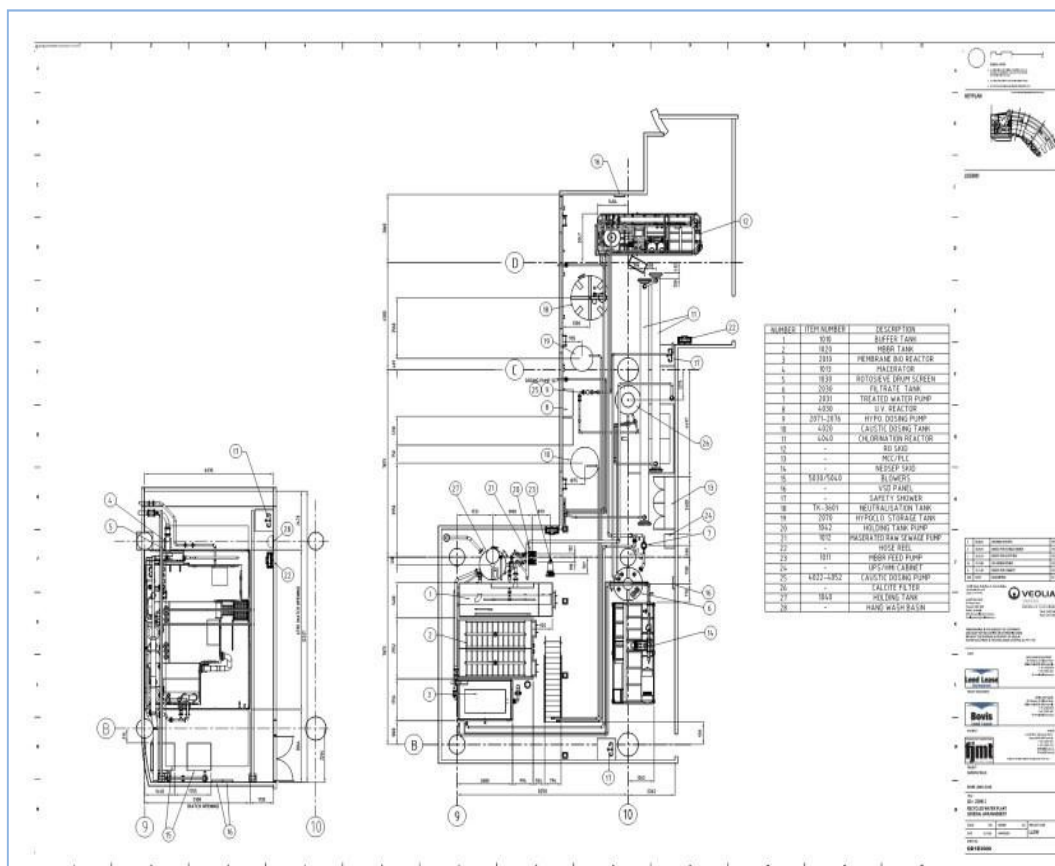
