VEOLIA WATER

Solutions & Technologies

Bingara Gorge Development

Combined Sewerage & Water Infrastructure Operating Plan Rev 8

August 2019

Combined Sewerage Services and Water Supply Infrastructure Operating Plan
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2		Release				
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4	February 2015		Review + Update	M. Sintrat / J Lindley	S Kar	Grant McNay
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6	April 2018	IPART Audit	Review / Update	C.Hancock	S.Kar	Grant McNay
7	Sept 2018	IPART Edit	IPART Update Request	C.Hancock	S.Kar	Grant McNay
8	August 2019	After PRWP Operations for ~ 1 Year	Review / Update	P.Coulton	C.Hancock / S.Kar	Grant McNay

Contents

Abbreviations

RWTP	Recycled Water Treatment Plant, consisting of 'PRWP + TRWP'
PRWP	Permanent Recycled Water Plant
TRWP	Temporary Recycled Water Plant
IPART	Independent Pricing and Regulatory Tribunal
WICA	Water Industry Competition Act 2006 as current
VWS / Veolia	Veolia Water Solutions & Technologies (Australia) Pty Ltd
Lend Lease	Lend Lease Communities (Wilton) Pty. Limited (ABN 31 110 022976)
The Regulation	Water Industry Competition (General Regulation) 2008, as current
WWTP	Waste Water Treatment Plant

1. Purpose

This combined Sewerage and Water Infrastructure Operating Plan (this Plan) has been prepared by Veolia Water Solutions & Technologies (Australia) Pty Ltd (VWS) for the Bingara Gorge Recycled Water Project, Wilton (NSW).

Veolia's current Network Operations License is the NSW Network Operator's License granted by the Minister on 11th July 2017. IPART granted Licensee to commercially operate the Bingara Permanent Recycled Water Plant (PRWP) under WICA Act Schedule 1 Part 1 Article 2 (3) on 1st November 2017, based on a Ministerial decision of the same date. PRWP has been commercially operating since 08 December 2017.

For avoidance of any doubt, the Temporary Recycled Water Plant (TRWP) which was in operations since 2011, has been mothballed from 08 December 2017, and its operations at any stage in future is pending discussions between the asset owner and licensee. Veolia's operation and maintenance activities of the TRWP have been detailed in the earlier version of the IOP Plans over the years.

The purpose of this Plan is to outline the ongoing operation of Bingara RWTP and existing networks infrastructure within the licensed area of operations.

The operation and maintenance activities under the License include the following:

a) collect and convey wastewater from Bingara Gorge Development, Bingara Gorge Existing catchment and Wilton Village (rising main from boundary of Sydney Water assets only) to the Bingara RWTP;
b) treat wastewater at the Bingara PRWP to a standard suitable for reuse within a household dual reticulation system.
c) supply recycled water services to lots in the Bingara Gorge Development for authorized use as prescribed in the License (toilet flushing and garden irrigation)
d) store recycled water in irrigation lagoons within the golf course property for usage for Golf Course Irrigation;
e) store recycled water in irrigation lagoons within the golf course property for the purposes of storage to accommodate peak irrigation demand.

The water industry infrastructure under the License is the infrastructure used for the storage, conveyance or reticulation of sewage and infrastructure used for the treatment of sewage as well as Infrastructure used for conveyance or reticulation of recycled water (Recycled Water Treatment Plant(s), Wilton Village Rising Main, Sewage and Recycled Water Reticulation Network). Under the current License the produced Recycled Water is used for the purpose of Toilet Flushing, Garden Irrigation and Golf Course Irrigation. (Ref: Network Operators License 10_012).

Apart from the above, there are no alternative treatment facilities within Bingara Gorge development.

2. Regulations and Standards

VWS operates and maintains the Infrastructure and will continue to do so in accordance with:

- Regulatory or Authority requirements such as:
    - Water Industry Competitor Act (WICA)
    - Australian Guidelines for Water Recycling Plants 2006
    - Interim NSW Guidelines for Management of Private Recycled Water Schemes 2008
- Australian Standards and Guidelines
- Licensing Requirements
- Operating, Maintenance and Management Plans
- Industry Codes of Practice

VWS will remain current with changes in regulations and guidelines that may impact the operations of the Infrastructure, and work with Authorized Person (Lend Lease Communities, LLU) to adjust to these changes.

3. Background

VWS has been contracted by the Developer, Lend Lease Communities (Wilton) Pty. Limited (ABN 31 110 022 976) (Authorized Person in the Network Operator License) (LLU), to provide Network Operator and Retail Supplier Services for Sewerage Services and Recycled Water Supply for the Wilton area, including the Bingara Gorge existing residences, Bingara Gorge Development and Wilton Village Development. This is termed herein as the Bingara Scheme.

The Bingara Wastewater and Recycled Water Scheme includes sewage collection and treatment to provide recycled water to a nearby golf course, irrigation of public spaces and for Recycled Water usage in a significant portion of houses within the Bingara community. (via a lilac network)

The Bingara Scheme covers:

(a) Current and future, residential and commercial tenements with connection to the sewer network, and where feasible the recycled water (lilac) network.
(b) Treat wastewater on a daily basis and provide greater capacity to manage peak flows
(c) Provision of recycled water to the lilac network..

There are an estimated total of 2000 equivalent tenements (ET) from the three connected catchments that will ultimately be serviced by the scheme, equating to treatment of an average dry weather flow (ADWF) up to 1125 kL/d at current sewage concentrations (with daily composites of raw sewage TKN up to 90 mg/L). The Bingara PRWP is suitable for servicing 1540 ET. However, it has provision for expansion to service the ultimate development to 2000 ET with installation of an additional train.

The overall master plan for the sewerage system is presented in Bingara Gorge Pressure Sewerage System Masterplan Report (May 19) and Bingara Gorge Master Plan Addendum 1: Option B8 High Level Assessment (Wilton Water Utility Pty Ltd, October 2013).

The Licensee's areas of operations are covered by infrastructure within 2 parts:

Part A:
Land situated under the Folio Identifiers DP 1108927 known as the Recycled Water Treatment Plant.

Part B:
Land situated under Folio Identifiers DP 270536, DP 1104390, DP 280010, DP 280014 and DP 1108927 known as the Wilton Parklands – Bingara Gorge.

DP 1108927 and DP 1104390 known as the Recycled Water Treatment Plant and the Bingara Gorge Golf Course in addition to the corridor of property associated with the reticulation, conveyance and storage infrastructure between the two sites.

Currently, Living Utilities, a company representing Lend Lease Communities (LLU) manages this Asset on behalf of Lend Lease Communities, LLU.

4 Plan Overview

4.1 Infrastructure Operating Plan (this Plan)

This Plan has been prepared pursuant to the Water Industry Competition (General Regulation) 2008 (the Regulation) Schedule 1 (Conditions for Network operators' licenses) Part 2 (Additional conditions for licenses for water infrastructure) Schedule 1 section 6 (Infrastructure Operating plans) Article 2 (a) and Part 3 (Additional conditions for licenses for sewerage infrastructure) section 13 (Infrastructure Operating plans) Article 2 (a).

Implementation and Compliance under the Water Industry Competition (General Regulation) 2008 (the Regulation) will be ensured by adherence to the requirements within the Regulation.

This Plan includes Infrastructure Operation Plan requirements of the Regulation under:

- Planning: Water Infrastructure (as per Section 4.1.1 below.)
- Planning: Sewerage Infrastructure (as per Section 4.1.2 below.)

As such, this Plan incorporates two plans into one, as outlined in Section 4.7.

4.1.1 Planning: Water Infrastructure

Prior to commencing to operate PRWP infrastructure commercially, the Licensed network operator for the infrastructure had provided IPART all relevant documents 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;
(b) the continued safe and reliable performance of the infrastructure;
(c) the continuity of water supply;
(d) alternative water supplies when the infrastructure is inoperable; and
(e) the maintenance, monitoring and reporting of standards of service'

IPART subsequently forwarded the following to the Minister for Energy and Utilities

(a) Report on the New Infrastructure Audit of the Bingara Gorge Recycled Water Scheme – 28 October 2016
(b) Addendum to the Report on the New Infrastructure Audit of the Bingara Gorge Recycled Water Scheme – 06 October 2017

based on which the Minister provided approval to commercially operate PRWP under meaning of the WICA Regulation and conditions of the License on 1st November 2017

4.1.2 Implementation: Water and Sewerage Infrastructure

The Licensee (VWS)

(c) must ensure that this combined sewerage and water supply 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 this plan, and
(d) must, if the Minister so directs, amend this plan in accordance with the Minister's direction.

4.1.3 Compliance: Water and Sewerage Infrastructure

If the Minister or IPART so demands, or if any significant change is made to this combined sewerage and water supply infrastructure operating plan, the Licensee:

(e) 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, as to the adequacy of the plans, or
(f) must pay the Minister's or IPART's costs of conducting an investigation into the adequacy of the plans.

4.2 Scope Not Included

This Plan does not cover:

(a) Drinking water infrastructure for Bingara Gorge; as design, construction and operation is the responsibility of others;

Water systems, design, construction and operation, delivering water for use in Golf Course irrigation and stored within storage lagoons is currently operated and maintained by others and covered in an irrigation plan for the golf course prepared by that entity.

4.3 Other Conditions under License

Schedule B under Network Operator's License No 10_012 prescribes a comprehensive list of standard conditions which the Minister has determined to impose pursuant to section 13(1)(b) of the Act 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 NWS 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 Licenses
- B8 Monitoring
- B9 Provision of copy of Plans
- B10 Delineating responsibilities – interconnections
- B11 Notification of changes to end-use
- B12 Notification of changes to Authorized Person, and
- B13 Notification of commercial operation

4.4 Specific Condition of the License Variation

This Plan includes details relating to commercial operation of the RWTP (TRWP and PRWP) Bingara Plant

The PRWP did not commence commercial operation until:

a) Ministerial Approval of the infrastructure and associated plans was obtained; and

b) 28 days of Validation Testing was undertaken prior, demonstrating
   a. Compliance on CCP; and
   b. 12 test results taken over the 28 days for recycled water Clostridium perfringens, Somatic Coliphage E.Coli COD, BOD, Oils & Greases, Total Phosphorus, Total Nitrogen, TKN, Nitrates and Nitrites, Ammonia, Alkalinity, Volatile Suspended Solids, Suspended Solids and Total Dissolved Solids these test results were returned from the National Association of Testing Authorities (NATA) accredited external laboratory demonstrating acceptable performance of the installed plant and process.
   c. These results were submitted to IPART and auditor.

c) Plant Owner approval to commence commercial operation.

Prior to commercial operation, potable water was being distributed throughout the Recycled Water Network existing infrastructure (refer to all earlier versions of IOP).

Since completion of (a) and (b) above, recycled water produced by the Bingara PRWP has been supplied to the residential network (dual pipe) scheme and golf course irrigation system.

With commencement of commercial operation of Bingara PRWP, Bingara TRWP has been temporarily mothballed under instruction from the asset owner. Mothballing of the TRWP prevents flow produced from the TRWP to storage lagoons.

As per current operations, recycled water produced is delivered into the RW network supplying the Bingara Gorge community (first preference) and surplus water flows to either the 60ML or 20ML storage ponds. Water from both dams is available for Golf Course irrigation. Each or a combination of dams can be used for Gold Course Irrigation.

Transfer of water from dam to dam can only be achieved via installation of temporary pumping and pipework systems if required.

Likewise, transfer of water from both storage lagoons back to the plant can only be achieved via installation of temporary pumping and pipework systems.

Figure 1, below indicates 'All Modes of Operation'

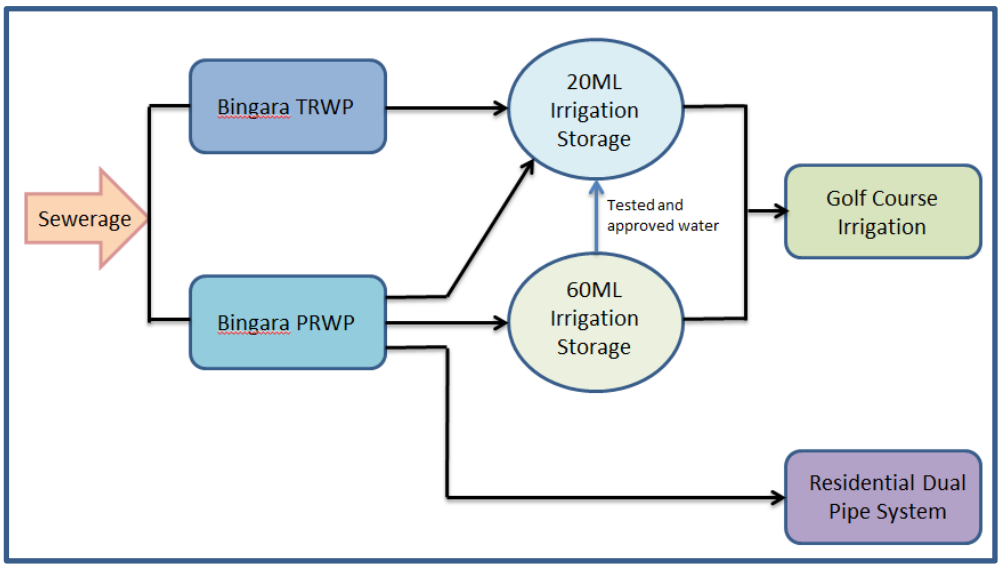


Figure 1: Overview of operation following commercial operation approval

At the time of this revision, the current operation, is depicted by the following diagram:

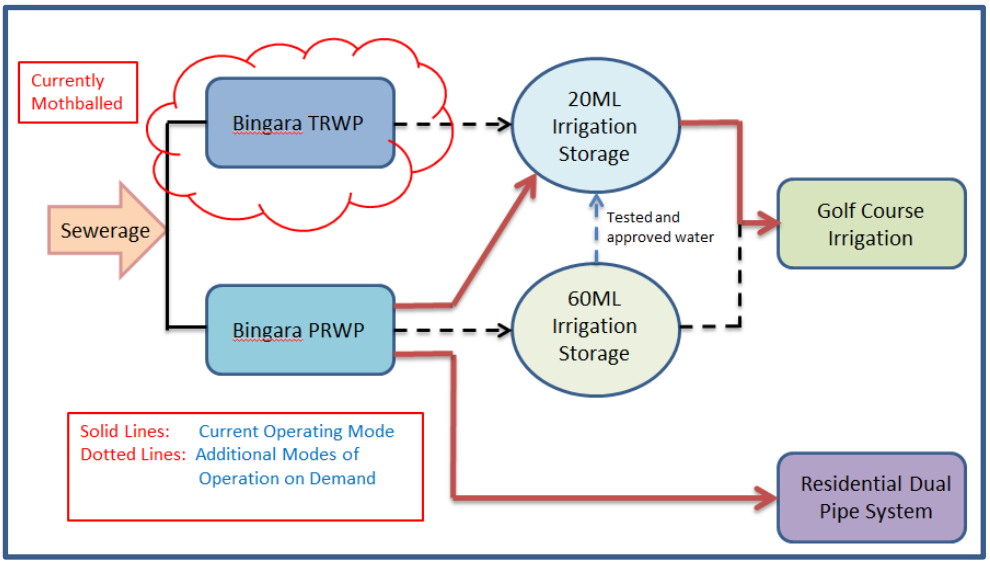


Figure 1a: Overview of current operational mode.

Water within each of the dams is tested as per the combined Sewage and Recycled Water Quality Management Plan (SRWQMP). Testing of the 20ML dam commenced 4th October 2012, testing of the 60ML commenced 18th May 2017 prior to commercial operation.

As a part of the overall Recycled Water use strategy, the water available to the 60 ML Pond is planned for use for golf course irrigation purposes.

VWS plan is to release water from the 60ML dam directly to the Golf Course irrigation network only in case of required demand, such a decision is taken by VWS Plant Manager

considering all available circumstances and in close consultation with the asset owner.

Given the large surface area of the pond in relation to the relatively shallow depth, there has been little to no change in water characteristics of water sampled at the surface and as such water sampled from surface is representative of the water quality in the pond as a whole. Sampling and test results support this.

VWS has verified, from the test results, that stored water (60ML dam) complies with Water quality standards for restricted golf course irrigation (Table 3.8 of Australian Guidelines for Water Recycling).

Additional sampling and testing will be made when such volume of water produced during the commissioning period, currently within the 60ML dam gets discharged to the Golf course.

Prior to any such discharge, in the event the stored water mentioned above becomes unacceptable due to a reason beyond the Licensee's control, then temporary pumping systems will be initiated to transfer the contents of the 60ML dam to RWTP.

4.5 Other Conditions under Regulation

In addition to this Plan, the Licensee (VWS) must meet the following conditions under Regulation, Schedule 1 Parts 1 and 2 and to which VWS commits to meeting as applicable to the License No 10_12 unless directed otherwise by IPART or the Minister:

- Part 1

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

1. This Infrastructure Operating plan (in part – water infrastructure),
2. Water Quality Plan,
3. Water meters,
4. Drinking Water (not included in this Plan),
5. Non-potable Water,
6. Customer connections
7. Matters to be contained on Licensee's website.

- Part 3

1. This Infrastructure Operating plan (in part – sewerage infrastructure),
2. Sewage Management Plan,
3. Customer connections,
4. Matters to be contained on Licensee's website

4.6 Codes of Conduct

VWS commits to complying with any water industry code of conduct (Clause 25 of the Regulation), marketing code of conduct (Clause 26 of the Regulation) and transfer code of conduct (Clause 27 of the Regulation) that may be applicable to its Network Operator's License.

4.7 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 Licensee (not part of this License requirement) in relation to the sewerage services and water supply infrastructure as follows.

1) Network Operators (4 plans, combined into 2 plans)

   Plan #1…"Combined Water and Sewage Infrastructure Operating Plan"

   - Infrastructure Operating Plan for water infrastructure (WIOP) pursuant to the Regulation Schedule 1, Part 2, Section 6 and describes the design, construction, operation and maintenance of the water infrastructure and its integrity
     Status: This Plan

   - Infrastructure Operating Plan for sewerage infrastructure (SIOP) pursuant to the Regulation Schedule 1, Part 3, Section 13 and describes the design, construction, operation and maintenance of the sewerage infrastructure and its integrity

     Status: This Plan

   Plan #2…"Combined Sewage and Water Quality Management Plan"

   - Water Quality Plan (WQP) pursuant to the Regulation Schedule 1, Part 2, Section 7 and 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;
     Status: Recycled Water Quality Plan (being submitted with the SMP, as below);

   - Sewage Management Plan (SMP) pursuant to the Regulation Schedule 1, Part 3, Section 14 and describes the manner in which health and ecological assessments will be undertaken as well as arrangements for disposal of waste from the infrastructure.
     Status: Sewage Management Plan (being submitted with the WQP, as above)

2) Retail Supplier's Licenses (2 Plans, combined into one)

   - Retail Supply Management Plan (RSMP) for water and sewerage services supply pursuant to the Regulation, Schedule 2 Part 2 (Additional conditions for licenses for water supply) Section 7A, (Retail Supply Management Plans);

   Status: All plans will be reviewed as necessary under the Act;

Strictly speaking there are six (6) separate Plans required under Regulation as above; however the two plans required under Retail supply have been combined, the two IOPs have been combined, and the WQP and SMP have been combined. Combining plans is permissible under the Regulation (Division 3, Clause 16) and logical given both Licenses relate to combined Sewerage and Water infrastructure. The total number of plans required following these combinations is 3.

5 Relationship between Parties

5.1 Stakeholders

This Plan refers to stakeholders, namely those persons, entities and authorities that have an interest in the Treatment Infrastructure and its supply of services under license.

These stakeholders are listed below noting all have been regularly updated and involved and continue to be so in the initiation and development of this project. All necessary approvals and comments have been and continue to be sought at the required times.

Table 2: Stakeholders

Stakeholder	Role
Wollondilly Shire Council	Assessor and Approver of development applications associated with the Bingara Wastewater and Recycled Water Scheme. (Approver of recycled water plumbing installations downstream of the residential / commercial lockable isolation valve)
Lend Lease Communities (Wilton)	Asset owner (the Developer) - Responsible for managing design and construction of the housing development. - Responsible for managing design and construction infrastructure associated with transfer of sewage and supply of recycled water. - Responsible for insuring that plumbing installations under the housing development are compliant and are approved for use by the Bingara community. - Principal to which VWS is under Contract for operations and maintenance of the Bingara scheme under the License.
Cardno (NSW/ACT) Pty. Ltd.	Engineering Consultant directly employed by Lend Lease Communities for Design and Construction of Water and Sewer Infrastructure.
Veolia Water Solutions & Technologies (Australia) Pty Ltd (VWS)	Licensee Responsible as Network Operator and Retail Supplier of non-potable water to the Bingara Scheme, as defined herein (under O&M contract to Lend Lease Communities (Wilton))
Golf course owner	User of recycle water (Current owner of Golf Course is

	Lend Lease Communities (Wilton) Pty Ltd) Manages all aspects of Golf course irrigation and golf course irrigation networks, inclusive of irrigation water storage facilities.
Customers (Commercial and residential)	Customers discharging sewage to the sewer network (Households, small retail units and commercial establishments within Bingara Scheme) The end users of recycled water in the lilac network
Minister for Energy and Environment, NSW	Responsibilities for matters relating to resources,**energy**, utilities, and the **environment** and conservation
Environment Protection Authority (EPA)	Agent responsible for issue of the Environment Protection Licenses (EPL) to monitor and control Plant activities that could have an impact on the environment or human health, and that monitors compliance in relation to the impacts of emissions and discharges. The agency applies fines as required if there is a breach of NSW environmental laws.
Independent Pricing and Regulatory Tribunal (IPART)	Independent economic regulator for NSW. In this case administers the WICA legislation. Reports to Minister of Energy and Environment in relation to WICA license approval and ongoing audit and regulation of Licensed activities.
Department of of Water within NSW Department of Industry	WICA License Approver and Administrator of WICA Act
NSW Health (NSW Ministry of Health and Medical Research)	Supports the executive and statutory roles of the NSW Health Minister. Statutory body in relation to all health incidents for schemes operated under WIC Act
Office of Environment & Heritage (under Ministry of Planning & Environment)	Administers environmental and water legislation other than WICA including noise and air quality (odour)
Water NSW (Minister for Industrial Relations and Minister for Finance, Services and Property on Board)	Administers the Water Act and Water Management Act (established under an Operating License by IPART, came into being after merger of State Water Corporation and Sydney Catchment Authority)
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.
Sydney Metropolitan Water (under NSW Department of Planning, Industry)	Administers WIC Act, as necessary
Sydney Water (SWC)	Supplier of potable water
Contractors Engaged by Lend lease	Management / maintenance of community development,

	community irrigation networks , community support schemes e.g. Community Security, grounds maintenance etc
Specialist Contractors	Contractors employed by VWS to conduct specific / select and or specialist tasks.

5.2 Contractual and License Requirements

The relationship between stakeholders including under Contract and Regulation is illustrated in the following figure, figure 2. However, for the avoidance of any doubt, Design and Construction Phase has been completed and is presented for information purposes only.