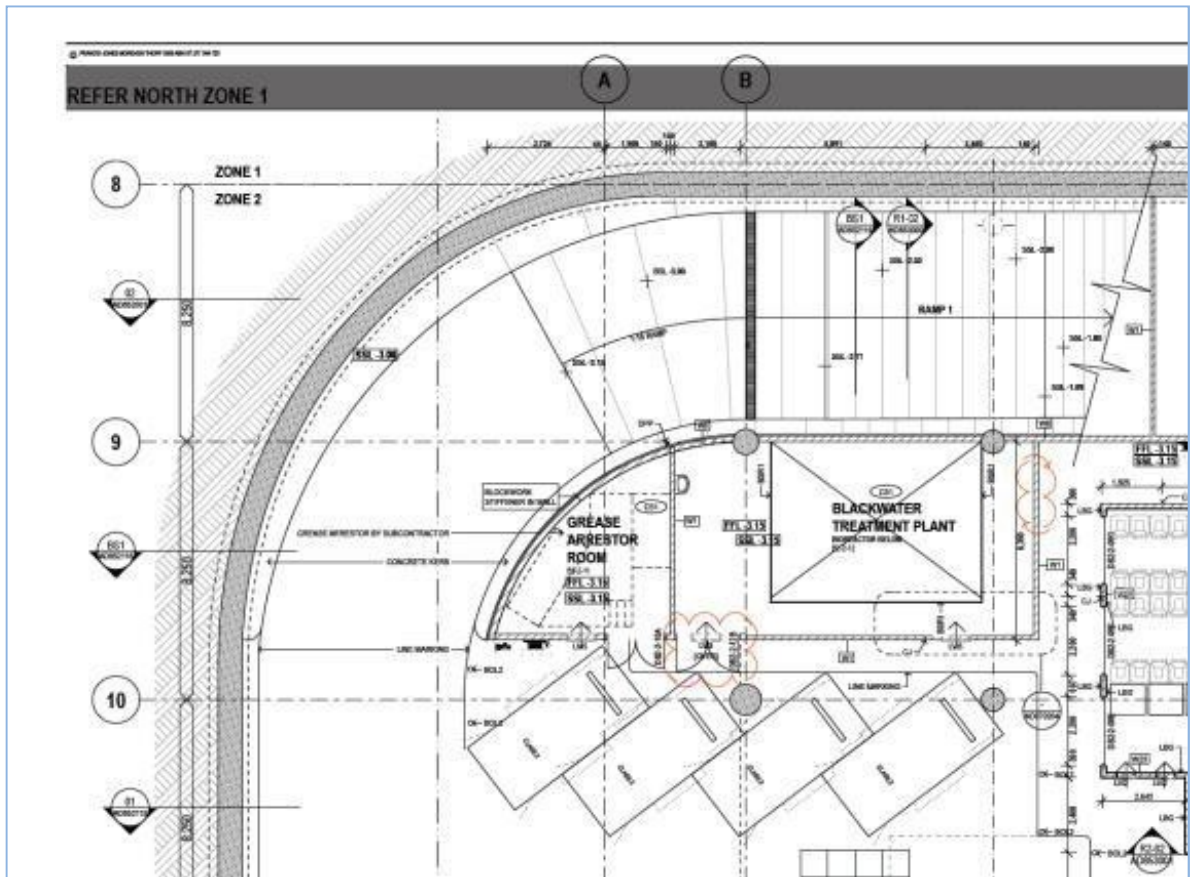
Appendix 1: WRP Block Flow Diagram

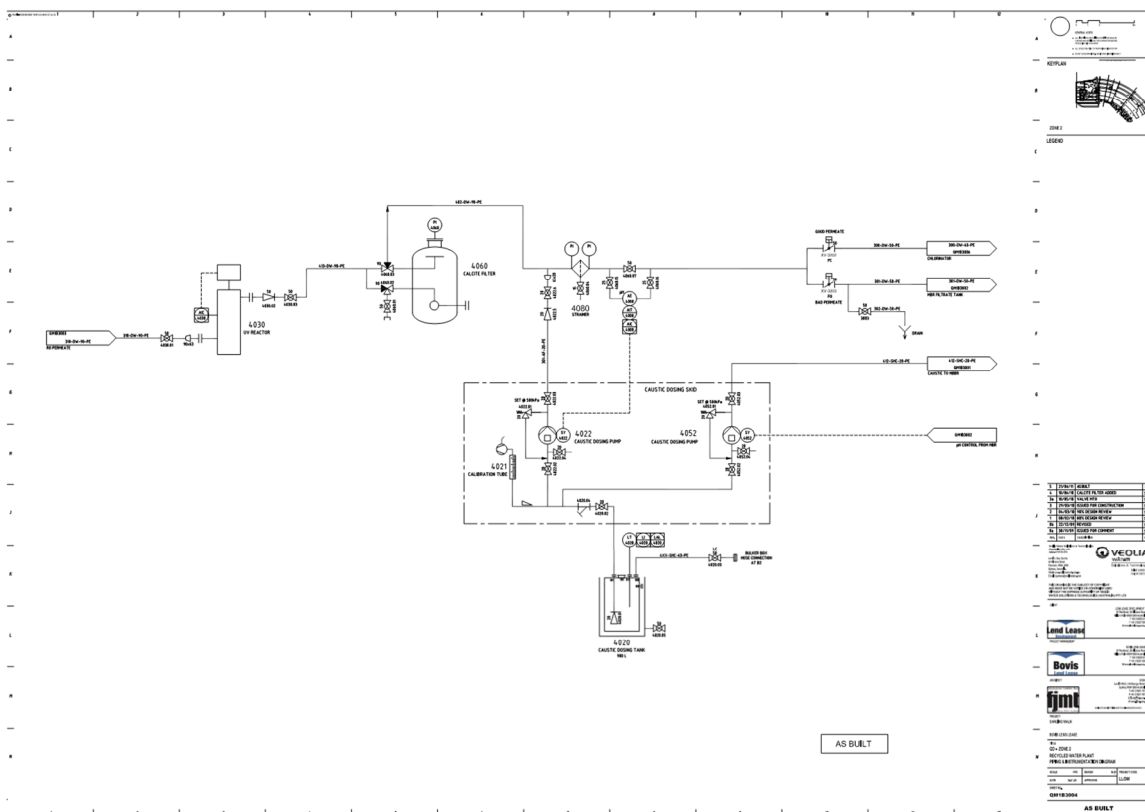
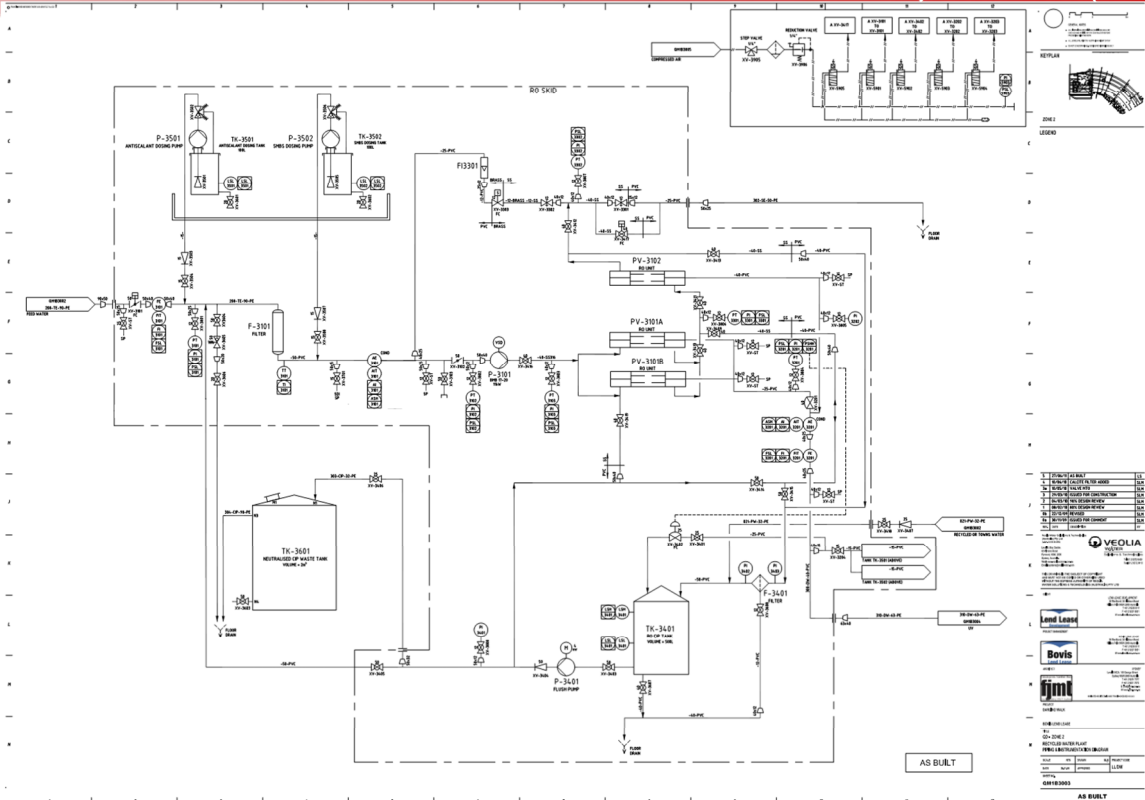