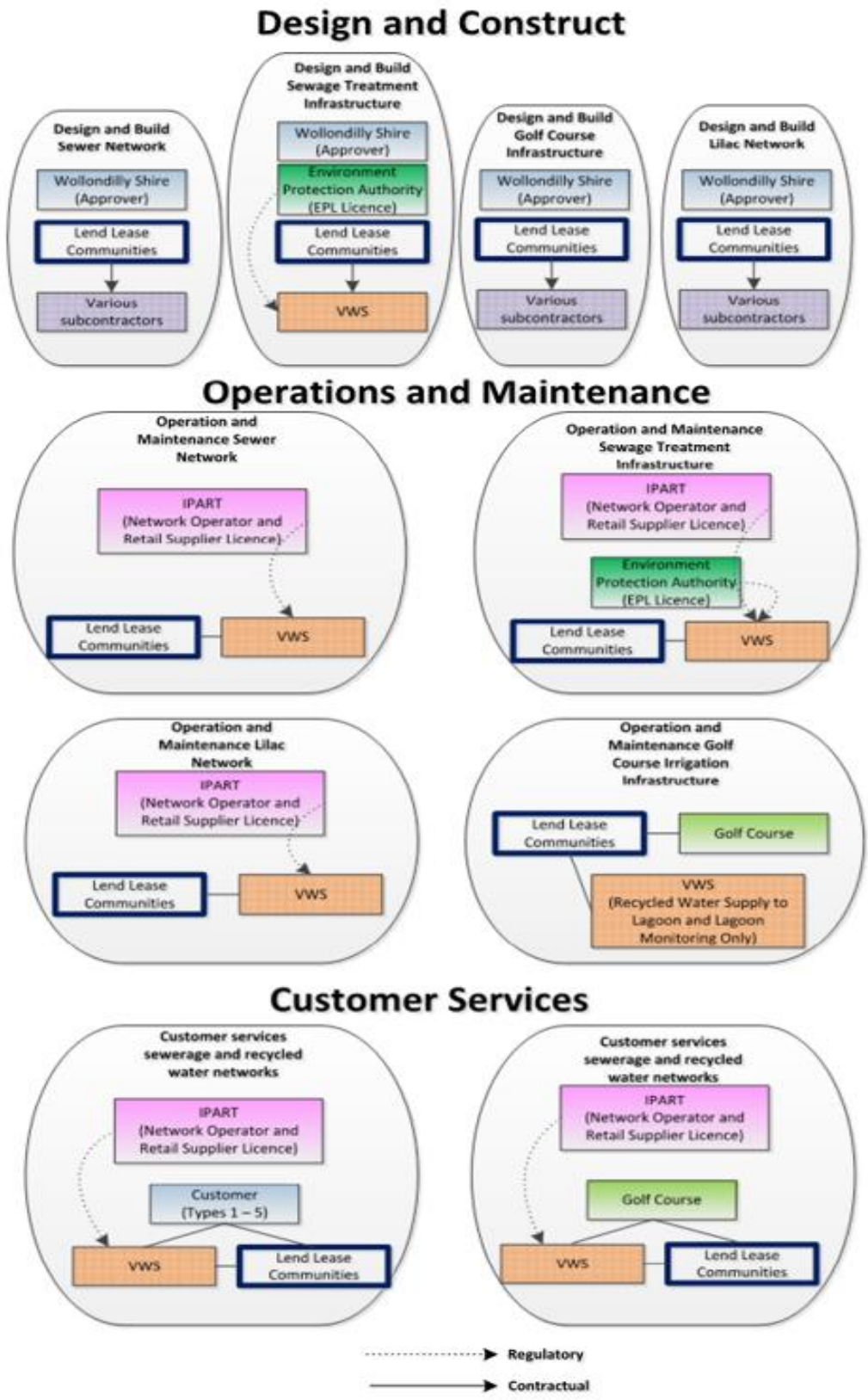


Figure 2: Contractual and regulatory relationships between stakeholders

5.3 Delineation of Responsibilities

The infrastructure delineation is provided Figure 3.

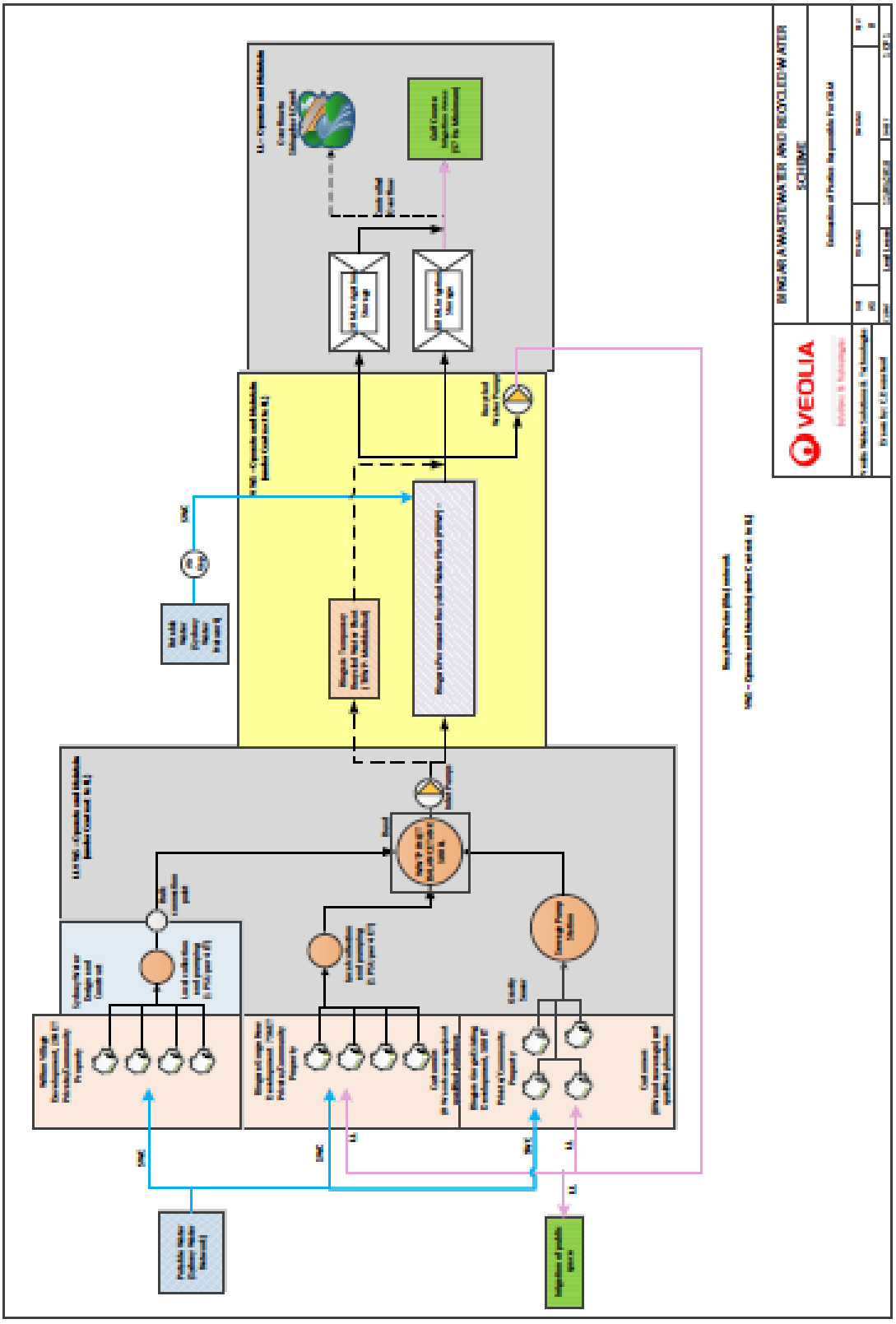


Figure 3: Design and Construct, and Operate and Maintain Infrastructure Delineation

5.4 Design and Construction

5.4.1 By Lend Lease Communities (Wilton); the Developer

Lend Lease Communities (Wilton) (Authorized Person on the Network Operator's License) is responsible for the design and construction of the following:

1. Gravity sewerage infrastructure including:
    - Sewage conveyance from individual house connections within the Bingara existing development to the gravity sewage pumping station (SPS) (complete);
    - The sewage pumping station (SPS) and sewerage conveyance infrastructure associated with transfer from the SPS to RWTP (Construction Complete)
    - Odour control facilities as required within the gravity sewer network (complete).

2. Pressure sewerage infrastructure for the Bingara development (with construction ongoing) including:
    - Infrastructure for sewage conveyance from individual house grinder pumps within the Bingara development to centralized pressure sewer units (PSU) shared between properties (generally one PSU per 4 properties.)
    - Pressure sewerage infrastructure for sewage conveyance from PSU to RWTP
    - Pressure Sewerage Units (PSU) communication networks for monitoring of the PSU's.

3. Wilton development sewage conveyance infrastructure from the single point of connection from the Sydney Water Corporation (SWC) pressure sewer (Construction Complete). Pressure Sewerage Units (PSU) communication networks for monitoring of PSU's within the Wilton development.

4. Civil works and services, including:
    - The wastewater treatment plant (WWTP) inlet storage tank and inlet feed pumps (Construction complete as current)
    - Wastewater treatment plant building (Construction complete)
    - Underground pipework and Services
    - Wastewater treatment plant services such as potable water and electricity, to the termination point

5. Irrigation storage:
    - All irrigation water lagoons for storage of recycled water for golf course irrigation including earthworks, aeration equipment, pumps, ancillaries and fencing.

6. Non-potable (lilac) infrastructure (present and future):
    - The non-potable water piping infrastructure (Lilac System) including supply and installation of customer recycled water meters.

5.4.2 By Sydney Water

Infrastructure for sewage conveyance from individual house grinder pumps within the Wilton development to centralized pressure sewer units (PSU) either individual or shared between properties (generally one PSU per property) to the connection point with the LL owned Wilton pressure sewer conveyance network infrastructure.

5.4.3 By VWS; the Licensee

VWS has been responsible for design and construction of:

1. The TRWP (design and construction includes process equipment only, excluding services and civil works); and

2. The PRWP (design and construction includes process equipment only, excluding services and civil works).

The TRWP process train is as follows:

- Inlet Screening system
- Ecodisks®
- Drum Filters
- Ultra filtration
- UV disinfection
- Chlorine (sodium hypochlorite) disinfection,
- Sludge Dewatering
- Odour Control
- Ancillary pumps and equipment.

The TRWP (now mothballed) is capable to produce a quality of water suitable for golf course irrigation.

The PRWP produces recycled water suitable for supply to residential houses in the lilac network and for unrestricted irrigation on public open spaces, as demonstrated by the design log-removal targets of pathogens.

Suitable measures have been implemented with Critical Control Points (CCPs) at the treatment plant to ensure these standards are achieved. CCPs are managed and monitored during the Operations and Maintenance phase of RWTP.

The PRWP process train is as follows:

- Inlet screening system,
- Equalization storage tanks,
- Activated sludge tanks and membrane tanks, or membrane bioreactors (MBRs),
- UV disinfection;
- Chlorine (sodium hypochlorite) disinfection,
- Sludge dewatering;
- Odour control; and
- Ancillary pumps, piping, electrics, instrumentation and controls.

The PRWP did not commence commercial operation until Ministerial Approval was obtained. Until such a time, the TRWP has continued to operate as the final treatment step prior to discharge to the irrigation lagoons.

During this time (up to 08 Dec 2017) TRWP was used for treatment of the effluent from PRWP (Completed, technically validated but awaiting Ministerial approval).

Upon Ministerial approval, the Bingara PRWP has commenced commercial operation and supply of recycled water produced to the lilac network and golf course irrigation storage.

The TRWP is currently mothballed and retained for supply of recycled water for golf course irrigation in the future.

Various Drawings are provided as follows:

- Appendix A - Overall Bingara System PFD and EPL Monitoring Points
- Appendix B - Bingara TRWP PFD .
- Appendix C - PFD / Mass Balance for Bingara PRWP.

5.5 Operation and Maintenance Only

VWS is responsible for operation and maintenance of items described in Section 5.4.1 and 5.4.2, including the network infrastructure constructed by others.

6 Treatment Infrastructure (Design and Construction)

6.1 Overview

This section covers the following aspects of the IOP, with specific regard to PRWP and TRWP*:

- Design and construction robustness (WIC Reg Sched 1 cl.6(1)(a) and/or cl.13(1)(a)):
  - Life-span of the infrastructure; and
  - System redundancy built into the infrastructure.

- Overview of Operation and Maintenance manuals (included under WIC Reg Sched 1 cl.6(1)(a) and/or cl.13(1)(a) and WIC Reg Sched 1 cl.6(1)(b) and/or cl.13(1)(b)):
  - System operating rules to operate the infrastructure in the most effective manner during normal and breakdown conditions.
  - Performance requirements for assets
  - Performance requirements / criteria for assets.

Termination points of treatment infrastructure are considered as follows:

- Downstream of the WWTP inlet balance tank and inlet pumps (the design and construct scope of Lend Lease Communities)
- Upstream of the recycled water (lilac) network to the Bingara Development.
- Upstream of the overflow discharge to the irrigation lagoon storage.

*Note: TRWP processes had been detailed extensively in earlier versions of IOP and may be referenced and read together with the shorter description provided here in Section 6.4.

6.2 Design Overview

Design principles were followed ensuring that the Project Specifications were met and Safety in Design achieved with regular reviews of documents.

This is the case for the PRWP (as was the case for the TRWP). Components of the design process included the following:

- Concept design, verifying basic requirements of the system and interaction between treatment plant, sewer and network (see the Sewage Management plan for details);
- Process Flow Diagram (PFD) – see Appendix A, B and C for the Overall Scheme, TRWP and PRWP respectively.
- Piping and Instrument Diagrams (P&ID's)
- General Arrangement drawings (GA's)
- HACCP of overall system – see the Sewage Management Plan for documentation of HACCP for the RWTP
- HAZOP of P&ID – conducted, with documentation available upon request.
- Equipment and device schedules and specifications –included in the O&M Manual.
- Civil Guidance drawings for third party civil consultants and contractors.
- Electrical drawings from single line diagrams through to detailed schematics.
- Control Philosophy – see Appendix of the O&M Manual
- PLC programming and FAT testing
- Issue for construction (IFC) documentation, and
- O&M manual
- Performance and Validation Testing

6.3 Raw Sewage Feed Sources and Quality

There are three sources of raw wastewater to the Bingara treatment infrastructure via the WWTP Inlet Feed (also known as RT tank) Tank:

- Gravity sewer catchment, discharging to the Bingara RWTP via a 200 mm PVC Sewerage Rising Main from the existing gravity SPS;
- Bingara Pressure sewer catchment, discharging to the Bingara RWTP via a 250 mm Pressure Sewer Main from the Bingara Gorge pressure sewer network;
- Wilton Pressure sewer catchment, 125 mm Pressure Sewer Main from Wilton Village pressure sewer network.

These networks and sewers have been designed and constructed by others but are operated and maintained by VWS. More detail on Sewerage Transfer Infrastructure is provided in Section 7.

The catchment area has been identified as residential, commercial and retail, with no industrial loading. Customers are required to adhere to customer contracts wherein they are not permitted to discharge to the sewer toxic or other materials not suitable for biological wastewater treatment. This mitigates the risk of raw sewage being of non-municipal nature.

Periodic composite sample analysis was undertaken for the Bingara Gorge combined influent. The range of potential sewage characteristics is outlined in Table 3 below based on composite sampling of raw sewage influent to the Bingara TRWP conducted in February/March of 2015 and November/December 2015.

The ranges are provided to indicate potential variation in concentrations based on available information. Ongoing monitoring on a weekly basis has been occurring to develop an understanding of the influent characteristics and potential changes, as the catchment is built out. Such monitoring frequency may be modified in future if found appropriate, no less than on a quarterly basis. Contingency measures have been allowed in the design (e.g. addition of acetic acid dosing) to meet recycled water quality objectives.

It should be noted that the TDS has been assumed to be higher than what the current monitoring data indicates, based on the expectation that there will be a recycle of TDS back to the Bingara RWTP from the Recycled Water network.

The risk of adverse effects on the treatment process due to illegal discharges of prohibited substances to the sewer is minimized due to the dilution effect. Community consultation are being provided by Lend Lease from time to time.

Lend Lease customer contracts clearly identify prohibited substances. Such information is also published on the dedicated website, community notice boards and email campaigns conducted by Lend Lease. Engagement may be increased as necessary to ensure that the quality of recycled water for Lilac supply is maintained.

Table 3: Raw Sewage Characteristics

Parameter	Units	Expected Raw Sewage
Oil & Grease	mg/L	< 50
Ammonia NH3-N	mg/L	30 –70
BOD5	mg/L	150 – 350
COD	mg/L	500 – 950
pH		6 – 8
SS	mg/L	250 – 550
TN	mg/L	50 – 95
TP	mg/L	8 – 15
Conductivity	µS/cm	<1800
TDS	mg/L	<1000

6.4 Bingara TRWP (for Information)

The plant was designed to operate at flow rates of 300 kL/day to an “Ecodisc” treatment plant with tertiary membrane filtration. Treated effluent from the plant is discharged to a 20 ML storage and used for restricted irrigation of the Bingara Gorge golf course.

At the Bingara TRWP, sewage was pumped to screening (1 mm) where large solids are removed.

Sewage was then pumped to the Veolia proprietary Ecodisc treatment units where biological breakdown of sewage occured. These units operated according to the level in the Ultrafiltration (UF) feed buffer sump.

The water leaving the Ecodiscs was filtered through a fine cloth drum filter prior to entering the UF feed sump to remove particles greater than 100 micron. A downstream 40 micron filter provided further screening of wastewater prior to the UF.

Drumfilter effluent was treated through the UF unit and stored in the UV feed buffer tank. The UF unit operated according to the level in the UV feed buffer tank so long as there was sufficient water available in the UF feed buffer sump. Non-chemical backwashing within the UF unit was automated based on timer settings with an overriding differential pressure set point to initiate backwash. Periodically the UF unit required a chemical clean in place (CIP) via the semi-automated CIP system.

Filtrate from the UF was pumped to ultraviolet (UV) disinfection, followed by chlorination (sodium hypochlorite dosing) and then to storage before discharging to existing storage area, to provide feed to the golf course irrigation lagoon for storage prior to irrigation (refer to the sewerage infrastructure section 12.2).

Wastes from the treatment system included backwash water from the UF and drum filter. The waste was collected in a waste sump before being transferred to the sludge thickener. Sludge thickening was by gravity, with sludge pumped out periodically from the bottom of the thickening tank, and clear water overflowing to upstream of the Ecodisc array.

Odour treatment was provided by way of negative draft on specific equipment and the plant room, discharging to atmosphere through activated carbon odour catchment facilities.

The temporary plant was used:

- For treatment of sewage during construction of the permanent plant (under NSW Operator's License No 10_012.)
- For treatment of effluent from the permanent plant during commission and proof of performance testing.

An O&M manual was developed for the Bingara TRWP, including the various expansions that have occurred to the plant since the initial installation. This O&M Manual content remains maintained for future reference and as a guide to the O&M activities. This is contingent upon the intended future status of the plant (e.g. activities required to maintain equipment, or acceptance that replacement equipment will be required if the plant is to run.)

6.5 Bingara PRWP

6.5.1 Process description

The Process Flow Diagram (PFD) in Appendix C shows the current key treatment components of process flow for the Bingara PRWP.

The PRWP process has been designed with two separate treatment trains for ease of construction and flexibility of operation. These were initially labelled Stage 1 and 2, however have been constructed in parallel.

There is also provision for a Stage 3 installation to be constructed as required based on the rate of growth in the catchment. This is expected to be required to service the 2000 ET in the catchment.

The hydraulic design basis for the Bingara PRWP is summarized in Table 4. It should be noted that the ratio of PWWF to ADWF decreases over the stages as the greater proportion of the flows is from the pressure catchment which has a lower peaking factor.

The screening and inlet works capacity has been designed to match the PWWF at each stage. Equalization Tanks are provided to smooth out the peak flows to the downstream process, as discussed in the next page.

Table 4: Summary of inflows and treatment capacity for each stage

Stage	ET	EP	ADWF (kL/day)	PWWF Hourly Flow to plant[1] (kL/day)	Screening / Inlet Works Capacity (kL/d)	No of MBR Trains	MBR and Disinfection Capacity - PWWF (kL/d)
1	900	2700	531	2403	2403	1	960
2	1540	4620	877	2879	2879	2	1920
Ultimate	2000	6000	1225	3219	3219	3	2880

[1] Based on 6 x ADWF from gravity catchment and 1.5 x ADWF from pressure catchment at initial flows expected

From the existing WWTP Inlet Balance Tank the wastewater is fed by Inlet Pumps to the Inlet Screens. The WWTP Inlet Balance Tank (Feed Tank / RT Tank) and Inlet Pumps are provided by Lend Lease Communities.

The inlet pumps and screens are sized to manage Peak Wet Weather Flows (PWWF) from the gravity sewer (assumed to have a PWWF of 6 x ADWF) and pressure sewer (assumed to have a PWWF of 1.5 x ADWF with minimal infiltration.) All inlet works are fully operational to ensure adequate Duty/Standby provision in screening.

From the screens, screened wastewater discharges via gravity to a transfer sump and pumped to the Equalization Tanks. These tanks provide effective storage of around 3 days during peak wet weather events to attenuate flows to the plant.

From the equalization tanks, screened wastewater is pumped to the activated sludge system. All wastewater is treated with Veolia's standard BioSep 2 M20 MBR's with modification specific to the application at Bingara. Each MBR system has a three-stage activated sludge tank (incorporating a de-aeration zone for recirculated sludge, a swing/anoxic zone for feed and an aerated zone) and two membrane tanks. Each MBR process train has a peak design capacity of 80 m3/hour (or 1.92 ML/d), providing 100% redundancy in the system at design wet weather flows. The MBR provides disinfection to some extent with log-reduction of pathogens across the membranes.

Disinfection in the Bingara PRWP is via a multiple barrier approach to achieve log reduction targets outlined in the Australian Guidelines for Water Recycling (2006) using Microfiltration membranes (in the MBR described above), Ultraviolet disinfection, chlorine contact tank and residual chlorination.

MBR effluent is discharged via gravity to filtrate tanks, and then pumped to the UV-system. Following UV-disinfection, treated water is discharged to the chlorine contact tanks for chlorination prior to transfer to the treated water storage. Chlorine dosing points are provided at the inlet to the chlorine contact tanks, the inlet to the treated water storage, and on each of the distribution lines from the treated water storage.

Odour treatment is achieved with extraction via fans from the following sources of foul air:

- Inlet screens
- Centrifuge
- Dewatered biosolids and screenings skips
- Transfer pump station
- Return pump station

And the following source of dilute foul air:

- Equalization tanks

Concentrated odorous gases are treated in an odour treatment facility designed to maintain <500 OU in treated air at the outlet.

Waste Activated Sludge (WAS) from the activated sludge tanks are pumped to a centrifuge for dewatering. Following dewatering, sludge is transferred via a conveyor to a completely covered and sealed sludge storage bin. Dewatered sludge is periodically trucked offsite.

The detailed P&IDs and general arrangement drawings are available with VWS. Schedules of Mechanical Equipment, Valves and Instruments are contained in the O&M Manual and are being attended to as CMMS Maintenance Schedules.

6.5.2 Redundancy

Key mechanical equipment is provided as Duty/Standby for the Bingara PRWP. The continued availability of the facility to provide recycled water and treat sewage is critical to the success of this infrastructure. Features of the design include:

- Installed standby for all critical equipment.
- Emergency (generator) power supply permanently installed onsite to maintain continuous operation during power failure.

The plant is designed to have a minimum of 95% availability with sufficient storage provided in the inlet feed tank and the equalization tanks to ensure that plant has no overflows during any maintenance periods. Additional storage is available within the gravity Sewer Pump Station.

The following are provided, by Lend Lease under the O&M Contract and a register of these spares is kept as part of the asset management process:

- Critical spare parts for all non-critical equipment.
- Shelf spares for all critical instruments, valves and fittings.

Maintenance activities accommodated in the plant design include:

- Membrane cleaning, pinning and repairing: Provided with two membrane trains designed to handle 100% of the ultimate hydraulic load for a period of 24 hours, and the capacity to operate either membrane train with both bioreactors in service (splitting return flows from one membrane train to two bioreactors.)
- Mechanical servicing of pumps, dosing pumps, mixers and blowers: Provided with “n+1” redundancy on critical equipment.
- Cleaning of air diffusers with formic acid (during operation with injection to aeration pipework);

- Cleaning of air diffusers (out of operation) with capacity to pump out the bioreactors to the equalization tanks for servicing purposes.
- Calibrations, with allowance in access to maintenance and shelf-spares for critical instruments.
- UV reactor lamp cleaning: Duty / Standby UV Reactors.
- Plant storage capacities.
- Breakdowns: Dial-out alarms and 24-hour response to critical alarms from operators, and "n+1" redundancy on critical equipment.
- Remote dial in and remote interrogation functionality.

An overview of major equipment and Duty/Standby status is provided in Table 5. .