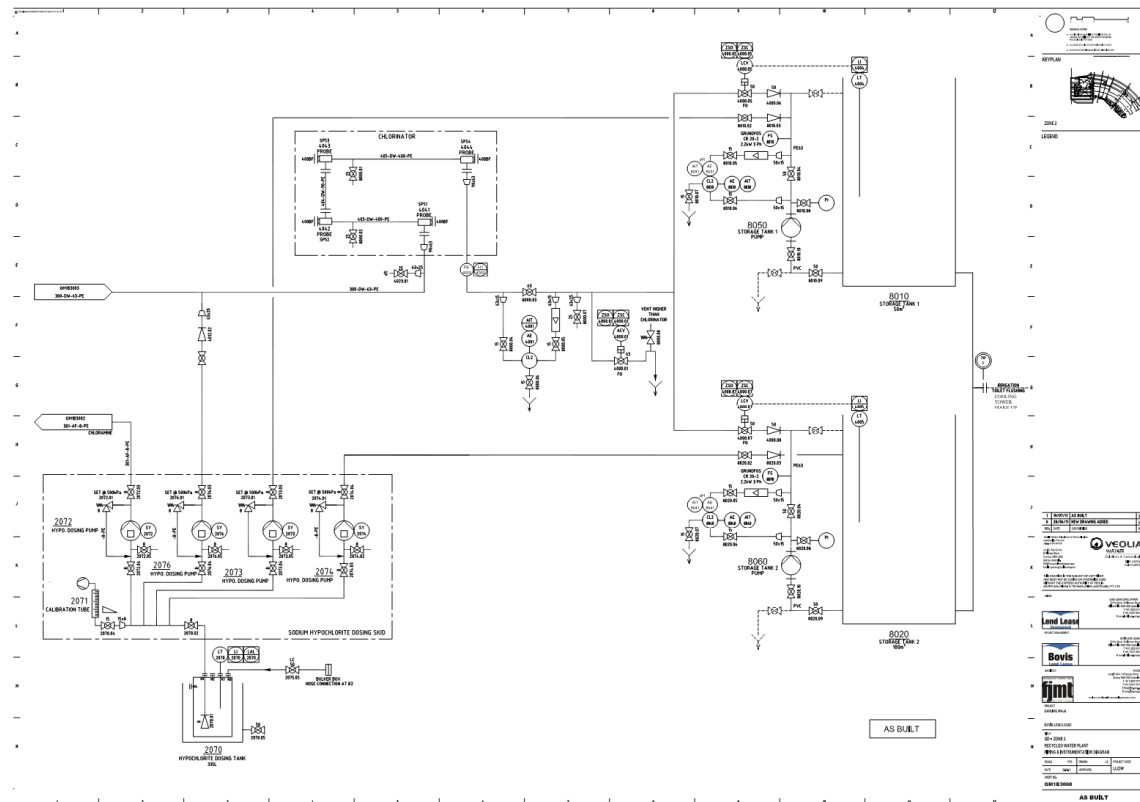
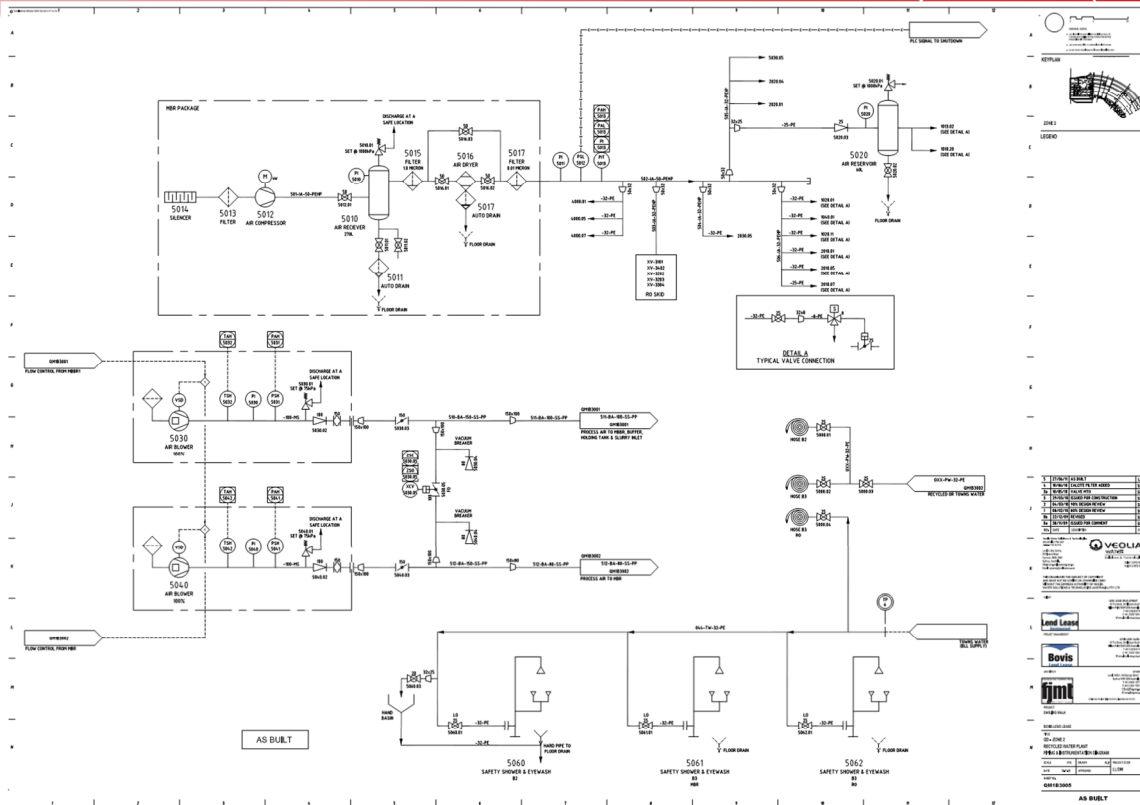
Appendix 2: 3-D Pictorials