Table 5: Redundancy Table Bingara PRWP

Equipment	Configuration
Screen Feed Pumps (Existing)	Duty / Standby
Return Pumps	Duty / Standby
Equalisation Tank Feed Pumps	Duty / Standby
Equalisation Tank Mixing Pumps	Duty / Standby
AS Feed Pumps	Duty / Standby
Membrane Tank Feed Pump	Duty per Membrane Tank with 100% Duty Standby in Membrane Tanks (effectively Duty/Standby)
Filtrate Pumps	Duty / Standby
Chlorinated Water Pumps	Duty / Standby
Residential Pumps	Duty / Standby
Backwash Pump	Duty / Standby
Ferric Dosing Pumps	Duty / Standby
Sodium Hypo Dosing Pumps (to Chlorination Tanks)	Duty / Standby (Shared)
Sodium Hypo Dosing Pumps (to pre- treated water tanks)	Duty / Standby (Shared)
Sodium Hypo Dosing Pumps (to Residential Network)	Duty / Standby (Shared)
Sodium Hypo Dosing Pumps (to Irrigation Network)	Duty / Standby (Shared)
Polymer Dosing Pump	Duty / Standby
WAS Pumps	Duty / Standby
Sample Pump	Duty, Redundancy is sampling off alternate treated water line to Recycled Water Network
Inlet Drum Screen	Duty / Standby
Drum Screen Screw Press	Duty / Standby
Activated sludge mixers	Duty/Duty per activated sludge tank Standby is Operation of Diffused Aeration in AS Tanks (all equipped with diffusers)
AS Blowers	Duty/Duty/Standby
Odour Fans	Duty/Standby
Membrane Tank Blowers	Duty per Membrane Tank with 100% Duty Standby in Membrane Tanks (effectively Duty/Standby)
UV Units	Duty / Standby
Centrifuge	Duty, Redundancy is capacity to cease WAS removal from AS tanks

	for at least 3 days, and ability to truck un- dewatered sludge offsite
Centrifuge screw conveyor	Duty, Redundancy as above (for centrifuge)

6.5.3 Occupational Health, Safety and Environment

Occupational Health, Safety and Environment are regularly assessed during operations and maintenance of the Bingara RWTP through the following processes:

RWTP

- An assessment of hazards and operational risks was addressed for the Bingara RWTP in a HAZOP workshop during Design Phase and VWS refers to this as required
- Public health and environmental related risks and critical control points (CCPs) were addressed in a HACCP workshop during Design Phase (see the Sewage Management Plan for details.)

Further, an EHS Management Plan has been developed for the Bingara RWTP for operations and maintenance, attached in Appendix 9 of Bingara Gorge Retail Supply Management Plan (RSMP) Appendix 9. This plan sets out how VWS manages the Environmental and OHS requirements for all site activities to ensure the health safety and welfare at work of all VWS employees and to ensure that third parties (including subcontractor employees) are not exposed to risks to their health and safety while they are at theWorkplace.

Before commencement of Commercial operation of the PRWP, a number of Operational based risk assessments have been conducted, in collaboration with Lend Lease including

- Safety
- Environmental
- Operational

For the avoidance of any doubt, these are the updated risk assessments, following risk assessments undertaken in August 2016 with the involvement of all stakeholders; while PRWP was under construction and TRWP was in operation.

6.5.4 Design Life of Assets

The design life of all assets provided by VWS as part of the Bingara PRWP is summarized in Table 6.

Key asset performance requirements, e.g. flow rates, pressures, are summarized in the equipment data sheets, included in the O&M Manual. Equipment performance has been verified against data sheet requirements during commissioning. Key performance requirements are monitored and assessed on a regular basis to inform any decision regarding asset maintenance.

Table 6: Required Design Life of Assets

Design Component	Design Life (years)
Steel frames and supports	>25
Pipework, fittings and valves	>20
Instruments	>15
Electrical	>20
Control	>15
Chemical storage tanks	>20
Membranes	>5
Protective coatings	>15

VWS has been implementing operations and maintainance phase with the help of an asset management software, a Veolia proprietary software called 'VAMS' (also known as Gamma). The software has been programmed from supplier maintenance recommendations, Veolia service experience and existing Veolia plant operations from a number of Veolia operated sites.

In co-ordination with Lend Lease, VWS improves and refines the installed system throughout the operations phase as appropriate. Periodic maintenance tasks are conducted as per a system generated Work order. Ad-hoc maintenance tasks are entered into the system for future development and initiation of work orders.

Work orders are used to track all maintenance activity conducted on assets, tasks conducted, maintenance steps, date and time taken to complete each system generated work order.

Spares are provided by Lend Lease under the O&M Contract and managed as part of the O&M asset management procedure.

VWS Operations, in co-ordination with Lend Lease, develops asset management and spares availability for the networks on the same basis.

6.5.5 Construction, Commissioning and Performance Testing

Good construction principles and practice in accordance with VWS construction procedure were followed for the construction, commissioning and testing of the PRWP:

VWS Construction adhered to the following procedures under the VWS OH&S systems and requirements of LLU:

- Construction safety and environmental management (Construction stage OHSE Plan);
- Method and order of construction;
- Program from mobilization to demobilization;
- Organization and position responsibilities (Construction stage OHSE Plan);
- Materials receiving, storage and issuing procedures;
- Construction and installation execution following approved safe work method statements (SWMSs); and
- Construction Quality; construction installation integrity ITPs.

The Bingara PRWP was commissioned according to the documented Commissioning Plan, presented and approved by Lend lease. VWS commissioning procedures had considered the following:

- Safety and environmental requirements including SWMSs, lockout-tag out
- Organization and responsibilities,
- Sighting of construction installation integrity ITPs to ensure safe to energize
- Logical multidiscipline commissioning approach using inspection and test plans (ITPs) for planning, execution and records:
- Electrical energization, and post energization testing
- No-load testing (device, package and system functional testing),
- Operations stabilizing, preliminary optimization,
- Training of operations and maintenance staff as necessary to assist and carry forward to performance testing.

As outlined in Section 4.4, a 4-week Performance and Validation Testing period for the Bingara PRWP was completed; the results from this Testing was used to demonstrate that the plant met all performance requirements necessary for commercial operation. Sampling and testing undertaken during this period was outlined in the Performance and Validation Reports. Throughout the testing period, operations staff were involved and trained in all aspects of the plant operation.

6.6 Operation and maintenance manuals

An Operation and Maintenance (O&M) manual for the PRWP was prepared and was duly approved by LLU and is currently available at the PRWP plant for use by operations staff.

An overview of the Bingara PRWP O&M Manual structure is as follows:

Section 1: Introduction
Section 2: System Overview
Section 3: Safety
Section 4: Equipment Operation
Section 5: Functional Description
Section 6: Process Description
Section 7: SCADA Outline
Section 8: Troubleshooting
Section 9: Sampling and Testing
Section 10: Safety Data Sheets
Section 11: Maintenance
Section 12: Drawings
Section 13: Driven Equipment Schedule
Section 14: Instrument Schedule
Section 15: Valve Schedule
Section 16: Supplier Details
Section 17: Spare Parts
Section 18: Warranties

7 Sewerage Transfer Infrastructure (Design and Construction)

7.1 Scope

As outlined in Section 5.4, the design and construction of the sewerage and recycled water network has been the scope of Lend Lease Communities (Wilton) without involvement of the Licensee in any way during design and construction.

Lend Lease Communities (Wilton) had engaged specialist consultants / subcontractors to design and construct the following infrastructure:

- The gravity sewerage system, collection tank and transfer pump station (VKL Consulting);
- The pressure sewerage system (Pressure Sewer Solutions);
- The Lilac system (VKL Consulting); and
- Irrigation (golf course) storage lagoon

These items of sewerage infrastructure continue to be designed and constructed in stages in line with Bingara Gorge Development's progressive growth, in-line with the relevant overall planning strategy and develop approvals for the development. A copy of the Master Plan for the community is available through LLU.

Operation and maintenance of all these networks is covered under VWS' License Conditions.

Lend Lease Communities (Wilton) has contracted a separate entity for Operation and Maintenance of Golf Course (infrastructure beyond the Golf Course Storage Lagoon within the Golf Course boundary) and management of the irrigation storage to the golf course operators. (Refer as stated in Article 4.2 (b) of this Plan)

For reference, a description of the existing gravity catchment and pressure sewer network is provided below.

7.2 Sewerage Collection System

7.2.1 Overview

The Bingara scheme includes collection of wastewater as follows:

- Existing gravity sewerage catchment already constructed to service existing development draining to one sewage pump station (SPS)
- Future pressure sewer network for all new connections in Bingara Gorge, including:
    - Bingara Gorge: Up to 4 lots drain by gravity to each pressure sewer pump unit (PSU), design and construct by Lend Lease Communities (Wilton)
    - Wilton Village: One PSU per lot, design and construct by Sydney Water Corporation.

7.2.2 Existing Gravity Sewerage Network

The existing gravity sewerage catchment was constructed during the first phase of residential development.

The existing gravity catchment services an approximate population of 1500 EP (500 ET).

All wastewater in the gravity catchment, drains to a single sewage pump station (SPS) located adjacent to a tributary of Stringy Bark Creek on Greenbridge Drive.

The SPS currently pumps through an existing 200 mm rising main that runs along Fairway Drive, reduced to 180mm on Stirling Drive and then finally 335mm to transfer sewage to the Bingara RWTP.

Drawings of the gravity sewerage lines are available on GIS database. Generally these sewers are located on private land, community land with some sewer lines crossing public roads within an easement. Each property has a sewer connection point at the gravity sewerage main. House service pipelines connecting to this point are the responsibility of individual owners of the property.

Drawings of in ground services are available on 'Dial to Dig', as uploaded under the responsibility of LLC. These drawings continue to be amended and updated as the community develops.

The following drawing references are provided. These drawings are also located on VWS's server outlining the configuration of the gravity sewer network and infrastructure:

5505-06-201 to 202	Sewerage reticulation layout sheets 1 to 2
5505-06-203 to 207	Sewerage longitudinal sections sheets 1 to 5
5505-06-214	Sewerage pump station SPS2 detail
5505-05-208	Sewerage pump station SPS2 access track layout
5505-05-209	Sewerage pump station SPS2 arrangement and electrical conduits
ME209-02	Bingara Gorge – Wilton Sewer Pump Stn SPS2
ME209-04	Wet Well and Valve Pit Pipework Connection
CT986 – 203	Private Sewage Pumping Station Sewage Pump #2 Schematic Diagram
SV302 H1	Transfer pumps data sheets and pump curves

7.2.2.1 Redundancy and Emergency Operating Measures in Design

The Gravity SPS is provided with the following redundancy and emergency operating measures:

- A generator to continue pump operation in the event of power failure;
- Duty/Standby pumps (with automated changeover) to manage breakdown and maintenance events;
- Level monitoring with alarms in the SPS and approximately 110 kL of emergency storage (~ 1 hour storage at peak flows) associated with the SPS; and
- Capacity to pump-out sewage from the SPS as an emergency measure if the system is inoperable or required to operate beyond capacity.

A more comprehensive overview of the operating principles for the Bingara Scheme

under various wet weather and emergency scenarios is provided in the combined Water Quality and Sewage Management Plan.

7.2.2.2 OHS Confined Space Caution Note

The SPS, and associated 110KL storage tank, maintenance pit, pump pit and valve pit are all classified as confined spaces. Entry is prohibited without proper planning and the preparation of safe work method statements and confined space entry permits in place. Only qualified personnel having the applicable confined space training, PPE and RPE are permitted to enter under strict supervision and monitoring.

7.2.2.3 Design Life of Gravity Sewer Infrastructure

Design Component	Design Life (years)
Pipework, fittings and valves	>20
Instruments	>15
Electrical	>20
Control	>15
Mechanical	>20

7.2.3 Pressure Sewer Networks

There are two separate pressure sewer networks as outlined above. Operation of the Bingara Pressure Sewer Network includes operation of the PSU connection point for private households.

For the Wilton Pressure Sewer Network, operation of the PSU is outside the scope of this IOP, with operations only included from the connection point to the Sydney Water asset at Hornby St.

The following documents are referenced for details of the design and operation and maintenance of the pressure sewer networks, these are provided in:

- Bingara Gorge – Highlands Pressure Sewer Network, Interim Operating Procedure, March 2015 (Cardno)
- Wilton Pressure Sewer Transfer Main, Detailed Design, September 2013.

Detail on the pressure network configurations, provided in the referenced reports.

The pressure sewer network provides the following benefits to the Bingara Scheme:

- Reduced groundwater infiltration.
- Reduced stormwater infiltration.
- Peak flows into the Bingara RWTP can be minimized by the control system using the buffer storage capacity provided in each pressure sewer pump unit (PSU), with each PSU providing a minimum of 24-hours emergency storage.
- Reduced peak design capacity of the WWTP.
- All wastewater is macerated using grinder pumps before entering the pressure sewer network reducing the potential for blockages of pipe work and WWTP inlet screens.

7.2.3.1 Bingara Gorge Network

The Bingara Gorge pressure sewer network is designed with a maximum of 4 lots per PSU. The PSU and the entire pressure network up to the property connection point are owned by Lend Lease.

The Bingara Development pressure sewerage system has been designed by Pressure Sewer Systems Pty Ltd. The design of the system addresses the following:

- Topography
- Peak flows including wet weather
- Assignment of duplex and simplex units
- Maximum desirable total discharge head
- Friction loss factors
- Sewage flow velocities
- Swimming pool backwash discharges
- Odour control
- Water hammer
- Low voltage interruptions
- Air management and
- Storm allowance

7.2.3.2 Wilton Village Network

The existing Wilton Village pressure sewer network discharge to the plant inlet balance tank via the 125 mm pressure sewer main (as outlined in Section 7.2.2 above.) Sydney Water owns all assets upstream of the connection point on Hornby St. Lend Lease owns the 125 mm pressure sewer main downstream of the connection point.

The PSUs in the Wilton network are identical to the Bingara Gorge network and is connected to a central SCADA system at the Bingara RWTP. This allows VWS to monitor and control the Wilton Village pressure sewer network during operation.

Lend Lease is responsible for provision of Operation and Maintenance (O&M) services for sewage to Wilton Village under a contract with Sydney Water, and VWS has been contracted by Lend Lease to undertake these services. (as outlined in the report "Boundary Conditions for Wilton Connection to Bingara Gorge" (Pressure System Solutions Pty Ltd, April 2013).)

7.2.3.3 Redundancy Built into System

The pressure sewer network is provided with the following redundancy and emergency operating measures:

- 24 hours storage in each PSU;
- Level indication to alert of overflow of PSU; and
- Capacity to manually access and pump out at each PSU in the event of pump failure/blockages.

7.2.3.4 Design Life of Pressure Sewer Infrastructure

Design Component	Design Life (years)
Pipework, fittings and valves	>20
Instruments	>15
Electrical	>20
Control	>15
Mechanical	>15
Tanks	>20

8 Recycled Water Infrastructure (Design and Construction)

8.1 Lilac Recycled Water System

The Lilac Recycled Water system is designed to provide recycled water produced by the treatment infrastructure to customers for toilet flushing, garden irrigation and laundries (if customers elect to have laundry connected.)

Prior to the plant being provided with Ministerial approval, potable water supplied by Sydney Water Corporation (SWC) was used in the Lilac System by way of a temporary connection.

Upon commencement of commercial operation, i.e. delivery of Recycled Water into the network, an air gap was introduced within the above temporary connection assembly, inspected and approved by SWC. The air gap was introduced by means of removal of a small section of pipework.

The introduction of this air gap ensures there is no cross connection between the Lilac system network and potable water systems network downstream of the SWC connection.

The original design of the Lilac system for the Bingara Wastewater and Recycled Water System was undertaken by VKL Consulting. The construction of the system is complete for residential areas already constructed; with the design accommodating the required ongoing and future expansions and community development.

The Lilac system pressure is designed to be less than the SWC mains pressure, including allowance for fluctuations within the potable and Lilac networks.

Annual cross connection testing is being conducted at residential meters to ensure no cross connection of the potable network and recycled networks at these junctures.

A register of customer recycle water meters is maintained, by Lend Lease, in the electronic files including customer name, address, meter number, meter serial number and original calibration certificate. Lend Lease are responsible to ensure that plumbing installations are fully compliant and have been approved by Wollondilly Shire Council, prior to the installation of recycled meter sets and introduction of recycled water to residents.

8.1.1 Redundancy Built into System

The recycled water network is provided with the following redundancy and emergency operating measures:

- 100% standby capacity at the residential pump station to ensure continuity of supply;
- Capacity to top up the treated water tanks at the Bingara PRWP in the event of shortfall in supply of recycled water; and
- Measures to prioritize recycled water provision to households with shutdown of irrigation in the network during high demand periods.

8.1.2 Design Life of Recycled Water Network Infrastructure

Design Component	Design Life (years)
Pipework, fittings and valves	>20
Instruments	>15
Electrical	>20
Control	>15
Mechanical	>15
Tanks	>20

8.2 Recycled water storage lagoon

Recycled water storage lagoons for golf course irrigation include:

- A 60 ML HDPE lined recycled water storage lagoon; and
- A 20 ML clay lined recycled water storage lagoon.

Under normal operation, these lagoons are used to store surplus recycled water effluent from the Bingara RWTP until it can be supplied to the golf course for irrigation.

The recycled water storage is designed to store surplus irrigation of water during periods when irrigation is not possible due to certain conditions e.g. rainfall, elevated soil moisture, high wind etc.

The key infrastructure associated with the golf course irrigation water storage, includes the following:

- Storage ponds for storing recycle water storage for Golf Course irrigation,
- The gravity line from the treatment infrastructure to the golf course storage pond,
- Standby water tank for SWC potable water for Golf Course irrigation,
- Pump sump and discharge lines for recycle water to Golf Course irrigation
- The future administration building and associated pump station.

  Note: There is presently no fixed infrastructure provision to return the water from the storage ponds to the plant for re-treatment should the water become out of spec. Temporary pumps and pipework will be utilized if the need arises.

9 Strategic Service Planning

9.1 Overview

This section covers Strategic service planning including (WIC Reg Sched 1 cl.6(1)(b) and/or cl.13(1)(b)):

- Required levels of service (including future growth in customer base and/or demand and documented performance targets).
- Security of supply or service provisions (including inherent reliability, redundancy, alternative sources of supply or service, emergency management and business continuity).
- Whole of life cycle cost evaluation.

9.2 Bingara RWTP

Forecast growth in the catchment is monitored in conjunction with Lend Lease against actual growth and the quantity (flow) and load (organic and nitrogen content) of sewage to determine future planning requirements for upgrade of the Bingara RWTP This is outlined in the Water Quality and Sewage Management Plan.

O&M Process Records are kept of the incoming loads to the plant, and tracked against the number of connected tenements to forecast future infrastructure requirements.

As indicated on site drawings, space has been allowed for a “Stage 3” upgrade of the Bingara PRWP. The implementation of Stage 3 is dependent on:

- Tracking actual growth in the catchment – with installation expected to be complete prior to reaching 1540 equivalent tenements (ET);
- Analysis of flows on a per capita basis.
- Analysis of loads (in particular organics and nitrogen) on a per capita basis.
- Assessment of plant performance on a load/flow basis.

Security of supply for the Bingara RWTP is addressed under:

- Section 10.8.1.
- Design system redundancy, summarized in Section 6.5.2.
- Storage and system details as provided in the Sewage Management Plan.

9.3 Gravity Sewer Network

The gravity sewer network is fully constructed. No future planning applies. Security of services for the gravity system is addressed in Section 7.2.2.

9.4 Pressure Sewer Network

The future planning of the pressure sewer network and security of service is outlined in the following:

- Bingara Gorge Pressure Sewerage System Masterplan Report (May 2019); and
- Bingara Gorge Master Plan Addendum 1: Option B8 High Level Assessment

(Wilton Water Utility Pty Ltd Pty Ltd, October 2013).

9.5 Recycled Water (Lilac) Network

The future planning of the recycled water (lilac) network and security of service is outlined in the following: Recycled Water Masterplan, Bingara Gorge Development (Cardno, 2014).

9.6 Whole of Life Cost Evaluation

Lend Lease, as Asset Owner, is responsible for whole of life cost evaluation of the scheme.

Lend Lease continues to monitor whole of life cost evaluations and adapts its financial models for Bingara Gorge Development.

Veolia reports to Lend Lease all necessary information required for financial modelling.

10 Level of Service

10.1 General

The general service obligated under the License and as detailed in the O&M contract between VWS and Lend Lease Communities (Wilton). This contract broadly outlines the Services included as follows:

- Supply recycled water services to lots in Bingara Gorge;
- Supply recycled water to Lend Lease operated irrigation storage ponds for golf course irrigation
- Take and treat waste water from Bingara Gorge and Wilton Village; and
- Any other services, as outlined in the contract and or as instructed and agreed with Lend Lease, required for the operation, maintenance and repair of the Infrastructure.

10.2 Treatment Capacity and Performance Criteria

The combined Water Quality and Sewage Management Plan provides details of the treatment capacity and effluent quality that will be provided at the Bingara RWTP.

10.3 Availability

10.3.1 Bingara TRWP and PRWP

The TRWP is currently mothballed.

The Bingara PRWP is designed with 95% availability with sufficient storage provided in the WWTP Inlet Balance Tank and Equalization Tanks tank to ensure that plant has no overflow during any maintenance periods based on the maximum design flow. Additional storage may be installed as required to manage the ultimate capacity requirements of the system.

In addition, the plant is designed with 3 ML of storage in the treated water tanks. This ensures a reliability of supply to the recycled water network during shutdown and

maintenance periods.

10.3.2 Scheduled Outages

For the Bingara RWTP, VWS develops the best estimate of planned outages on a regular basis, usually monthly, when storages and potentially potable water backup supply, are required to ensure continuity of service.

VWS uses reasonable endeavors to ensure that during any Financial Year:

(1) each individual scheduled Outage does not exceed 12 hours; and
(2) the aggregate of all scheduled Outages does not exceed 24 hours.

VWS uses reasonable endeavors to ensure that any scheduled Outage does not occur during any of the following periods:

(1) any public holidays declared by the NSW Government in New South Wales;
(2) each Thursday immediately prior to Good Friday, and each Easter Sunday; and
(3) each period from and including 20 December to and including the immediately following 5 January.

Lend Lease and VWS will communicate and agree on the suitable time and duration of any interruption to service. Lend Lease will provide all necessary notifications and communications to residents and community who may be impacted by any scheduled outage.

10.4 Site Attendance and Response

For the existing infrastructure, VWS has been managing the site attendance and response by a blend of physical attendance and remote access for technical and administrative matters, as per provisions within the current O&M contract between VWS and Lend Lease, for the RWTP.

The current O&M contract between VWS and Lend Lease encompasses RWTP together with networks infrastructure, demarcation points and details further specifics on the level of service required in terms of attendance and response; some salient features are as follows.

10.4.1 Site Operations

Operation and monitoring of the plant 24/7 in accordance with the plant operating procedures and performance criteria.

10.4.2 Call Centre

There is a provision of 24/7 call / service centre availability to receive contact for both the end user customers and Lend Lease, and provision of a report to Lend Lease for all events logged on a monthly basis (also available to IPART if requested). Refer to the monthly report prepared for Lend Lease.

10.4.3 Service support

a) Plant checks and maintenance as outlined in O&M manuals for specific

equipment, and developed into an overall O&M manual for the site.
b) All necessary plant maintenance/optimization.
c) Asset management software for plant assets, extendable to include network assets.
d) Calibration and maintenance of testing and analysis equipment.
e) Availability of a Plant Manager or his delegate available to be present onsite during Monday to Friday between 0800 – 1600.

10.4.4 Response Times

Compliance with the following response times for all service requests or plant failures.

Normal Hours:	First Response within 30min
After Hours "Dial In":	60 Minutes
After Hours Attendance:	240 Minutes (Plant Failures Only)

"First Response" is defined as the point at which the event has been acknowledged by the Operator and the Operator has provided an estimate time of starting the works associated with the event. The operator may choose to attend non-critical 'Service Requests' within the next 24hr period.

All information for each job or single event shall be logged with "Call Log Time/Date", "Call Attendance Time/Date" and "Call Complete Time/Date". The Operator shall on a monthly basis provide performance data with regards to response times.

Response times for Wilton Sewer networks via Sydney Water are outlined within Sydney Water response time protocols and is dependent upon the level of priority, received from Sydney Water call centre.

10.4.5 Management Meetings

a) Six initial monthly site meeting upon start of operations with Lend Lease operational management.
b) Subsequent to this, quarterly contract / operations review meetings with Lend Lease operational management.