Appendix 3: Location drawings within DQ complex (on Harbour Street)







Appendix 4: Responsibilities in relation to the use of recycled water at Darling Quarter

The responsibilities of the Building Manager (BM; JLL) in relation to the use of recycled water supplied by VWS at the Darling Quarter Development are as follows:

▪ **Definition**

The following reticulation systems designed and built by the Developer (Bovis Lend Lease; BLL) commencing at the RWTP battery limits are together termed the Recycled Water Systems (RWS):

- toilet flushing system,
- garden irrigation system
- cooling tower make-up system

▪ **Scope**

Included by BM

- The BM shall be responsible for the operation, care and maintenance of the RWS commencing at the termination point with the RWTP
- The BM shall also be responsible for the management of the Owner's Sewage Mining Licence with SWC and Trade Waste Licence with SWC associated with the RWTP

Not included by BM

- VWS shall be responsible for the operation and maintenance of the RWTP within the battery limits of the RWTP in accordance with its O&M contract with JLL.

▪ **Restricted use**

The BM shall ensure recycled water shall be used for the following purposes only and none other:

- toilet flushing,
- garden irrigation, and
- cooling tower make-up

▪ **Operation and Maintenance of the RWS:**

- The BM shall prepare a full and complete Operations and Maintenance Manual containing a section relating to the occupational health and safety hazards in the use of Recycled Water (see below). It is anticipated this O&M manual will have been prepared by Bovis Lend Lease, the Developer (BLL).
- The BM shall train all its employees and subcontractors in the safe operation and maintenance of the RWS.
- The RWS shall be maintained in accordance with the BM's detailed O&M manual including manufacturer's instructions
- The BM shall maintain accurate maintenance records as required by its own management systems and industry expectations.
- The maintenance of the RWS including piping, valves, irrigation nozzles and sign posting shall be in accordance with "Sydney Water's Recycled Water Areas Plumbing Guidelines published by Sydney Water Corporation document SW256 02/09 which also requires conformance with
 - The NSW Code of Practice Plumbing and Drainage,
 - AS/NZS 3500:2003, Plumbing & Drainage set as applicable to treated water; as amended from time to time.
 - AS1319 – 1994 Safety Signs for the occupational environment
- Specifically, the RWS shall have no cross connections with any potable water systems.
- Cooling tower maintenance by the BM shall be in accordance with the following and any referenced standards and codes therein:
 - NSW Code of Practice for the control of Legionnaires Disease (Cooling Tower Systems) 2nd Edition,
 - AS/NZS 3666.2: 2011, Operation & Maintenance, and
 - AS/NZS 3666.3: 2011, Performance based maintenance of cooling water systems