10.5 Complaint Handling

Consumer complaints are and will continue to be jointly managed between VWS and the LLU. LLU currently manages all operational related customer interface and communication matters. LLU currently manages all financial customer matters including tariff setting and debt recovery; keeping VWS as Licensee fully informed.

There is and will continue to be a 24/7 call / service centre available to receive contact for both the VWS and end user customers. The call centre is a dedicated call phone number, fax and email address for VWS. The Call Centre is and will continue to be responsible for end user complaints relating to the Infrastructure Scope of Service, complaint tracking and resolution and escalation points. VWS provides and will continue to provide a summary of all events logged on a monthly basis to LL.

10.6 Spare Parts, Consumables and Chemicals

It is and will continue to be the responsibility of VWS to:

- Manage the spare parts inventory onsite.
- Procurement / availability of spare parts is on approval of Lend Lease.
- Manage chemical deliveries to site
- Minimize chemical quantities kept on site
- Optimize plant chemical consumption
- Follow all WHSEQ requirements for all chemicals

Systems have been designed with a minimum of 30-days chemical storage at peak demand to minimize the frequency of chemical deliveries. The Standard Maintenance Procedure for chemical deliveries is outlined in the O&M Manual for the Bingara PRWP.

All chemical deliveries are to a road area bunded with a speed hump and one side and draining at the other.

All requirements for maintenance of the odour treatment system will be adhered to with carbon change-outs as required as the media becomes exhausted to ensure compliance with EPA requirements for odour at the site boundary.

10.7 Standard of Service (KPI)

The standard of performance are measurable as in terms of key performance indicators (KPIs) as in Table 7.

Table 7: KPI for Standard of Service

KPI	Target	Method of Assessment
Safety	No lost time injuries	LTIs incurred/reported
Environment	No environmental incidents	Incidents incurred/reported
Recycled Water Quality	Samples taken as per WICA License specification requirements.	Independent water analysis
	Recycled effluent to achieve log removal requirements as required	Compliance with CCP targets, (and CCP limit response as required)
System Performance	Maintenance events will be managed with: • 100% D/s capacity on membrane systems and critical mechanical equipment • 2 ML storage in equalization tanks (feeding the biological process) • 3 ML storage in treated water tanks (storage available to supply the recycled water network) • 80 ML in irrigation storage for the golf course	Review of plant availability hours and ability to meet requirements for recycled water supply.
Maintenance	All work detailed in the O&M contract as required to achieve safe and effective performance	Review of quarterly reports
Customer service (operational)	Operational calls answered 24/7. Immediate response by VWS&T call centre. Telephone call back within 30 minutes from VWS&T staff Emergency call-out response within 6hrs	No sewage overflows

	Non-emergency call-out response within 24hrs	

10.8 Continuity of Service

10.8.1 Continuity of Sewerage Services

Continuity of sewerage services has been addressed in the following:

- Throughout the network (detailed in the Combined Water Quality and Sewage Management Plan), including:
    - Storage in pressure sewer units (up to 24hours).
    - Storage in the gravity catchment SPS
    - A standby generator for the gravity catchment SPS.
- At the Bingara RWTP (outlined in detail in the Sewage Management Plan), including:
    - 300 kL storage in the WWTP inlet balance tank.
    - 2 ML storage in Equalization Tanks, with inlet screens sized for peak wet weather flows.
    - A standby generator for the Bingara TRWP & PRWP

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 HACCP appended to the Water Quality and Sewage Management Plan. This includes risk mitigation measures provided are adequate to ensure the continuity of sewage services.

10.8.2 Continuity of Recycled Water Supply

Continuity of recycled water supply services to the residential network dual reticulation system has been addressed in the following:

- Redundancy available in the recycled water pumps configuration (with 3 pumps, and D/S for the larger capacity pumps.
- Controls to prevent exceedance of the critical control points (CCP) and therefore ensure continuity of supply from the recycled water tanks. The level of service of recycled water supply is guaranteed by the automated critical control points (CCP) that ensure the supply system is shut down prior to CCP being exceeded CCP critical limit being reached, as detailed in the Water Quality Management Plan.
- Top-up supply of potable water from Sydney water to the treated water tanks for high-demand days, using an automated overnight top-up system.
- Ensuring reliability of supply with measures for prioritizing usage to houses, including:
    - The system that prioritizes feed to the lilac network with discharge to the golf course irrigation lagoon via overflow.
    - Mechanisms to cease irrigation of public spaces if there is a shortfall in supply to the lilac network.
    - Stormwater supply option to the golf course if necessary.

10.9 Emergency Response Plan

VWS has developed a Site Specific Emergency Preparedness and Response Plan (EPRP) which forms an integral part of RSMP for the Bingara RWTP. This plan addresses all events and circumstances that could adversely affect the operation of the RWTP and sewage infrastructure.

In addition to this site specific EPRP, VWS complies with a business-wide EPRP in practice (BR01 Emergency Preparedness and Response Plan) together with relevant

corporate plans / Guidelines and Tools, available for reference within VWS corporate BMS, e.g. BR09: Incident Management Procedure, BR09-GU01 – Return to Work Guideline, BR09-GU02 – Incident Investigation Guideline etc.

Emergency Response process of VWS identifies critical risks associated and provides a sequence of actions to be followed by VWS responsible person in case of each emergency.

11 Asset Management

11.1 Asset Register

The Project asset register has been developed during discussions between Lend lease and VWS prior to the commencement of commercial operation and is available with VWS. Assets have been specifically outlined within the Asset management software (VAMS). Addition of other assets within the VAMS system is ongoing. It is envisaged that network assets will be progressively added during the operations phase and as the community development continues. Notification of some of assets (such as PSUs) coming on-line will be provided by Lend Lease from time to time.

Criticality of these assets will form the basis for procurement of essential spare parts, via approval from Lend Lease.

VWS Operations refers to these documents and improves upon this in terms of optimization of the spare parts inventory, in co-ordination with Lend Lease. VAMS, O&M, Plant PID drawings include a list of assets by tag number along with basic physical data.

VWS Operations and Lend Lease work together to establish an asset list for the sewer and recycled water networks (based on existing information from ArcGIS and further information to be provided by LL). It is envisaged this list will be used for creation and asset identification with the VAMS system, this is ongoing.

Each asset shall have a unique identifying number that will be recorded within Veolia's own Computerized Maintenance Management System (CMMS, known as VAMS).

The system shall have the ability to manage:

- Asset List
- Maintenance Schedule
- Maintenance Scope of work
- Document Management System

11.2 Asset Management Plan

VWS had employed VWA (Veolia Water Australia) to support VWS in preparing the Asset Management under a Project Management Plan. This document details the philosophy and assumptions for maintenance and renewal of the Infrastructure, starting with the PRWP.

11.3 Asset Evaluation and Service

All asset conditions are assessed annually (i.e. 12 months after operation).

VWS shall provide condition reports of major asset types (Vessels, pumps, strainers etc.) inspected during annuals or major repairs, in line with its obligations under the WICA License.

Monthly report (from VWS to LL) includes details on Infrastructure performance and condition.

12 Reporting

12.1 Reporting Requirements

The following reporting is currently and will continue to be provided:

Statutory WICA Reports: All statutory reports as required under the WICA Licence requirements. (such as incidents, non-compliances, insurance changes)

Reporting to IPART will include a schedule of non- compliance events. This will be maintained by VWS and submitted as part of the annual report to IPART, as required. This schedule will include the following immediate reporting compliance requirements:

- Date and duration of non-compliance event,
- Nature and extent of any non-compliance 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

O&M Report On a monthly basis on or before the 10th of each calendar month VWS does and will continue to issue to Lend Lease an “O&M Report” (Monthly Report) VWS and Lend Lease do and shall continue to formally sit down and review following submittal.

The O&M report includes details on:

a. WH&S incidents;
b. Environmental incidents;
c. KPI compliance (as set out in Section 10.7);
d. Operational and maintenance issues;
e. Routine sampling effluent quality and quantity data; and
f. Any other relevant issues.

Status/Condition Report An annual Status/Condition Report is prepared in accordance with the Asset Management Plan, as described above.

12.2 Process for Keeping Records

All records for design and construction and operation and maintenance are maintained on the VWS server in accordance with VWS' records management procedure. Records are maintained for at least 6 years i.e. until December 2023.

13 Sampling and Testing

All Regulatory and License requirements are complied with in terms of frequency, points and compliance requirements. This includes compliance with testing requirements of the Environment Protection Authority (under the Environment Protection License) and IPART.

Currently, the following sampling/analysis regime by an external NATA accredited laboratory is undertaken on a weekly basis to satisfy compliance:
1. Treated water – See Table 8, below.
2. Storage Dam water - Ecoli test - grab sample.
3. Storage Dam water - Total Dissolved Solids (TDS) test - grab sample.

Table 8: Monitoring and Sampling for the Bingara RWTP (by a NATA Accredited laboratory)

Monitoring Stream/Point	Parameter	Compliance Requirement	Number of tests per year
Treated Water	TSS	Mandatory	52
Treated Water	TDS	Mandatory	52
Treated Water	Conductivity	On-Line	Continuous
Treated Water	pH	On-Line	Continuous
Treated Water	Turbidity	On-Line	Continuous
Treated Water	BOD	Mandatory	52
Treated Water	COD	N/A	As Required
Treated Water	Alkalinity as $CaCO_3$	N/A	As Required
Treated Water	Ions (Ca, Mg, Na)	N/A	As Required
Treated Water	Total Kjeldahl Nitrogen (TKN)	N/A	As Required
Treated Water	Ammonium Nitrogen (NH4-N)	N/A	As Required
Treated Water	Nitrate/Nitrite Nitrogen (NOx-N)	N/A	As Required
Treated Water	Total Nitrogen (TN)	Mandatory	52
Treated Water	Total Phosphorus (TP)	Mandatory	52
Treated Water	E coli (grab)	Mandatory	52
Treated Water	Clostridia (grab)	Mandatory	52
Treated Water	Coliphages (grab)	Mandatory	52
Storage Dam water	E. Coli (grab)	Mandatory	52
Storage Dam water	TDS (grab)	Mandatory	52

14 Training

The relevant operation and maintenance policies and procedures for the Bingara Scheme are and will continue to be available at all times at the Bingara Plant Site Personnel are and will continue to be trained in these procedures and training will be kept current as required for ongoing safe operation of the facilities.

14.1 Site Induction

An induction procedure has been developed for the site, and all operators and contractors are inducted onto the site to ensure understanding and compliance of site OHS and Environmental rules and obligations. Reference is also made to the Lend Lease GMR's (Global Minimum Requirements)

A suitable induction process has been developed for any appropriate work during commercial operation of the Bingara RWTP.

All persons working onsite should be aware of:

- The principles of risk management
- Regulatory and legislative requirements
- Their roles and responsibilities
- How their actions can affect water quality, and public and environmental health.
- Lend Lease GMR's

14.2 Staff Training

VWS engages only persons competent and experienced to perform duties prescribed in their employment contract which also sets out their position description, duties, authorities and performance indicators.

Each employee attends a formal annual individual performance appraisal that also identifies their training requirements based on the requirements of their role and career goals.

All new employees are inducted according to the VWS Induction Policy which will provide employees with an understanding, among others, of:

- General environmental duty and obligations under relevant legislation;
- Quality, WH&S and environmental objectives and targets;
- Company policy;
- Applicable legislation;
- WH&S and environmental controls;
- Emergency response;
- Responsibilities
- Levels of authority.

Safety and emergency training is provided to all employees as well as standard Company training e.g. Manual Handling and Respect in the Workplace.

VWS engages only subcontractors that have been fully prequalified technically, contractually and commercially.

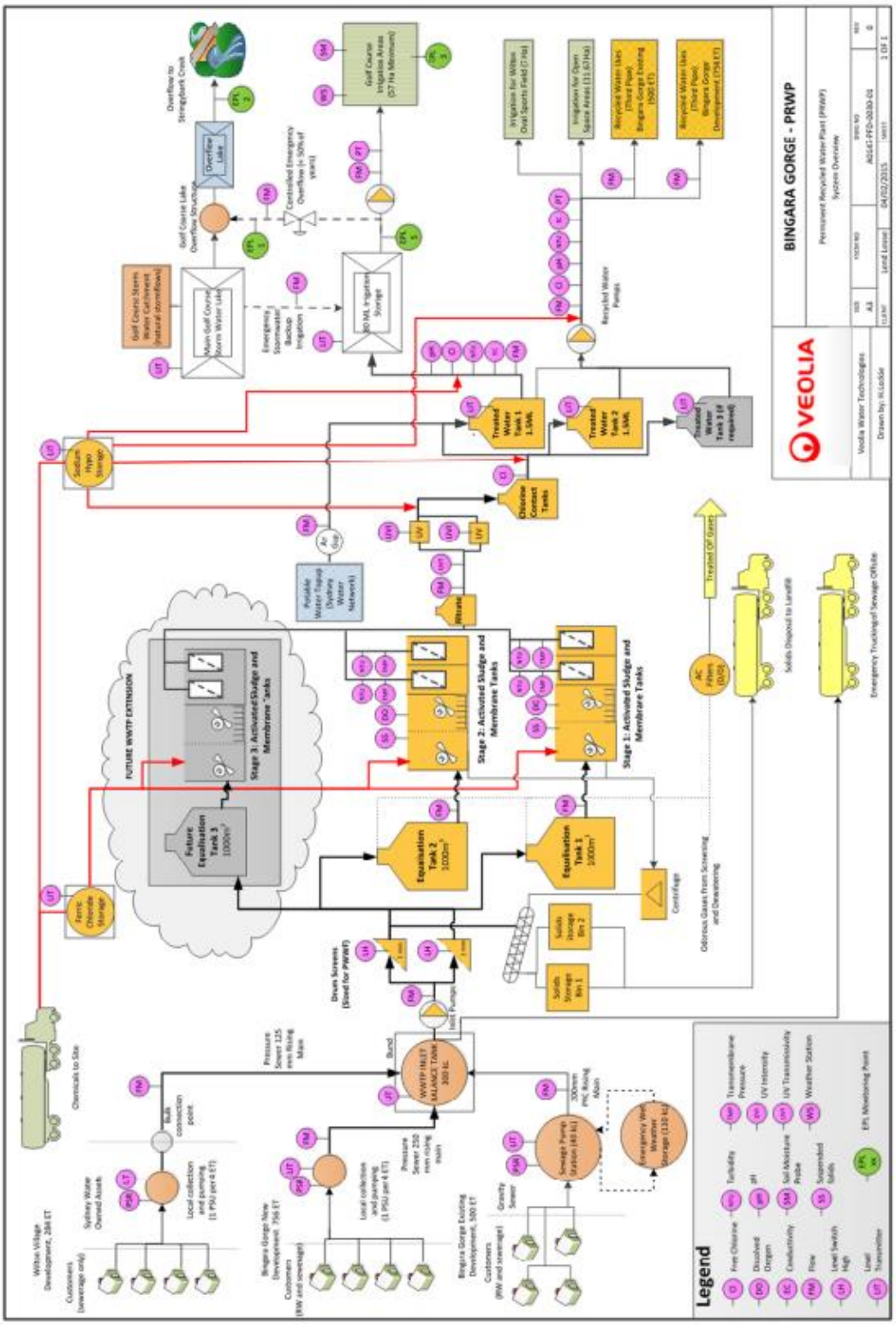
15 Assignment of Responsibilities

The assignment of responsibility to appropriate staff during the operation and maintenance of infrastructure is done with due diligence. VWS ensures that an individual is assigned to each role at all times with appropriate training. However, to avoid inaccuracies in documentation, the individual's names are not provided here. The roles and responsibilities for operation of the Bingara Scheme are outlined in the EPRP.

Assignment of responsibilities and tasks is also aligned with the sites training and competency matrix to ensure tasks allocated are within skill sets of employees, this also assists in identification of future training needs.

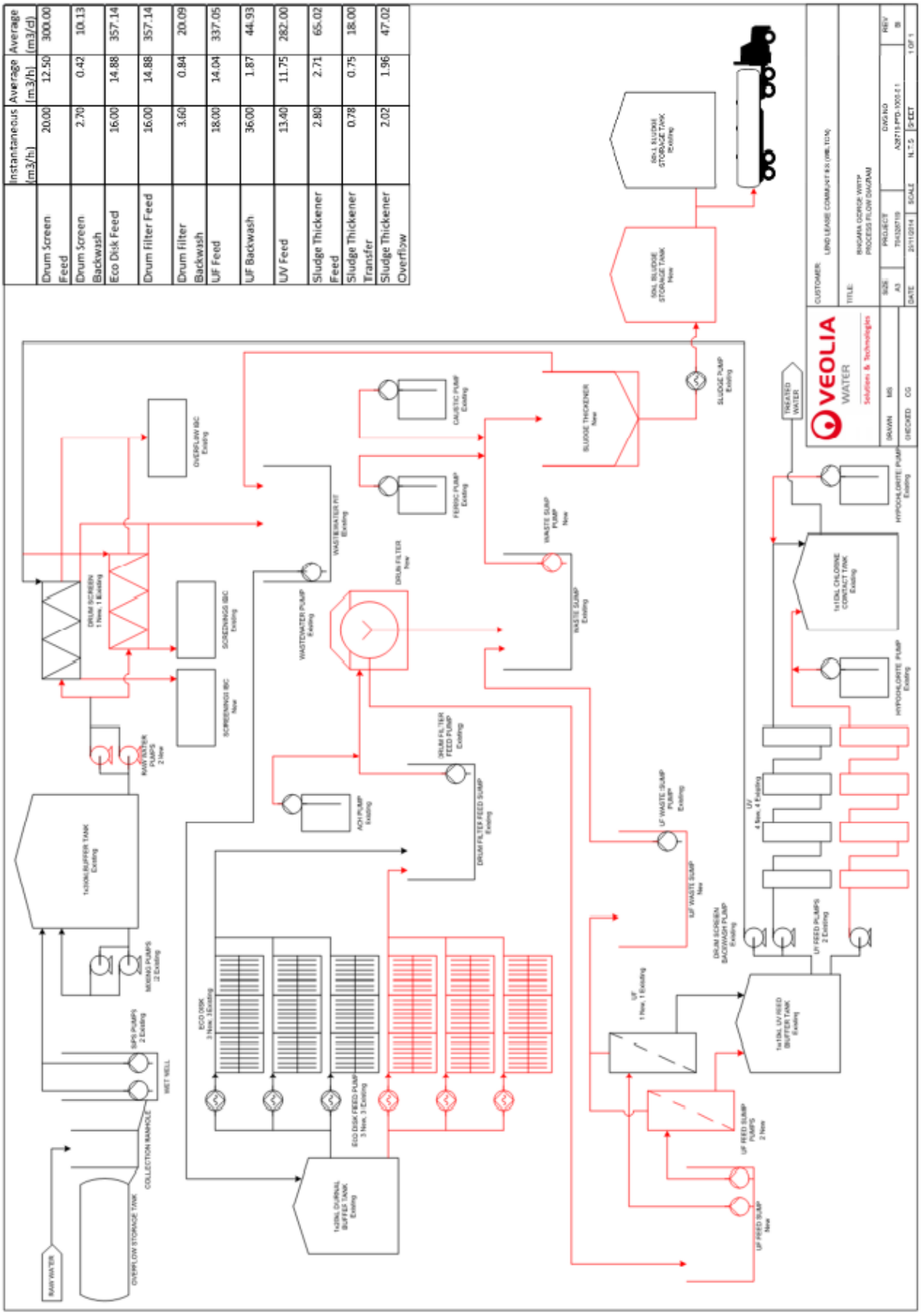
16 Appendices

16.1 Appendix A: Overall System PFD and EPL Monitoring Points

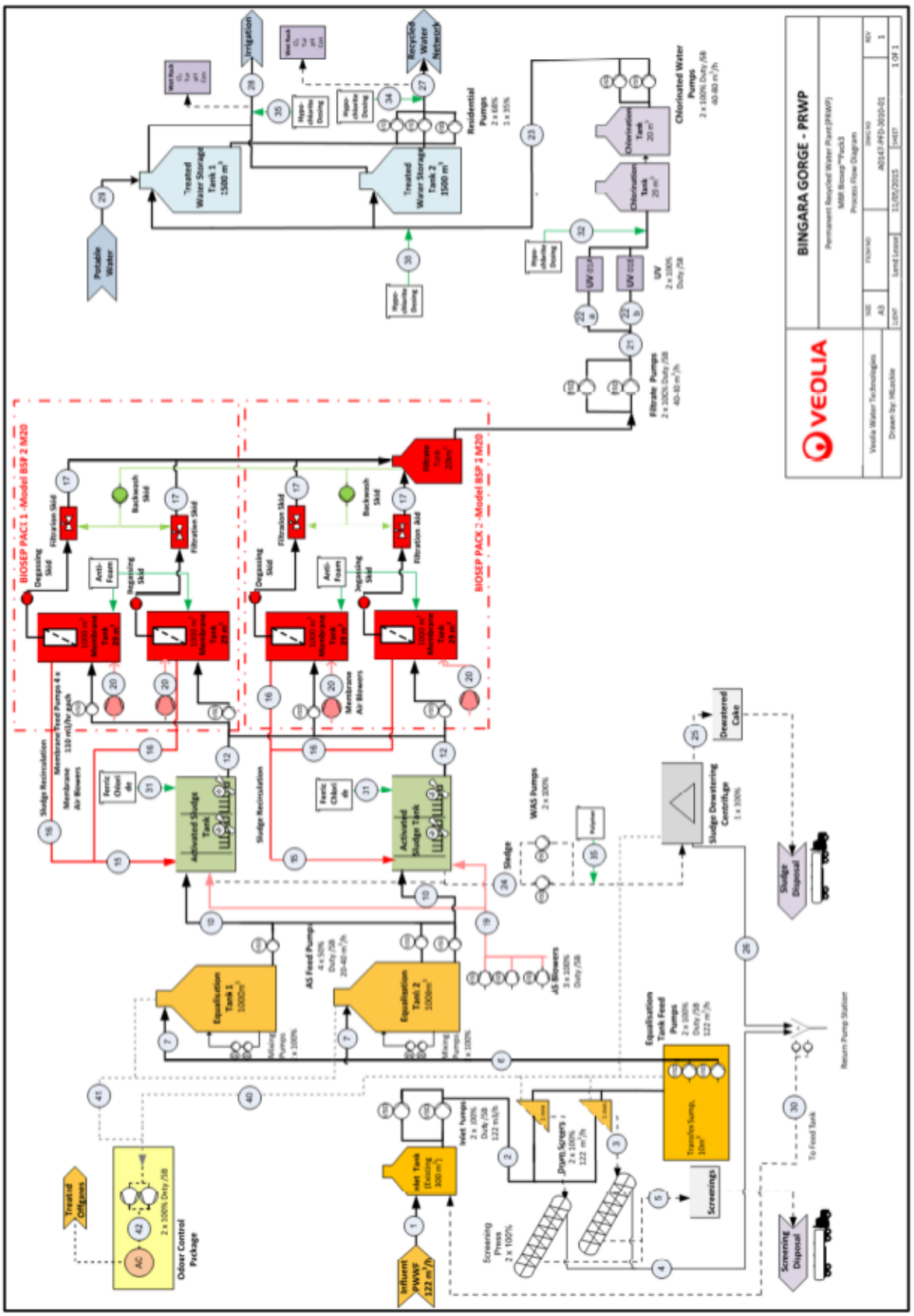


16.2 Appendix B: PFD Bingara TRWP (Temporary Plant)

	Instantaneous (m3/h)	Average (m3/h)	Average (m3/d)
Drum Screen Feed	20.00	12.50	300.00
Drum Screen Backwash	2.70	0.42	10.13
Eco Disk Feed	16.00	14.88	357.14
Drum Filter Feed	16.00	14.88	357.14
Drum filter Backwash	3.60	0.84	20.09
UF Feed	18.00	14.04	337.05
UF Backwash	36.00	1.87	44.93
UV Feed	13.40	11.75	282.00
Sludge Thickener Feed	2.80	2.71	65.02
Sludge Thickener Transfer	0.78	0.75	18.00
Sludge Thickener Overflow	2.02	1.96	47.02



16.3 Appendix C: PFD Bingara PRWP / Mass Balance (PRWP)



VEOLIA

Veolia Water Technologies (Australia) Pty Ltd - NSW

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Issue

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Chemicals

Odorous Gases