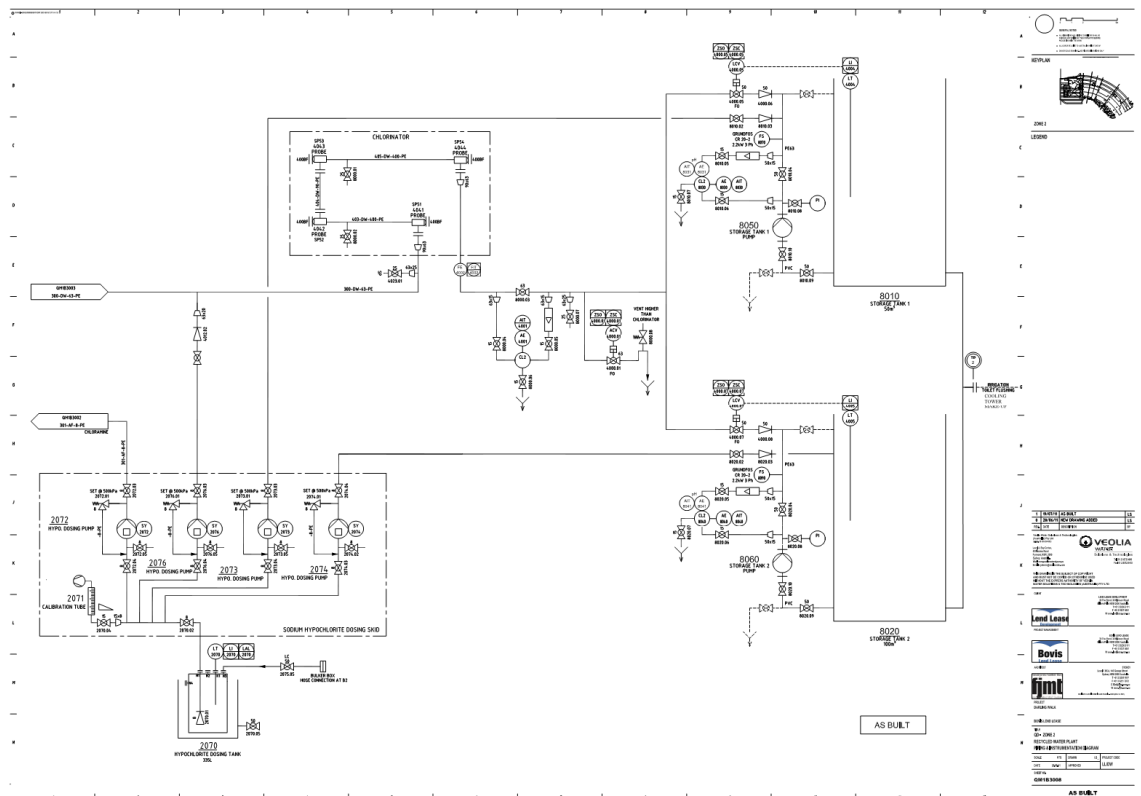
Notably the Sydney Water's Plumbing Inspection and Assurance Service (PIAS) transferred to NSW Fair Trading on 29 March 2010. While SWC currently remains responsible for on-site regulation of all plumbing and drainage work within Sydney it is anticipated that a new Act of Parliament will transfer these responsibilities to NSW Fair Trading in late 2011 or early 2012. The BM shall comply with any and all directions in relation to plumbing requirements.

▪ **Health and Safety obligations of the BM**

BM employees and third parties that come into contact with treated water shall:

- Always wash hands immediately after being in contact with treated water. If splashed in the eyes, wash immediately with clean water. Avoid any unnecessary contact with treated water.
- Ensure hands are washed before and after using the toilet and before eating, drinking or smoking and at the end of the day. Never eat, drink or smoke while using reclaimed water.
- Report any skin rashes, and illness such as fever, nausea, vomiting or diarrhoea to their supervisor who will ensure proper follow up corrective action.
- Cover any wounds with a waterproof dressing to prevent contact with treated water
- JLL to notify immediately in the event of a cross connection, or potential threat to public health, failure to notify immediately will cause VWS considerable harm and amount to a substantial breach by JLL of the Agreement

As-Built of Infrastructure Limit maintained and operated by VWS under contract with Lend Lease Fund Management (Reference: Sheet No. QM1B3008)



Extract in the next page shows the Terminal Point (TP2) showing the limit of VWS managed Infrastructure, beyond which all the infrastructure is operated and

managed by the Asset Owner's representative, JLL.

